

B.SC. COMPUTER SCIENCE

LOCF SYLLABUS 2026-27



Department of Computer Science

School of Computing Sciences

St. Xavier's College (Autonomous), Palayamkottai

Tirunelveli – 627 002, Tamil Nadu, India

Vision

To mould young men and women as leaders in all walks of life so that they may serve the people especially the poor and the oppressed of our nation in truth, justice and love.

Mission

To achieve a synthesis of academic excellence and the formation of character.

To ensure social justice through equity and access

To include the excluded for empowerment

To equip students with global competencies

To engage in relevant research activities.

To promote Lab to Land through the Outreach Programme – Student Training and Action for Neighbourhood Development (STAND)

SCHOOLS OF EXCELLENCE WITH CHOICE-BASED CREDIT SYSTEM (CBCS)

Undergraduate Courses

While the Tamil Nadu State Council of Higher Education (TANSCHÉ) came forward to introduce CBCS in all the affiliated colleges in Tamil Nadu in June 2008, St. Xavier's College had already introduced CBCS as early as June 2002 for UG courses and in June 2003 for PG courses. The aim of the Choice-Based Credit System is to provide ample choice of subjects to students, based on the weighted credit point system. This system offers the learners a chance to match their aptitude and interest with the subjects of their choice and learn at their own pace. Thus St. Xavier's College gives every student an opportunity to study his / her discipline - specific courses and pursue other courses from any other department simultaneously.

Essential Features of CBCS

Standardisation of degree courses to internationally accepted levels

Focus on skill-based curriculum

Emphasis on value education

Institution - Industry collaboration

Provision for earning more credits

Development of communication skills

Credit system

The credit system at St. Xavier's College (Autonomous) assigns weightage to courses based on the hours allocated to each course. Typically, one credit is equivalent to one hour of instruction per week. However, credits are awarded regardless of actual teaching hours to ensure consistency and adherence to guidelines. The credits and hours allotted to each course within a programme are detailed in the Programme Pattern table. While the table provides a framework, there may be some flexibility due to practical sessions, field visits, tutorials, and the nature of project work. For undergraduate (UG) courses, students are required to

accumulate a minimum of 150 credits, as stipulated in the programme pattern table. The total number of courses offered by the department is outlined in the Programme Structure.

OUTCOME-BASED EDUCATION (OBE)

Outcome-Based Education (OBE) is a student-centric teaching and learning methodology that focuses on measuring student performance through clearly defined outcomes. For St. Xavier's College, with its commitment to excellence and NAAC/NBA accreditation requirements, OBE is not just a regulatory expectation but a pathway to academic quality, global competitiveness, and improved employability of graduates.

We prepare students to meet future industry requirements and reinforce St. Xavier's College, Palayamkottai, as a leader in quality higher education. St. Xavier's College introduced OBE in 2018, and for the Attainment Calculation, we developed our own method in 2018. From the academic year 2025-26 onwards, in examinations, for each question we mark Course Outcome (CO), Competency and Performance Indicator, Programme Outcome / Programme Specific Outcome, Bloom's Revised Cognitive Level and we follow the OBE procedure for the calculation of the Attainment of Outcome for each student, course, semester, programme.

EVALUATION PATTERN (UG)

Continuous Internal Assessment

There is no internal minimum for any paper. However, Continuous Internal Assessment (CIA) is a mandatory requirement for all students. A student must take at least one CIA test out of two tests and must fulfil at least one mode of assessment among assignments, quiz, seminars, etc., otherwise he/she will not be permitted to write the semester examination.

S.No	Component	Marks Allotted
1	I CIA Test	50
2	II CIA Test	50
	Total	100

The total CIA marks of 100 will be converted to 70 marks. An additional 30 marks will be awarded through other internal assessment components.

The Continuous Internal Assessment (CIA) consists of two component tests, each carrying 15 marks (15 + 15).

The final internal assessment marks will be calculated out of 100 (70 + 30). The obtained marks will be **converted to 50 marks**.

Semester (External) Examination

- The External Semester Examination will be conducted for **100 marks**.
- The obtained marks will be **converted to 50 marks**.

