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

UNDERGRADUATE DEGREE PROGRAMME

B.Sc. Computer Science
Three Years
/
B.Sc. (Hons) Computer Science
Four Years

CURRICULUM & SYLLABUS

REGULATIONS 2026

Effective from the Academic Year
2026-2027

Department of Computer Science and Information Technology
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.



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DEPARTMENT OF COMPUTER SCIENCE AND INFORMATION TECHNOLOGY

VISION OF THE DEPARTMENT
To impart strong foundational knowledge in Computer Science, foster innovation, and equip students with skills in emerging technologies and thrust areas.

MISSION OF THE DEPARTMENT	
M1	To impart Computer Science education through effective teaching–learning practices supported by state-of-the-art facilities.
M2	To promote research, projects, innovation, and consultancy activities that contribute to the growth of IT and IT-enabled services.
M3	To prepare students for successful careers in the IT industry by developing technical expertise, problem-solving abilities, and industry readiness.
M4	To nurture communication skills, leadership qualities, teamwork, and ethical values among students for societal development and nation building.

PROGRAMME EDUCATIONAL OBJECTIVES(PEO)	
PEO1	Graduates will demonstrate knowledge of Computer Science, programming, software development, and emerging technologies to analyze complex problems and design effective computing solutions.
PEO2	Graduates will pursue successful careers in the IT industry, higher education, research, and entrepreneurship through technical competence, industry-relevant knowledge, and continuous professional development.
PEO3	Graduates will demonstrate innovation, critical thinking, and adaptability by embracing emerging technologies and engaging in lifelong learning to meet evolving industry demands
PEO4	Graduates will exhibit professional ethics, effective communication, leadership, and teamwork while contributing responsibly to society and the computing profession

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 computing problems and identify the requirements needed to develop appropriate solutions. .
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	Develop strong programming and full-stack development skills along with proficiency in cloud tools, DevOps practices, and service models to build and maintain modern scalable applications.
PSO2	Acquire knowledge and skills in data analytics, machine learning, IoT, and cyber technologies to develop intelligent solutions and support data-driven decision-making in real-world applications.

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 STURUCTURE

B.Sc. Computer Science Three Years / BSc. (Hons) Computer Science Four Years

Total number of Credits: 176

	B.Sc. Computer Science (Hons) Minimum Credits to be earned :176 B.Sc. Computer 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		Object Oriented Programming Languages	3	0	0	3	3	40	60	100
PCC		Microprocessor and Digital Logic Fundamentals	4	0	0	4	4	40	60	100
MDC		Mathematics-I	2	1	0	3	3	40	60	100
PEC		Introduction to Cyber Security	3	0	0	3	3	40	60	100
		Fundamentals of Robotics						40	60	100
PCC (Lab)		Object Oriented Programming Languages Lab	0	0	2	2	1	40	60	100
VAC		Universal Human Values	1	0	0	1	1	40	60	100
SEC		Orientation Programme / Industrial Visit	-	-	-	-	-	-	-	-
			19	1	2	22	21	-	-	-

CIA - Continuous Internal Assessment SEE - Semester End Examination

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

SEMESTER 2										
			Hours/Week					Maximum Marks		
Category	Code	Course	L	T	P	SL	C	CIA	SEE	Total
AEC		Tamil-II / Hindi-II / French-II	3	0	0	3	3	40	60	100
AEC		English-II	3	0	0	3	3	40	60	100
PCC		Web Development using PHP& MYSQL	3	0	0	3	3	40	60	100
PCC		Database Management System	3	0	0	3	3	40	60	100
MDC		Mathematics-II	2	1	0	3	3	40	60	100
PEC		Data Structures and Algorithms	3	0	0	3	3	40	60	100
		Embedded System								
PCC (Lab)		Web Development using PHP & MYSQL Lab	0	0	2	2	1	40	60	100
PCC (Lab)		RDBMS Lab	0	0	2	2	1	40	60	100
AEC		Communication Skills	0	0	4	2	2	-	100	100
			17	1	8	24	22	-	-	-

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SEMESTER 3										
			Hours/Week					Maximum Marks		
Category	Code	Course	L	T	P	SL	C	CIA	SEE	Total
VAC		Environmental Studies	3	0	0	3	3	40	60	100
PCC		Python for Data Science	4	0	0	4	4	40	60	100
PCC		Principles of Data Science	3	0	0	3	3	40	60	100
PEC		Modern Operating System	3	0	0	3	3	40	60	100
		Responsible & Safe AI Systems						40	60	100
PCC (Lab)		Python for Data Science Lab	0	0	2	2	1	40	60	100
PCC (Lab)		Data Visualization Lab	0	0	2	2	1	40	60	100
VAC		Indian Knowledge System	2	0	0	2	2	40	60	100
VAC		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	1	-	-	100
			19	-	6	25	23	-	-	-

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SEMESTER 4										
			Hours/Week					Maximum Marks		
Category	Code	Course	L	T	P	SL	C	CIA	SEE	Total
MDC		Statistics-IV	2	1	0	3	3	40	60	100
PCC		Advanced Java Programming	4	0	0	4	4	40	60	100
PCC		Computer Graphics and Multimedia	3	0	0	3	3	40	60	100
PEC		Cyber Law	4	0	0	4	4	40	60	100
		Neural Networks								
PCC (Lab)		Advanced Java Programming Lab	0	0	2	2	1	40	60	100
PCC (Lab)		Computer Graphics and Multimedia Lab	0	0	2	2	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 / National Service Scheme/Disaster Management	0	0	2	2	2	-	100	100
SEC		In-plant Training/ Industrial Tour/ Summer Term	-	-	-	-	-	-	-	-
			16	1	8	24	22	-	-	-

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SEMESTER 5										
			Hours/Week					Maximum Marks		
Category	Code	Course	L	T	P	SL	C	CIA	SEE	Total
PCC		Web Development using MEAN Stack	3	0	0	3	3	40	60	100
PCC		Data Communication and Networking	4	0	0	4	4	40	60	100
PCC		Programming with Generative AI	3	0	0	3	3	40	60	100
PEC		Foundation of Artificial Intelligence	4	0	0	4	4	40	60	100
		Natural Language Processing						40	60	100
PCC (Lab)		Web Development using MEAN Stack Lab	0	0	2	2	1	40	60	100
PCC (Lab)		Generative AI Lab	0	0	2	2	1	40	60	100
SEC		Professional Development – III	2	0	0	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	23	21	-	-	-

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SEMESTER 6										
			Hours/Week			Maximum Marks				
Category	Code	Course	L	T	P	SL	C	CIA	SEE	Total
PCC		Theory of Computation	4	0	0	4	4	40	60	100
PCC		Full Stack Development	3	0	0	3	3	40	60	100
PCC		Design Thinking for Data-Driven App Development	4	0	0	4	4	40	60	100
PCC		IOT Fundamentals	4	0	0	4	4	40	60	100
PEC		Software Testing	4	0	0	4	4	40	60	100
		Games & Information						40	60	100
PCC (Lab)		Full Stack Development	0	0	2	2	1	40	60	100
PRD		Mini Project	2	0	0	2	2	-	100	100
SEC		On Job Training / Apprenticeship / Startup	0	0	1	1	1	-	100	100
			21	-	3	24	23	-	-	-