Question Pattern

UG Semester Examinations Part- I & II & III (3 Hours)

PART	TYPE	Mark Distribution	Total Marks
A	MCQ	20X1	20
B	ALL	5X3	15
C	Either/or	5X7	35
D	3 out of 5	3X10	30
		Total	100

UG Semester Examinations Part- IV (2 Hours)

PART	TYPE	Mark Distribution	Total Marks
A	MCQ	5X1	5
B	ALL	5X2	10
C	Either/or	5X5	25
D	1 out of 2	1X10	10
		Total	50

UG Internal Examinations Part- I & II & III (1.30 Hours)

PART	TYPE	Mark Distribution	Total Marks
A	MCQ	6X1	6
B	ALL	3X3	9
C	Either/or	3X5	15
D	2 out of 3	2X10	20
		Total	50

UG Internal Examinations Part- IV (1.00 Hour)

PART	TYPE	Mark Distribution	Total Marks
A	MCQ	5X1	5
B	ALL	5X3	15
C	2 out of 3	2X7.5	15
		Total	35

Grading System

Range of Marks	Letter Grade	Grade Point	Description
90-100	A+	9.0-10.0	Outstanding
80-89	A	8.0-8.9	Excellent
70-79	B+	7.0-7.9	Very Good
60-69	B	6.0-6.9	Good
50-59	C	5.0-5.9	Above Average
40-49	D	4.0-4.9	Average
00-39	U	0	Reappear

PROGRAMME OUTCOMES (PO) FOR UG PROGRAMMES

Students of all Undergraduate Degree Programmes at the time of graduation will be able to attain the following:

PO1. Critical Thinking: Acquire the knowledge in the respective field and take informed actions.

PO2. Effective Communication: Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology.

PO3. Social Interaction: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional practice.

PO4. Effective Citizenship: Demonstrate empathetic social concern and equity centered national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.

PO5. Ethics: Recognize different value systems and apply ethical principles and commit to professional ethics and responsibilities and norms of different value systems.

PO6. Environment and Sustainability: Demonstrate the issues of environmental contexts and sustainable development.

PO7. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern IT tools including prediction and modeling to complex activities with an understanding of the limitations.

PO8. Self-directed and Life-long Learning: Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of socio-technological changes.

Programme Specific Outcomes (PSOs)

At the completion of the B.Sc. programme in Computer Science the students will be able to

PSO1: Algorithmic thinking to solve Real life problems.

PSO2: Enable to apply their programming skills to solve real world problems in society.

PSO3: Know when there is a need for information, to be able to identify, locate, evaluate, and effectively use that information for the issue or problem at hand.

PSO4: Understand, formulate, develop programming model with logical approaches to a Address issues arising in social science, business and other contexts.

PSO5: Acquire good knowledge and understanding to solve specific theoretical and applied problems in advanced areas of Computer science and Industrial statistics.

PSO6: Provide students/learners sufficient knowledge and skills enabling them to undertake further studies in Computer Science or Applications or Information Technology.

PSO7: Equip with Computer science technical ability, problem solving skills, creative talent and power of communication necessary for various forms of employment.

PSO8: Develop a range of generic skills helpful in employment, internships& societal activities

B.Sc. Computer Science - Pattern

Sem	Part	Status	Sub. Code	Title of the Paper	Hrs	Cdt
I	I	Lang	26UGTL11	General Tamil – I		
	I	Lang	26UGHL11	Hindi – I		
	I	Lang	26UGFL11	French - I	6	3
	II	Lang	26UGEL11	Communicative English - I	6	3
	III	Core-T1	26UCSC11	Programming in C and C++	5	5
	III	Core-P1	26UCSC12	Practical: Programming in C and C++	5	5
	III	EC-T1	26UCSE11	Discrete Mathematics/Numerical Methods	4	3
	IV	SEC1	26UCSN11	Word Processing Applications (NME)	2	2
	IV	FC	26UHER11/ 26UHEE11	Foundation Course: Religion: Catholic Doctrine/ Ethics	2	2
					30	23
II	I	Lang	26UGTL21	General Tamil – II		
	I	Lang	26UGHL21	Hindi – II		
	I	Lang	26UGFL21	French - II	6	3
	II	Lang	26UGEL21	Communicative English – II	6	3
	III	Core-T2	26UCSC21	Data Structures and Python Programming	5	5
	III	Core-P2	26UCSC22	Practical: Data Structures and Python Programming	5	5
	III	EC-T2	26UCSE21	Computer Architecture and Microprocessor / Micro Controller	4	3
	IV	SEC2	26UCSN21	Advanced Excel (NME)	2	2
	IV	SEC3	26UHEI21	Integrated Personality Development	2	2
					30	23
III	I	Lang	26UGTL31	General Tamil – III		
	I	Lang	26UGHL31	Hindi – III		
	I	Lang	26UGFL31	French - III	6	3
	II	Lang	26UGEL31	Communicative English - III	6	3
	III	Core-T3	26UCSC31	Java Programming	5	5
	III	Core-P3	26UCSC32	Practical: Java Programming	5	5
	III	EC-T3	26UCSE31	Operation Research/Probability and Statistics	4	3
	IV	SEC4	26UHEL31	Life Issues & Entrepreneurial Skill Development	2	2
	IV	SEC5	26UCSS31	Cloud Applications (NME)	2	2
					30	23
IV	I	Lang	26UGTL41	General Tamil – IV		
	I	Lang	26UGHL41	Hindi – IV		
	I	Lang	26UGFL41	French - IV	6	3
	II	Lang	26UGEL41	Communicative English - IV	6	3
	III	Core-T4	26UCSC41	RDBMS and ORACLE	4	4
	III	Core-P4	26UCSC42	Practical: RDBMS and ORACLE	3	3
	III	EC-T4	26UCSE41	Operating Systems and Shell Programming / Linux Programming	3	3
	III	EC-P1	26UCSE42	Practical: Shell Programming / Linux Programming	2	2
	III	EC-T5	26UCSE43	Programming	4	4