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SEMESTER 7										
			Hours/Week					Maximum Marks		
Category	Code	Course	L	T	P	SL	C	CIA	SEE	Total
PCC		Machine Learning Essentials	3	0	0	3	3	40	60	100
PCC		Image Processing	4	0	0	4	4	40	60	100
PCC		Business Intelligence & Analytics	4	0	0	4	4	40	60	100
PEC		Cryptography and its Applications	4	0	0	4	4	40	60	100
		UI/UX Design Fundamentals and Applications						40	60	100
PCC (Lab)		Machine Learning Lab	0	0	2	2	1	40	60	100
PRD		Research Project-I	0	0	12	6	6	40	60	100
			15	-	14	23	22	-	-	-

CIA - Continuous Internal Assessment SEE - Semester End Examination

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

SEMESTER 8										
			Maximum Marks					Maximum Marks		
Category	Code	Course	L	T	P	SL	C	CIA	SEE	Total
PCC		Big Data Analytics	3	0	0	3	3	40	60	100
PCC		Mobile computing	3	0	0	3	3	40	60	100
PCC		Research Methodology	4	0	0	4	4	40	60	100
PEC		Block Chain Technology	4	0	0	4	4	40	60	100
		Foundations of AR &VR						40	60	100
PCC (Lab)		Big Data Analytics Lab	0	0	2	2	1	40	60	100
PCC (Lab)		Android Studio Lab	0	0	2	2	1	40	60	100
PRD		Research Project-II	0	0	12	6	6	-	60	100
			14	-	16	24	22	-	-	-

CIA - Continuous Internal Assessment SEE - Semester End Examination

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

PROGRAMME CORE COURSES

Category	Code	Course	L	T	P	SL	C
PCC		Object Oriented Programming Languages	3	0	0	3	3
PCC		Microprocessor and Digital Logic Fundamentals	4	0	0	4	4
PCC (Lab)		Object Oriented Programming Languages Lab	0	0	2	2	1
PCC		Web Development using PHP & MYSQL	3	0	0	3	3
PCC		Database Management System	3	0	0	3	3
PCC (Lab)		Web Development using PHP & MYSQL Lab	0	0	2	2	1
PCC (Lab)		RDBMS Lab	0	0	2	2	1
PCC		Python for	3	0	0	3	3

		Data Science					
PCC		Principles of Data Science	3	0	0	3	3
PCC (Lab)		Python for Data Science Lab	0	0	2	2	1
PCC (Lab)		Data Visualization Lab	0	0	2	2	1
PCC		Advanced Java Programming	3	0	0	3	3
PCC		Computer Graphics and Multimedia	3	0	0	3	3
PCC (Lab)		Advanced Java Programming Lab	0	0	2	2	1
PCC (Lab)		Computer Graphics and Multimedia Lab	0	0	2	2	1
PCC		Web Development using MEAN Stack	3	0	0	3	3
PCC		Data Communication and Networking	4	0	0	4	4
PCC		Programming with Generative AI	3	0	0	3	3
PCC (Lab)		Web Development using MEAN Stack Lab	0	0	2	2	1
PCC (Lab)		Programming with Generative AI Lab	0	0	2	2	1
PCC		Theory of Computation	4	0	0	4	4
PCC		Full Stack Development	3	0	0	3	3
PCC		Design Thinking for Data-Driven App Development	4	0	0	4	4
PCC		IOT Fundamentals	4	0	0	4	4
PCC (Lab)		Full Stack Development Lab	0	0	2	2	1
PCC		Machine Learning Essentials	3	0	0	3	3
PCC		Image Processing	4	0	0	4	4
PCC		Business Intelligence & Analysis	4	0	0	4	4
PCC (Lab)		Machine Learning Lab	0	0	2	2	1
PCC		Big Data Analytics	3	0	0	3	3

PCC		Mobile computing	3	0	0	3	3
PCC		Research Methodology	4	0	0	4	4
PCC (Lab)		Big Data Analytics Lab	0	0	2	2	1
PCC (Lab)		Android Studio Lab	0	0	2	2	1

PROFESSIONAL ELECTIVE COURSES

Category	Code	Course	L	T	P	SL	C
PEC		Introduction to Cyber Security	3	0	0	3	3
		Fundamentals of Robotics	3	0	0	3	3
PEC		Data Structures and Algorithms	3	0	0	3	3
		Embedded System Design	3	0	0	3	3
PEC		Responsible & Safe AI Systems	3	0	0	3	3
		Data Visualization	3	0	0	3	3
PEC		Cyber Law	4	0	0	4	4
		Neural Networks	4	0	0	4	4
PEC		Foundation of Artificial Intelligence	4	0	0	4	4
		Natural Language Processing	4	0	0	4	4
PEC		Software Testing	4	0	0	4	4
		Games & Information	4	0	0	4	4
PEC		Cryptography and its Applications	4	0	0	4	4
		UI/UX Design Fundamentals and Applications	4	0	0	4	4
PEC		Block Chain Technology	4	0	0	4	4
		Foundations of AR &VR	4	0	0	4	4

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/Disaster Management	0	0	2	2	2
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	1	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