	IV V	EVS Extension Activities	26UCSS41 26UEVS41	Software Engineering Environmental Studies STAND (Student Training and Action for Neighbourhood Development)	2 -	2 1
					30	25
V	III	Core-T5	26UCSC51	Full Stack Development	5	5
	III	Core-T6	26UCSC52	PHP Programming	5	5
	III	Core-P5	26UCSC53	Core Practical: Full Stack Development	5	3
	III	Core-P6	26UCSC54	Core Practical: PHP Programming	5	3
	III	EC-T6	26UCSE51	Data Analytics using Python	4	3
	III	EC-P2	26UCSE52	Practical: Data Analytics using Python	4	3
	IV	VE	26UVEH51	Human Rights & Social Analysis	2	2
	IV	Internship	26UCSI51	Internship	-	2
					30	26
VI	III	Core-T7	26UCSC61	Artificial Intelligence and Machine Learning	5	4
	III	Core-T8	26UCSC62	Computer Graphics and Multimedia System	5	4
	III	Core-P7	26UCSC63	Practical: Machine Learning Programming using Python	4	2
	III	Core-P8	26UCSC64		4	2
	III	Project	26UCSC65	Practical: Computer Graphics and Multimedia	6	3
	III	EC-T7	26UCSE61	Project with Viva Voce	4	3
	IV	SEC6	26UCSS61	Data Communications and Computer Network/ Network Security Professional Competency Skill	2	2
					30	20
					180	140
					Additional Compulsory Courses	
					I Year (Add-On Course)	2
					II Year (Value – Added Course)	2
					III Year (Extra-Credit Course)	2
					Field Visit/Industrial Visit	1
					MOOC	2
					Cocurricular/Extra Curricular Activities	1
					TOTAL	180 150

EC – Elective Course

FC – Foundation Course

VE – Value Education

SEC – Skill Enhancement Course

Add-on Course

1. Advanced MS-Excel(26UCSAO1)
2. Visual Designing using Canva (26UCSAO2)
3. Introduction to Data Science(26UCSAO3)

Value Added Course

1. Mobile Application Development(26UCSVA1)
2. Robotics and Its Applications(26UCSVA2)
3. UI/UX Design(26UCSVA3)

Extra Credit Courses

1. Problem Solving Techniques (26UCSEC1)
2. Digital Marketing (26UCSEC2)
3. Internet of Things (26UCSEC3)
4. Quantum Computing (26UCSEC4)
5. Data Visualization (26UCSEC5)
6. Big Data Analytics (26UCSEC6)

பொதுத்தமிழ் - I
26UGTL11

Sem	Course Code	Course Category	Hours	Credit	MARK FOR EVALUATION		
					CIA	ESE	TOTAL
I	26UGTL11	GT	6 Hrs	3	100	100	100
COURSE TITLE		பொதுத்தமிழ் - I					
COURSE OUTCOMES: (பயன்கள்)							
CO1	பாரதியார் காலந்தொட்டுத்தற்காலப் புதுக்கவிதைகள் வரையிலானகவிதைகளை அறிமுகப்படுத்துவதால் படைப்பாற்றல் திறன் பெறுதல் (K1, K2)						
CO2	புதுக்கவிதை வரலாற்றினை அறிந்துகொள்ளுதல்.(K2)						
CO3	இக்கால இலக்கியவகையினைக் கற்பதன் மூலம் படைப்பாக்கத்திறனைப்பெறுதல்.(K4)						
CO4	மொழிஅறிவோடுசிந்தனைத் திறன் அதிகரிக்கச் செய்தல்.(K3)						
CO5	தமிழ்மொழியைப் பிழையின்றிஎழுதவும்,புதியகலைச்சொற்களைஉருவாக்கவும் அறிந்து கொள்ளுதல்.(K4)						
CO6	காலந்தோறும் சமூகச் சிந்தனைகள் மாறுவதை இலக்கியவரலாற்றின் மூலம் புரிந்துகொள்ளுதல்.(K6)						