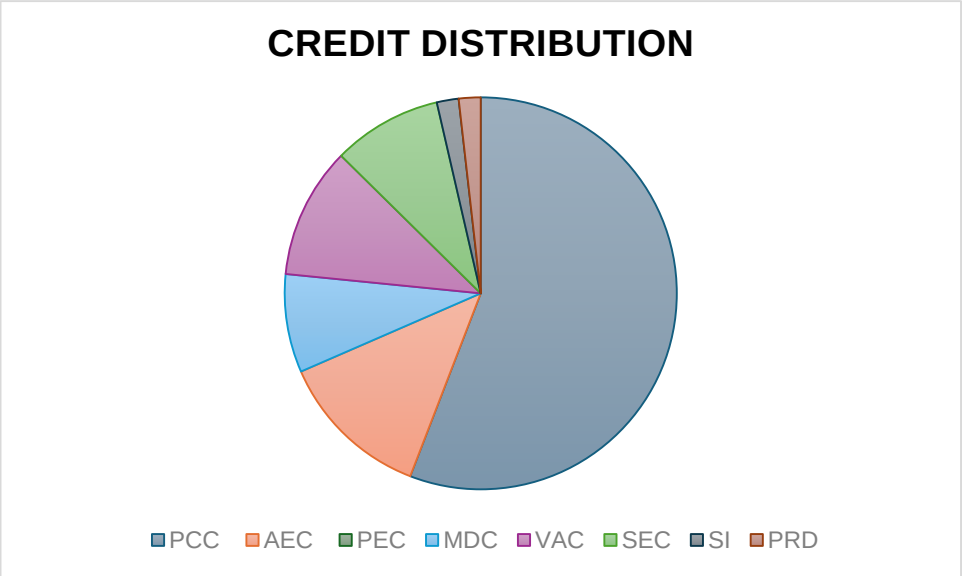
B.Sc. (Hons) Computer Science / 4 Years

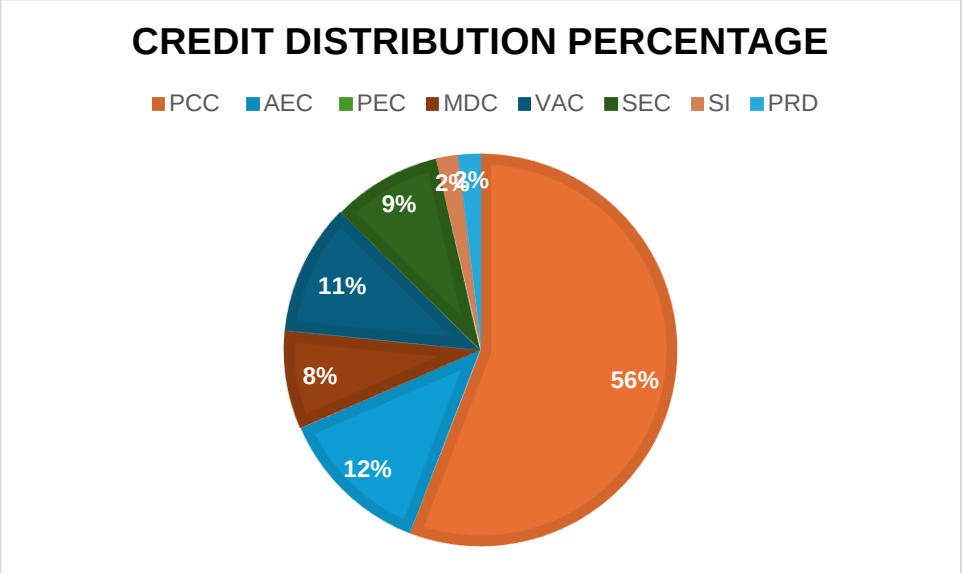
Minimum credits to be earned: 176

B.Sc. Computer Science / 3 Years

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 Yr 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
PCC
AEC
PEC
MDC
VAC
SEC
SI
PRD


CREDIT DISTRIBUTION PERCENTAGE
PCC
AEC
PEC
MDC
VAC
SEC
SI
PRD
56%
12%
8%
11%
9%
2%
2%

SEMESTER I

26LTAM11	TAMIL-I	L	T	P	SL	C
		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

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		

மொத்தம்; 45 மணிநேரம்
சுய கற்றல்: 45 மணிநேரம்

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	Appreciate and interpret the aesthetic values and literary excellence embedded in Sangam literature.	K2
CO2	Analyze and apply the ethical and moral principles presented in classical Tamil literature to contemporary life situations.	K3
CO3	Examine the evolution, social relevance, and narrative techniques of Tamil prose, short stories, and related literary forms.	K4
CO4	Evaluate proficiency in Tamil language skills including listening, speaking, reading, and writing.	K5
CO5	Identify the historical development of the Tamil language and the formation of technical terminology in Tamil.	K1

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	-	-

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26LHIN11	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		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.

UNIT II		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		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		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		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 Links:

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	-	-

26LFRE11	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	–	–	–	–	-	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**	-	-

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:

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

Reference Books:

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

Websites:

- British Council. *LearnEnglish*. British Council, https://learnenglish.britishcouncil.org.
- Duolingo. *Duolingo*. Duolingo Inc., https://www.duolingo.com.

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	-	-

26CBCS11	OBJECT ORIENTED PROGRAMMING	L	T	P	SL	C

	LANGUAGES	3	0	0	3	3

COURSE OBJECTIVES

The course provides insight knowledge about object-oriented programming concepts and programming language in C++ and JAVA.

UNIT I	Object oriented programming and basics of C++	9 Hours

Principles of Object-Oriented Programming – Beginning with C++ - Applications of C++ - Tokens –Keywords- Expressions – Data Types – Storage Classes – Operators –Manipulators- Typecast Operator – Arrays –Strings-Control Structures – Operator Overloading -Functions in C++ - Function Prototyping – Call by Reference – Inline Functions –Recursion – Function Overloading – Friend and Virtual Function.

UNIT II	Classes and objects and operator overloading	9 Hours

Introduction – Classes and Objects – Constructors –Parameterized Constructors – Copy Constructor – Dynamic Constructors – Destructors – Introduction to Operator Overloading – Overloading Unary Operator – Overloading Binary Operator – Type Conversions.

UNIT III	Inheritance and polymorphism	9 Hours

Introduction- Defining Derived Classes - Inheritance – Types of Inheritance – Abstract Classes - Introduction to Virtual Functions - Pure Virtual Function-Polymorphism – Exception Handling.

UNIT IV	Java introduction, arrays and strings	9 Hours

Java Evolution - Overview of Java Language – Constants – Variables – Data Types – Operators and Expressions – Class, Objects and Methods – Arrays, Strings and Vectors

UNIT V	Packages and multithreading	9 Hours

Introduction – Java API Packages – Creating Packages – Accessing a Package – Adding a Class to a package – Multithreading – Creating Threads - Life Cycle of a Thread – Thread Exceptions – Inter-Thread Communication.

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 basic concepts of object-oriented programming, C++ fundamentals, tokens, data types, operators, functions, and control structures.	K2
CO2	Explain classes, objects, constructors, destructors, and operator overloading in C++.	K2
CO3	Apply inheritance, polymorphism, virtual functions, and exception handling in C++ programming.	K3
CO4	Analyze Java programming concepts including data types, operators, classes, objects, arrays, strings, and vectors.	K4
CO5	Evaluate Java packages, multithreading concepts, thread lifecycle, and inter-thread communication.	K5

COURSE ARTICULATION MATRIX

COs / POs-PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	2	2	-	-	-	-	3	-	2	-
CO2	3	3	-	-	-	-	-	-	3	-
CO3	-	2	3	-	-	-	3	-	3	-
CO4	2	-	-	3	-	-	2	-	-	-
CO5	-	3	3	3	2	-	3	-	-	3
Avg	2.3	2.5	3.0	3.0	2.8	-	2.8	-	2.8	3.0

Text Books:

1) Balaguruswamy E. (2023). Programming with JAVA: A Primer. 7th edition. India: McGraw Hill Education

2) Schildt, H. (2022). Java: The Complete Reference. 12th edition. McGraw-Hill Education.

Reference Books:

1. Arunesh Goyal, The Essentials of JAVA, Khanna Book Publishing Company Private Limited, 2012.

2. Tanweer Alam, Core JAVA, Khanna Book Publishing Company Private Limited, 2015.

3. Y. Daniel Liang, Introduction to Java Programming, 7th Edition, Pearson, 2008.

4. S. Malhotra and S. Choudhary, Programming in Java, 2nd Edition, Oxford University Press,

Web links:

1.https://www.geeksforgeeks.org/introduction-of-object-oriented-programming/

2.https://www.educative.io/blog/object-oriented-programming

NPTEL Link:

https://onlinecourses.nptel.ac.in/e-learning/preview/noc25_cs34

26CBCS12	MICROPROCESSOR AND DIGITAL LOGIC	L	T	P	SL	C

	FUNDAMENTALS	4	0	0	4	4

COURSE OBJECTIVES:

This course aims to provide an understanding of the architecture and operation of the 8085 microprocessor and its interfacing techniques. It develops basic assembly language programming skills along with knowledge of number systems, digital codes, and logic gates.

UNIT I	INTRODUCTION TO MICROPROCESSOR	12 Hours

Microprocessor architecture and its operations, Memory, Input & output devices, The 8085 MPU-architecture, Pins and signals, Timing Diagrams, Logic devices for interfacing, Memory interfacing, Interfacing output displays, Interfacing input devices, Memory mapped I/O.

UNIT II	BASIC PROGRAMMING CONCEPTS	12 Hours

Flow chart symbols, Data Transfer operations, Arithmetic 0perations, Logic Operations, Branch operation, Writing assembly language programs, Programming techniques: looping, counting and indexing. Additional data transfer and 16 bit arithmetic instruction,Logic operation: rotate,compare, counter and time delays, 8085 Interrupts.

UNIT III	NUMBER SYSTEM AND CODES	12 Hours

Binary-why it is so important in computers? – Conversions: binary to decimal – decimal to binary – octal – Hexa decimal – ASCII code –Excess-3 Code – Gray Code –Gates: OR gates – AND gates – Boolean Algebra – NOR gates – NAND gates.

UNIT IV	COMBINATIONAL LOGIC CIRCUIT	12 Hours

Boolean Law and theorems –sum of product method – K-Map truth tables – Pairs, Quads, Octets – K-Map simplifications – Don't care – product of sum method – product of sum simplifications- Multiplexers –Demultiplexers – Decoders – Encoders – Code Converters – Parity Generators & Checkers – PAL – PLA.

UNIT V	SEQUENTIAL LOGIC CIRCUITS II	12 Hours

Sequential Logic: RS, JK, D and T Flip-Flops – Edge-Triggered – Master – Slave Flip- Flops. Registers: Shift Registers – Types of Shift Registers-Types of ROMs - Types of RAMs -Counters: Asynchronous Counters- Ripple – Synchronous Counters – Shift Counters.

Total: 60 Hours

Self Learning : 60 Hours

COURSE OUTCOMES:

COURSE OUTCOMES	DESCRIPTION	KNOWLEDGE LEVEL
CO1	Identify the architecture and operation of 8085 microprocessor and its interfacing techniques.	K1
CO2	Apply assembly language programming concepts including data transfer, arithmetic, logic, looping, counting, indexing, and branching operations.	K3
CO3	Explain number systems, digital codes, and basic logic gates used in digital systems.	K2
CO4	Analyze combinational logic circuits using Boolean algebra, K-maps, and digital components like multiplexers, decoders, encoders, and code converters.	K4
CO5	Evaluate sequential logic circuits including flip-flops, registers, counters, and memory elements.	K5

COURSE ARTICULATION MATRIX

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	-	2	-	-	-	-	-	-	-	-
CO2	-	-	3	-	-	-	-	-	-	2
CO3	3	-	-	2	-	-	2	-	3	-
CO4	3	-	2	-	3	-	3	-	-	3
CO5	2	2	2	-	2	-	3	-	2	3
Avg	2.6	2.8	2.3	2.0	2.5	-	2.6	-	2.5	2.6

Text Books:

1. Ramesh Gaonkar, “Microprocessor Architecture, Programming and Applications with the 8085”, 6th Edition, Penram International Publication (India) Pvt. Ltd.,2013
2. D.P. Leach & A.P. Malvino (2002), Digital Principles and Application, THM Fifth Edition

Reference Books:

1. Shah Satish, “8051 Microcontrollers MCS 51 Family and its variants”, OxfoPPRD,2010
2. M.M. Mano (2001), Digital Logic and Computer Design, PHI
3. T.C. Bartee (1991), Digital Computer Fundamentals, 6th Edition, Tata McGraw Hill.
4. Donald D.Givone (2004), Digital Principles and Design – Tata McGraw – Hill Publishing Company Limited .

Web Links:

1. https://www.geeksforgeeks.org/electronics-engineering/introduction-of-microprocessor/
2. www.tutorialspoint.com/computer_logical_organization

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, Cardinality of Set, Simple Applications.

UNIT III	RELATIONS & FUNCTIONS	9 Hours

Relations: Properties of Relations, Equivalence Relation. **Functions:** Partial Order 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

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

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	PSO1	PSO2
CO1	2	-	-	–	-	-	-	–	-	-
CO2	-	-	2	–	-	-	-	–	-	-
CO3	-	3	-	–	2	-	-	-	2	2
CO4	-	2	-	–	2	-	-	-	2	2
CO5	3	3	3	2	3	-	-	-	3	3
Avg	**2.5**	**2.6**	**2.5**	**2.0**	**2.4**	**-**	**-**	**-**	**2.4**	**2.3**

26PBCS11	OBJECT ORIENTED PROGRAMMING LANGUAGES LAB	L	T	P	SL	C
		0	0	2	2	1

COURSE OBJECTIVES:

The purpose of this course is to introduce to students to the field of programming using C++ and Java. Be able to use the Java SDK environment to create, debug and run simple Java programs.

List of Programs:

1. Design C++ classes with static members, methods with default arguments.
2. Implement complex number class with necessary operator overloading using C++.
3. C++ program to illustrate concept of Virtual Functions
4. Implement Multiple Inheritance using C++
5. Program to Demonstrate Operator Overloading using C++
6. Programs illustrating various data types in java.
7. Programs to implement method overloading in java.
8. Programs illustrating the implementation of various forms of inheritance (single, hierarchical, multilevel).
9. Programs to implement polymorphism and method overriding in java.
10. Programs implementing exception handling.
11. Programs to illustrate interfaces in java.

Total: 15 Hours

Self-Learning: 30 Hours

COURSE OUTCOMES

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

COURSE OUTCOMES	DESCRIPTION	KNOWLEDGE LEVEL
CO1	Apply basic concepts of C++ and Java including classes, objects, data types, methods, and static members.	K3
CO2	Apply operator overloading and function overloading concepts in C++ and Java programs.	K3
CO3	Analyze object-oriented programming concepts such as inheritance and polymorphism in C++ and Java.	K4
CO4	Create advanced OOP concepts including virtual functions, method overriding, and interfaces.	K4
CO5	Evaluate exception handling and package creation in Java for real-world programming problems.	K5

COURSE ARTICULATION MATRIX

COs / POs-PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	2	2	-	-	-	-	3	-	2	-
CO2	3	3	-	-	-	-	-	-	3	-
CO3	-	2	3	-	-	-	3	-	3	-
CO4	2	-	-	3	-	-	-	-	-	-
CO5	-	3	3	3	2	-	3	-	-	3
Avg	2.3	2.5	3.0	3.0	2.8	-	3.0	-	2.8	3.0

Text books:

1. Herbert Schildt, *Java: The Complete Reference*, **11th Edition**, McGraw Hill Education, 2018.
2. Bjarne Stroustrup, *The C++ Programming Language*, **4th Edition**, Addison-Wesley, 2013.

Reference Books:

1. E. Balagurusamy, Object-Oriented Programming with C++, 7th Edition, McGraw Hill Education, 2020.
2. Deitel & Deitel, C++ How to Program, 10th Edition, Pearson Education, 2017.
3. Abraham Silberschatz, Henry F. Korth, S. Sudarshan, Database System Concepts, 7th Edition, McGraw Hill, 2019.