UNITS	SYLLABUS CONTENTS	HOURS
I	மரபுக் கவிதை 1. பெ.சுந்தரனார் - தமிழ்த்தெய்வவணக்கம் 2. இராமலிங்கஅடிகளார் - வள்ளலார் பாடல்கள் 3. பாரதியார் - பாரத ஜனங்களின் தற்கால நிலைமை 4. பாரதிதாசன் - சிறுத்தையே வெளியில் வா 5. மு.நல்லசுவாமிபண்டிதர் - சிலுவைத் தியானமாலை - மரியாள் புலம்பல் 6. கவிமணிதேசிகவிநாயகம்பிள்ளை -புத்தரும் ஏழைச்சிறுவனும் 7. முடியரசன் - மொழிஉணர்ச்சி 8. கண்ணதாசன் - ஆட்டனத்திஆதிமந்தி - ஆதிமந்திபுலம்பல் 9. கல்யாணசுந்தரம் - பட்டுக்கோட்டையார் பாடல்	30
	புதுக்கவிதை 1. கவிக்கோஅப்துல் ரகுமான் - வீட்டுக்கொருமரம் வளர்ப்போம் 2. சிற்பி- கவிதைமுடியவில்லை 3. மு.மேத்தா- வாழைமரத்தின் சபதம் 4. வைரமுத்து- புத்தகப்புராணம் 5. ஞானக்கூத்தன் - அம்மாவின் பொய்கள் 6. அறிவுமதி-வள்ளுவம் பத்து 7. நா.முத்துக்குமார் - ஆனந்தயாழை மீட்டுகிறாய் 8. சுகிர்தாராணி- சபிக்கப்பட்டமுத்தம் 9. அபிமானி - தலித்தியக்கவிதைகள் - 10. வைகைச் செல்வி - அம்மி 11. நாட்டுப்புறப்பாடல்	

II	சிறுகதைகள் 1. புதுமைப்பித்தன் - கடவுளும் கந்தசாமிப் பிள்ளையும் 2. கு.ப.ராஜ கோபாலன் - விடியுமா? 3. கி.ராஜநாராயணன் - கதவு 4. வண்ணதாசன் - ஒருசிறுஇசை 5. உமாமகேஷ்வரி - மரப்பாச்சி உரைநடை 1. இலக்கியத்தின் உயிர்- இரா.மோகன் 2. இருபதாம் நூற்றாண்டுக்கவிதைகளில் தொழிலாளர் நிலை- இரா.மோகன் 3. எண்பதுகளில் புதுக்கவிதைப் போக்குகள் - இரா.மோகன் 4. தமிழ்ச் சிறுகதைகளில் முன்னிலைஉத்தி- இரா.மோகன் 5. வளமுடன் வாழ - அருள்முனைவர் ச.இன்னாசிமுத்து.சே.ச.	15
III	தமிழ் இலக்கியவரலாறு (இக்கால இலக்கியம்)	15
IV	இலக்கணம் - எழுத்து 1. தொல்காப்பியத்தின் எழுத்துவகை 2. முதல் எழுத்துக்கள் 3. சார்பெழுத்துக்கள் 4. மொழிமுதல் எழுத்துக்கள் 5. மொழி இறுதிஎழுத்துக்கள் 6. மொழி இடைஎழுத்துக்கள் 7. போலி 8. பதவிலக்கணம் 9. புணர்ச்சி இலக்கணம்	15
V	பிழையின்றிஎழுதுவோம் 1. பிழைப்பட எழுதும் சொற்களும், திருத்தங்களும் 2. சொற்பொருள் வேறுபாடு 3. பிழையான வாக்கியங்களும், திருத்தங்களும் 4. நிறுத்தற்குறிகள் 5. மரபு 6. வல்லெழுத்து (க்,ச,த்,ப்) மிகுமிடங்கள் 7. வல்லெழுத்துமிகா இடங்கள் 8. வாக்கியம் :வகைகளும்,மாற்றங்களும் 9. வழ(ழு)க்குத் தமிழ் 10.உவமைகள் - பழமொழிகள் - மரபுத் தொடர்கள்	15
TEXT BOOKS (பாடநூல்கள்)		
- தமிழ்த்துறை வெளியீடு- தூய சவேரியார் கல்லூரி,(தன்னாட்சி)பாளையங்கோட்டை. - வகைமைநோக்கில் தமிழ் இலக்கியவரலாறு- பாக்கியமேரி		
REFERENCE BOOKS (பார்வைநூல்கள்)		
- தமிழ் இலக்கியவரலாறு- சிற்பிபாலசுப்பிரமணியன் - புதியநோக்கில் தமிழ் இலக்கியவரலாறு- தமிழண்ணல் - தமிழ் இலக்கியவரலாறு- சேதுராமன்		
WEB SOURCES(இணையதளங்கள்)		
- Tamil Heritage Foundation – www.tamilheritage.org<http://www.tamilheritage.org> - Tamil Virtual University Library – www.tamilvu.org/library http://www.virtualvu.org/library - Project Madurai – www.projectmadurai.org - Chennai Library – www.chennailibrary.com<http://www.chennailibrary.com> - Tamil University Library – www.ulib.prg<http://www.ulib.prg> - Tamil E-books downloads – tamilebooksdownloads.blogspot.com - Tamil Books online – books.tamilcube.com - Catalogue of the Tamil Books in the library of British congress archive.org		