Web links:

1. https://www.geeksforgeeks.org
2. https://www.tutorialspoint.com
3. https://www.w3schools.com

NPTEL Link:

https://onlinecourses.nptel.ac.in/e-learning/preview/noc25_cs34

26DVAC11	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

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. A. N. Tripathi (2004), Human Values. First Edition. New Age International Publishers, New Delhi.

NPTEL Link:

https://nptel.ac.in/courses/109104068

COURSE OUTCOMES

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

COURSE OUTCOMES	DESCRIPTION	KNOWLEDGE LEVEL
CO1	Identify the basics of value education, skill education, and the concept of happiness and prosperity in life.	K1
CO2	Explain harmony at multiple levels including self, family, society, nature, and co-existence.	K2
CO3	Apply right understanding in ethical human conduct and value-based living in daily life.	K3
CO4	Analyze human relationships, societal harmony, and interconnectedness in nature and existence.	K4
CO5	Evaluate ethical practices, professional values, and strategies for value-based life and profession.	K5

COURSE ARTICULATION MATRIX

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

SEMESTER II

26LTAM21	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
6.பாடநூல் தேடலுக்கான இணையம்
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	Describe the civilization, cultural heritage, and traditional practices of the Tamil people through literary and historical perspectives.	K2
CO2	Evaluate the structural richness, themes, and ideological significance of Tamil epics and Bhakti literature.	K5
CO3	Create Tamil poetic compositions using appropriate literary and aesthetic techniques.	K6
CO4	Apply practical knowledge and procedural skills in Tamil computing and digital applications.	K3
CO5	Develop language competence and analytical abilities required for Tamil proficiency and competitive examinations.	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**	**-**	**-**

26LHIN21	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		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		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		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		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		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
5. Sursagar, Surdas, Lokbharti Prakashan
6. Vinay Patrika, Tulsidas, Gita Press, Gorakhpur
7. Kambaramayan, Bhuvan Vani Trust, Lucknow
8. Him Tarangini, Makhanlal Chaturvedi, Bharati Bhandar
9. Anuvaad Vigyan, Dr. Bholanath Tiwari, Kitab Mahal
10. Gyanendra Pati Ki Kavitaayein,Gyanendra Pati, Rajkamal Prakashan
11. Prayojanmoolak Hindi, Dr. Kailash Chandra Bhatia, Vani Prakashan
12. 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.	K5

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	-	-

26LFRE21	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'accord 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 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	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

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**	-	-

26LENG21	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:

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

Reference Books

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

Web Links

- *British Council LearnEnglish*. British Council, https://learnenglish.britishcouncil.org/.
- *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**	**-**	**-**

26LENG21	WEB DEVELOPMENT USING PHP & MYSQL	L	T	P	SL	C
		3	0	0	3	3

COURSE OBJECTIVES:

To demonstrate different open source technology like Linux, PHP & MySQL with different packages. To lustrate Linux commands for programming. To explore programs of PHP with MySQL connection.

UNIT I	INTRODUCTION TO OPEN SOURCE	9 hours

Open Source Definition, The distribution terms of open source software, open source technology importance Free and open Source Software (FOSS), LAMP (Linux, Apache, MySQL, PHP, Python, and Perl) Benefits, Perspective of Open Source software Linux and Open Source, basic commands of Linux. Introduction to PHP – what does PHP Do? – a brief history of PHP – language basics – lexical structure – data types – variables – expressions and operators – flow control statements – including code – embedding PHP in web pages.

UNIT II	FUNCTIONS & STRINGS	9 hours

Functions & Strings: Calling a function – defining a function – variable scope – function parameters – return values – variable functions anonymous function. Strings: Accessing individual characters – cleaning strings – encoding and escaping – comparing strings – manipulating and searching strings – regular expression.

UNIT III	ARRAYS & OBJECTS	9 hours

Arrays and Objects : Indexed Vs associative arrays – identifying elements of an array – storing data in arrays – multidimensional arrays – extracting multiple values – converting between arrays and variables – traversing arrays – sorting. Objects: Creating an object – accessing properties and methods – declaring a class – introspection.

UNIT IV	MYSQL AN OVERVIEW	9 hours

Introduction – Entering queries – Creating and using a database – Creating and selecting a database – creating a table – loading data into a table – Retrieving information from a table – selecting all data – selecting particular rows – selecting particular columns – sorting rows – date calculations – working with NULL values – pattern matching – counting rows – using more than one tables

UNIT V	WORKING WITH MYSQL ADMIN	9 hours

Working with PHP Myadmin - Getting Information about Databases and Tables -Examples of Common Queries - Create student information and Emplyee database.

Total: 45 Hours

Self Learning: 45 Hours

Text Books:

1. Red Hat Linux Bible by Christopher Negus (2010). Wiley Publishing ISBN: 0-7645-4333-4,
2. Open Source Software: The Secret to Effective Digital Transformation by O'Reilly Media (2024),

Reference Books

1. Lee Babin, Nathan A. Good, Fran4k M. Kromann, Jon Stephens (2005), "PHP 5 Recipes, A problem solution approach", après Special edition.

2.The Complete Reference PHP by Steven Holzner MCGrawHill, Indian edition, First Edition

Web links

1. https://www.tutorialspoint.com//cakephp/cakephp_form_handling.htm
2. http://www.php.net/tut.php

NPTEL links

https://onlinecourses.swayam2.ac.in/e-learning/preview/aic20_sp32

COURSE OUTCOMES

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

COURSE OUTCOMES	DESCRIPTION	KNOWLEDGE LEVEL
CO1	To explore different open source technologies like Linux, PHP, and MySQL with different packages.	K1
CO2	To understand the various string functions in PHP.	K2
CO3	To apply the concepts of arrays in PHP programming.	K3
CO4	To analyze the concepts of database connectivity and MySQL operations using PHP.	K4
CO5	To develop web applications using PHP and MySQL effectively.	K6

COURSE ARTICULATION MATRIX

COs / POs-PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	3	2	-	-	-	-	3	-	2	-
CO2	-	-	-	-	-	-	-	-	-	2
CO3	2	2	3	-	-	-	-	-	3	2
CO4	2	-	-	3	2	-	2	-	2	-
CO5	-	2	3	3	3	-	3	-	-	3
Avg	2.3	2.0	3.0	3.0	2.5	-	2.6	-	2.3	3.0

26CBCS22	DATABASE MANAGEMENT SYSTEM	L	T	P	SL	C
		3	0	0	3	3

COURSE OBJECTIVES:

This course introduces the basic concepts of Database Management System, the Structured Query Language (SQL) and PLSQL. The students gain knowledge about Database, Data models, Relational Algebra, Normalization, SQL, PL/SQL and Stored Procedure.

UNIT I	INTRODUCTION TO OPEN SOURCE	9 hours

DBMS Definition, Characteristics of DBMS ,Application and advantages of DBMS, Instances , Schemas and Database States, Three Levels of Architecture , Data Independence, DBMS languages, Data Dictionary, Database Users, Data Administrators.

UNIT II	DATA MODELS	9 hours

Data Models, types and their comparison, Entity Relationship Model, Entity Types, Entity Sets, Attributes and its types, Keys, E-R Diagram, Data Integrity, PPRDBMS –Concept, Components and Codd's rules.

UNIT III	RELATIONAL ALGEBRA AND NORMALIZATION	9 hours

Relational Algebra (selection, projection, union, intersection, Cartesian product, Different types of join like theta join, equi-join, natural join, outer join) Functional Dependencies, Good & Bad Decomposition, Anomalies as a database: A consequences of bad design, Normalization: 1NF, 2NF, 3NF, BCNF, 4NF, 5NF.

UNIT IV	INTRODUCTION TO SQL	9 hours

Introduction to SQL: DDL, DML, and DCL statements, Creating Tables, Adding Constraints, Altering Tables, Update, Insert, Delete & various Form of SELECT- Simple, Using Special Operators for Data Access. Aggregate functions, Joining Multiple Tables (Equi Joins), Joining a Table to itself (self Joins) Functions.

UNIT V	PL/SQL	9 hours

Introduction to PL/SQL (blocks of PL/SQL, Variables, constants), Control Structure Introduction to Stored Procedures, Functions, Cursor and Triggers-Case Study.

Total: 45 Hours

Self Learning: 45 Hours

Text Books:

1. A. Silberschatz, H. F. Korth, S.Sudharsan (2011), Database System Concepts,Sixth Edition, Tata McGraw Hill
2. Ivan Bayross (2015), SQL,PL/SQL, The programming language of Oracle, Second Revised Edition, BPB Publication

Reference Books:

1. R.Elmasri, S.B.Navathe (2008), Fundamentals of Database systems, Fifth Edition,Pearson Education
2. C. J. Date (2005), Introduction to Database Systems, Fifth Edition, Pearson Education,

NPTEL links:

https://onlinecourses.nptel.ac.in/e-learning/preview/noc26_cs117

Web links:

1. www.guru99.com/dbms-tutorial.html
2. www.oracletutorial.com

COURSE OUTCOMES

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

COURSE OUTCOMES	DESCRIPTION	KNOWLEDGE LEVEL
CO1	Understand the fundamental concepts of DBMS including architecture, schemas, users, and data independence.	K2
CO2	Explain data models including ER model, relational model, entities, attributes, keys, and Codd's rules.	K2
CO3	Apply relational algebra and normalization techniques to design efficient database systems.	K3
CO4	Analyze SQL concepts including DDL, DML, DCL, queries, joins, and aggregate functions.	K4
CO5	Evaluate PL/SQL concepts including procedures, functions, cursors, and triggers in database applications.	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	2	-	2	-	2	-	-	-	2	2
CO4	3	3	-	2	3	-	2	-	-	3
CO5	2	3	3	-	-	-	2	-	3	3
Avg	2.3	3.0	2.8	2.0	2.3	-	2.0	-	2.5	2.7

26BMA002	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

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/

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

COs / POs-PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	-	-	-	–	-2	-	-	–	-	-
CO2	2	-	2	–	-	-	-	–	3	-
CO3	3	3	-	–	-	-	-	-	2	-
CO4	-	3	3	–	3	-	-	-	-	-
CO5	3	3	3	-	3	-	-	-	3	-
Avg	**2.6**	**3.0**	**2.6**	**-**	**2.6**	**-**	**-**	**-**	**2.6**	-

26PBCS21	WEB DEVELOPMENT USING PHP & MYSQL	L	T	P	SL	C
		0	0	2	2	1

COURSE OBJECTIVES:

After completing these PHP programs, students will be able to:

1. Understand the basics of PHP programming.
2. Write simple PHP scripts for arithmetic and logical operations.
3. Implement conditional statements and loops in PHP.
4. Work with functions and recursive functions.
5. Perform string manipulations using built-in PHP functions.
6. Handle arrays and array operations in PHP.
7. Understand object-oriented programming concepts like constructor and destructor.
8. Develop problem-solving skills using PHP.

List of Programs:

1. Write a PHP script to Print "Hello world".
2. Write a PHP script to find odd or even numbers from a given number.
3. Write a PHP script to find the maximum of three numbers.
4. Write a PHP script to swap two numbers.
5. Write a PHP script to find the factorial of a number.
6. Write a PHP script to check whether a given number is palindrome or not.
7. Write a PHP script to reverse a given number and calculate its sum.
8. Write a PHP script to generate a Fibonacci series using a recursive function.
9. Write a PHP script to implement at least seven string functions.
10. Write a PHP script to insert a new item in an array on any position in PHP.
11. Write a PHP script to implement the constructor and destructor.

Total: 15 Hours

Self-Learning: 30 Hours

Text Books:

1. Red Hat Linux Bible by Christopher Negus (2010). Wiley Publishing ISBN: 0-7645-4333-4,
2. Open Source Software: The Secret to Effective Digital Transformation by O'Reilly Media (2024),

Reference Books

1. Lee Babin, Nathan A. Good, Fran4k M. Kromann, Jon Stephens (2005), “PHP 5 Recipes, A problem

solution approach", après Special edition.

2.The Complete Reference PHP by Steven Holzner MCGrawHill, Indian edition, First Edition

Web links

1. https://www.tutorialspoint.com//cakephp/cakephp_form_handling.htm
2. http://www.php.net/tut.php

NPTEL links

https://onlinecourses.swayam2.ac.in/e-learning/preview/aic20_sp32

COURSE OUTCOMES

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

COURSE OUTCOMES	DESCRIPTION	KNOWLEDGE LEVEL
CO1	Understand the fundamentals of PHP programming, syntax, variables, operators, and data types.	K2
CO2	Develop PHP programs using conditional statements, loops, and functions to solve basic programming problems.	K3
CO3	Implement arrays, strings, and recursive functions for data manipulation and processing.	K3
CO4	Analyze object-oriented programming concepts such as classes, objects, constructors, and destructors in PHP.	K4
CO5	Design and develop simple dynamic web applications using PHP with logical thinking and problem-solving skills.	K5

COURSE ARTICULATION MATRIX

COs / POs-PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	**3**	**2**	**-**	**-**	**-**	**-**	**2**	**-**	**2**	**-**
CO2	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**2**
CO3	**2**	**2**	**3**	**-**	**-**	**-**	**3**	**-**	**3**	**2**
CO4	**2**	**-**	**-**	**3**	**2**	**-**	**2**	**-**	**2**	**-**
CO5	**-**	**2**	**3**	**3**	**3**	**-**	**3**	**-**	**-**	**3**
Avg	**2.3**	**2.0**	**3.0**	**3.0**	**2.5**	**-**	**2.5**	**-**	**2.5**	**3.0**

26PBCS22	RDBMS LAB	L	T	P	SL	C
		0	0	2	2	1

COURSE OBJECTIVES:

- To give a good formal foundation on the relational model of data.
- To present SQL and procedural interfaces to SQL comprehensively.
- To present the concepts and techniques relating to query processing by SQL engines.
- To present the concepts and techniques relating to ODBC and its implementations.

List of Programs:

1. Write a Program to create table and insert values using DDL Commands.
2. Write a Program to implement DML commands.
3. Write a Program on Types of Data Constraints.
4. Write a Program on Joins.
5. Write a Program on group-by clause and order-by clause.
6. Write a Program on different functions (aggregate, math and string).
7. Write a Program on different types of sub queries.
8. Write a Program on different SET Operations.
9. Write a Program on implementing Factorial, Fibonacci Series using PL/SQL.
10. Write a Program to implement triggers and cursors.
11. Write a program that creates the function and calculating area of circle.
12. Write a program that uses the concept of user defined exception

Total: 15 Hours

Self-Learning: 30 Hours

Text books:

1. A. Silberschatz, H. F. Korth, S.Sudharsan (2011), Database System Concepts,Sixth Edition, Tata McGraw Hill.
2. Ivan Bayross (2015), SQL,PL/SQL, The programming language of Oracle, Second Revised Edition, BPB Publication

Reference Books:

1. R.Elmasri, S.B.Navathe (2008), Fundamentals of Database systems, Fifth Edition,Pearson Education
2. C. J. Date (2005), Introduction to Database Systems, Fifth Edition, Pearson Education.
3.

Web links

1. **www.guru99.com/dbms-tutorial.html**
2. www.oracletutorial.com

COURSE OUTCOMES

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

COURSE OUTCOMES	DESCRIPTION	KNOWLEDGE LEVEL
CO1	Create an application to check user defined exception using PL/SQL.	K6
CO2	Evaluate the functionalities of trigger and cursor.	K5
CO3	Analyze different types of built-in function in PL/SQL.	K4
CO4	Apply DDL, DML and DCL statement using SQL.	K3
CO5	Apply various types of joins in tables.	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	2	-	2	-	2	-	-	-	2	2
CO4	3	3	-	2	3	-	2	-	-	3
CO5	2	3	3	-	-	-	2	-	3	3
Avg	2.3	3.0	2.8	2.0	2.3	-	2.0	-	2.5	2.7

26DAEC21	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

Text Books

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

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

Reference Books

- 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.
- Mitra, Barun K. *Personality Development and Soft Skills*. 2nd ed., Oxford University Press, 2016.
- Sasikumar, V., P. Kiranmai Dutt, and Geetha Rajeevan. *A Course in Listening and Speaking I*. Cambridge University Press, 2005.
- Murphy, Raymond. *English Grammar in Use*. 5th ed., Cambridge University Press, 2019.
- Lewis, Norman. *Word Power Made Easy*. Revised ed., Goyal Publishers & Distributors, 2014.

Websites

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

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

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	-	-

PROFESSIONAL ELECTIVE COURSES

26DBCS11	**INTRODUCTION TO CYBER SECURITY**	**L**	**T**	**P**	**SL**	**C**
		3	**0**	**0**	**3**	**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 CRIME**	**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.

UNIT V	**CYBER ETHICS AND LAWS**	**9 hours**

Introduction to Cyber Laws - E-Commerce and E-Governance - Certifying Authority and Controller - Offences under IT Act- Computer Offences and its penalty under IT Act 2000 - Intellectual Property Rights in Cyberspace.

Total: 45 Hours

Self Learning: 45 Hours

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. Dr. Gerald Auger, Jaclyn "Jax" Scott, Jonathan Helmus, Kim Nguyen, "Cybersecurity Career Master Plan" (2026)

Reference Books:

1. Roger Grimes (2017), "Hacking the Hacker", Wiley, Ist Edition
2. The Cybersecurity Playbook: How Every Leader and Employee Can Contribute to a Culture of Security" (2022) – J. B. Wood, Brian O'Neill

Web links

https://www.javatpoint.com/what-is-cyber-security

NPTEL Link

https://onlinecourses.nptel.ac.in/e-learning/preview/noc26_cs144

COURSE OUTCOMES

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

COURSE OUTCOMES	DESCRIPTION	KNOWLEDGE LEVEL
CO1	Understand the fundamental concepts of cyber security including cyberspace, cyber threats, CIA triad, and cyber terrorism.	K1
CO2	Explain hackers, cyber crimes, malware threats, and various attack techniques.	K2
CO3	Apply ethical hacking concepts, vulnerability assessment, penetration testing, and social engineering defenses.	K3
CO4	Analyze cyber forensics processes, auditing techniques, and ISO 27001 security standards.	K4
CO5	Evaluate cyber laws, IT Act provisions, intellectual property rights, and ethical issues in cyberspace.	K5

COURSE ARTICULATION MATRIX

COs / POs-PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	2	3	-	-	-	2	-
CO3	3	3	-	2	-	3	2	-	2	3
CO4	2	3	3	3	-	3	-	-	-	2
CO5	-	-	-	-	-	3	3	-	-	3
Avg	2.5	3.0	3.0	2.3	3.0	3.0	2.5	-	2	2.6

26DBCS12	FUNDAMENTALS OF ROBOTICS	L	T	P	SL	C
		3	0	0	3	3

COURSE OBJECTIVES:

This course introduces the basic concepts of robotics, sensors, robot controls, robot cell design, and micro robotics and Nano robotics system.

UNIT I	INTRODUCTION	9 hours

Robot anatomy – Definition - law of robotics - History and Terminology of Robotics- Accuracy and repeatability of Robotics - Simple problems - Specifications of Robot - Speed of Robot - Robot joints and links - Robot classifications - Architecture of robotic systems- Rob ot Drive systems - Hydraulic, Pneumatic and Electric system.

UNIT II	HACKERS AND CYBER CRIME	9 hours

Mechanical grippers-Slider crank mechanism, Screw type, Rotary actuators, cam type- Magnetic grippers - Vacuum grippers - Air operated grippers-Gripper force analysis - Gripper design - Simple problems - Robot controls - Point to point control, Continuous path control, Intelligent robot - Control system for robot joint - Control actions - Feedback devices - Encoder, Resolver, LVDT - Motion Interpolations - Adaptive control.

UNIT III	ETHICAL HACKING AND SOCIAL ENGINEERING	9 hours

Robot kinematics-Types- 2D, 3D Transformation-Scaling, Rotation, Translation - Homogeneous coordinates, multiple transformation - Simple problems. Sensors in robot – Touch sensors - Tactile sensor – Proximity and range sensors – Robotic vision sensor - Force sensor - Light sensors, Pressure sensors.

UNIT IV	CYBER FORENSICS AND AUDITING	9 hours

Robot work cell design and control - Sequence control, Operator interface, Safety monitoring devices in Robot - Mobile robot working principle, actuation using MATLAB, NXT Software Introductions - Robot applications - Material handling - Machine loading and unloading, assembly, Inspection, Welding, Spray painting and undersearobot.

UNIT V	CYBER ETHICS AND LAWS	9 hours

Micro/Nanorobotics system overview - Scaling effect - Top down and bottom up approach - Actuators of Micro / Nano robotics system - Nano robot communication techniques –Fabrication of micro / nano grippers - Wall climbing, micro robot working principles - Biomimetic robot - Swarm robot - Nano robot in targeted drug delivery system.

Total: 45 Hours

Self Learning: 45 Hours

Text Books:

1.S.R. Deb, “Robotics Technology and flexible automation”, Tata McGraw-Hill Education, 2009.

2."Robot Revolution: The Impact of Artificial Intelligence on Society" (2023) by Mark A. Wilson

Reference Books:

1."Robotics: Everything You Need to Know" (2023) by Peter M. R. Rony

2. "The Age of AI: Robotics and Beyond" (2023) by Sarah J. Thompson

Web links

1. https://www.infineon.com/cms/en/discoveries/fundamentals-robotics/
2. https://www.coursera.org/learn/fundamentals-of-robotics--industrial-automation

COURSE OUTCOMES

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

COURSE OUTCOMES	DESCRIPTION	KNOWLEDGE LEVEL
CO1	Understand robot fundamentals including anatomy, classifications, drive systems, and specifications.	K2
CO2	Explain robot end effectors, control systems, grippers, and feedback devices used in robotics.	K2
CO3	Apply robot kinematics and sensor concepts including transformations and robotic vision systems.	K3
CO4	Analyze robot cell design, control systems, and industrial robot applications.	K4
CO5	Evaluate advanced robotics concepts such as micro/nano robotics, swarm robots, and biomedical applications.	K5

COURSE ARTICULATION MATRIX

COs / POs-PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	-	-	3	2	-	-	2	-	2	3
CO2	-	-	-	-	-	-	-	-	-	-
CO3	-	2	3	2	3	-	3	-	3	2
CO4	2	-	-	-	-	-	-	-	-	-
CO5	-	3	2	3	-	-	3	-	3	3
Avg	2.0	2.5	2.7	2.3	3.0	-	2.6	-	2.7	2.7

26DBCS21	DATA STRUCTURES AND ALGORITHMS	L	T	P	SL	C
		3	0	0	3	3

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	9 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 STRUCTURE	9 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	9 hours

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

UNIT IV	CYBER FORENSICS AND AUDITING	9 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	9 hours

Asymptotic Notation – Big Oh Notation – Omega Notation – Theta 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: 45 Hours

Self Learning: 45 Hours

Text Books:

1. Introduction to Algorithms by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein (2023).
2. Horowitz, S. Sahni, and S. Rajasekaranm (2012), Computer Algorithms, Galgotia Pub. Pvt. Ltd.,

Reference Books:

1. R. Kruse C.L. Tondo and B. Leung (1997), Data Structures and Program design in C, PFU
2. Gav Pai (2017), "Data structures and algorithms, concepts, techniques and Applications", McGraw Hill

Web links:

1. www.nptel.com
2. www.hackerearth.com/practice/data-structures/arrays/1-d/tutorial/

NPTEL Link:

https://onlinecourses.nptel.ac.in/e-learning/preview/noc26_cs162

COURSE OUTCOMES

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

COURSE OUTCOMES	DESCRIPTION	KNOWLEDGE LEVEL
CO1	Understand the fundamentals of data structures including arrays, lists, ADTs, and basic operations.	K2
CO2	Explain linear data structures such as stacks, queues, and linked lists with their operations and implementations.	K2
CO3	Apply non-linear data structures including trees and graphs with traversal techniques and applications.	K3
CO4	Analyze sorting, searching, and hashing techniques for efficient data processing.	K4
CO5	Evaluate algorithm complexity using asymptotic notations and real-world case studies of data structures.	K5

COURSE ARTICULATION MATRIX

COs / POs-PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	-	2	-	-	-	-	-	-	-	3
CO2	3	-	3	-	3	-	2	-	2	2
CO3	2	2	2	-	2	-	2	-	-	-
CO4	-	-	3	2	-	-	2	-	3	-
CO5	-	3	-	3	-	-	-	-	-	2
Avg	2.5	2.5	2.7	2.5	2.5	-	2.0	-	2.5	2.3

26DBCS21	EMBEDDED SYSTEM	L	T	P	SL	C

		3	0	0	3	3

COURSE OBJECTIVES:

This course aims to introduce the fundamental concepts and applications of embedded systems. It provides knowledge about embedded system components such as processors, memory, sensors, and

UNIT I	**INTRODUCTION TO EMBEDDED SYSTEMS**	**9 hours**

Definition of Embedded System, Embedded Systems Vs General Computing Systems, History of Embedded Systems, Classification, Major Application Areas, Purpose of Embedded Systems, Characteristics and Quality Attributes of Embedded Systems.

UNIT II	**TYPICAL EMBEDDED SYSTEM**	**9 hours**

Core of the Embedded System: General Purpose and Domain Specific Processors, ASICs, PLDs, Commercial Off-The-Shelf Components (COTS), Memory: ROM, RAM, Memory according to the type of Interface, Memory Shadowing, Memory selection for Embedded Systems, Sensors and Actuators, Communication Interface: Onboard and External Communication Interfaces.

UNIT III	**EMBEDDED FIRMWARE**	**9 hours**

Reset Circuit, Brown-out Protection Circuit, Oscillator Unit, Real Time Clock, Watchdog Timer, Embedded Firmware Design Approaches and Development Languages.

UNIT IV	**RTOS Based Embedded System Design**	**9 hours**

Operating System Basics, Types of Operating Systems, Tasks, Process and Threads, Multi processing and Multitasking, Task Scheduling.

UNIT V	**TASK COMMUNICATION**	**9 hours**

Shared Memory, Message Passing, Remote Procedure Call and Sockets, Task Synchronization: Task Communication/Synchronization Issues, Task Synchronization Techniques, Device Drivers, How to choose an RTOS.

Total: 45 Hours

Self Learning: 45 Hours

Text Books:

1. Introduction to Embedded Systems - Shibu K.V, Mc Graw Hill.

Reference Books:

1.Embedded Systems - Raj Kamal, TMH.

2.Embedded System Design - Frank Vahid, Tony Givargis, John Wiley.

3.Embedded Systems – Lyla, Pearson, 2013.

4.An Embedded Software Primer - David E. Simon, Pearson Education.

Web links:

1. https://www.geeksforgeeks.org/embedded-systems/
2. https://www.tutorialspoint.com/embedded_systems/index.htm
3. https://www.javatpoint.com/embedded-system
4. https://www.w3schools.in/embedded-system/

NPTEL Link:

https://onlinecourses.swayam2.ac.in/e-learning/preview/ntr26_ed112

COURSE OUTCOMES

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

COURSE OUTCOMES	DESCRIPTION	KNOWLEDGE LEVEL
CO1	Understand the fundamentals of embedded systems including definition, classification, characteristics, and applications.	K2
CO2	Explain embedded system components such as processors, memory types, sensors, actuators, and communication interfaces.	K2
CO3	Apply embedded firmware concepts including reset circuits, timers, watchdogs, and firmware development approaches.	K3
CO4	Evaluate task communication and synchronization techniques including message passing, sockets, and RTOS selection.	K5
CO5	Analyze RTOS concepts including processes, threads, multitasking, and task scheduling in embedded systems	K4

Evaluate task communication and synchronization techniques including message passing, sockets, and RTOS selection.

COURSE ARTICULATION MATRIX

COs / POs-PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	**2**	**2**	**-**	**-**	**-**	**-**	**3**	**-**	**2**	**-**
CO2	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**-**
CO3	**-**	**-**	**3**	**-**	**-**	**-**	**3**	**-**	**3**	**-**
CO4	**2**	**-**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**
CO5	**-**	**3**	**3**	**3**	**2**	**-**	**3**	**-**	**-**	**3**
Avg	**2.3**	**2.6**	**3.0**	**3.0**	**2.8**	**-**	**3.0**	**-**	**2.8**	**3.0**