பொதுத்தமிழ் - II
26UGTL21

Sem	Course Code	Course Category	Hours	Credit	MARK FOR EVALUATION		
					CIA	ESE	TOTAL
II	26UGTL21	GT	6 Hrs	3	100	100	100
COURSE TITLE		பொதுத்தமிழ் - II					
COURSE OUTCOMES (பயன்கள்)							
CO1	பக்தி இலக்கியத்தின்தோற்றம்,வளர்ச்சி சிற்றிலக்கியத்தின் தோற்றம்,வளர்ச்சி குறித்து அறிந்துகொள்வர்.(K1)						
CO2	பக்தி இலக்கியங்கள் ,சிற்றிலக்கியங்கள் முதலியவற்றின் இலக்கண மற்றும் இலக்கிய அமைப்பை விளங்கிக் கொள்வர் (K2)						
CO3	பக்தி இலக்கியப் பாடல்களில் காணப்படும் தெய்வவழி பாட்டுணர்வு, சிற்றிலக்கியங்களில் காணலாகும் சமூகநீதிக் கருத்துகளை, இன்றைய வாழ்வோடு தொடர்புபடுத்தி நோக்குவர் (K3)						
CO4	பக்தி இலக்கியம் சிற்றிலக்கியங்களின் வழி இலக்கண இலக்கியச்சிறப்புகளை ஒப்பிட்டுப் பேதங்களைக் காண்பர். (K3)						
CO5	பக்தி இலக்கிய, சிற்றிலக்கியங்களின் வழி தமிழ்மொழி, பண்பாடு, மதம், தத்துவம் ஆகியவற்றினை மதிப்பிட்டுச் சீர்தூக்கிப் பார்ப்பர் (K5)						
CO6	கற்ற இலக்கியங்களை அடிப்படையாகக் கொண்டு,சிறுபக்திக் கவிதைகள் அல்லது சிற்றிலக்கிய மரபில் பாடல் இயற்றும் திறன் பெறுவர்.,(K6)						

UNITS	SYLLABUS CONTENTS	HOURS
I	பக்தி இலக்கியம் -1 1. திருஞானசம்பந்தர் - திருக்கோடிக்கா 2. திருநாவுக்கரசர் - திருப்பாதிரிப்புலியூர் 3. திருப்பாவை - ஆண்டாள் 4. குலசேகரஆழ்வார் - 5 ஆம் பதிகம் 5. சித்தர் பாடல்கள் - அழகணிசித்தர் (தேர்ந்தெடுக்கப்பட்டபாடல்கள்) சிற்றிலக்கியம்: 2 1 கலிங்கத்துப்பரணி - களம் பாடியது 2. திருக்குற்றாலக் குறவஞ்சி - மலைவளம் 3. திருக்காவலூர்க்கலம்பகம் - சமூகஉல்லாசம் 4. முக்கூடற்பள்ளு-நாட்டு வளம் 5. தமிழ்விடுதாது - தூதுக்கானகாரணம்	30
II	ஊரைநடை 1. இறைநம்பிக்கையும் மனிதவாழ்வும் 2. இயேசுபிரான் குறிப்பிடும் எண்வகைமனிதர்கள் 3. நபிகள் நாயகத்தின் வாழ்வியல் நெறிகள் 4. திருமூலர் காட்டும் இறைநெறி 5. வள்ளலார் கூறும் வாழ்வியல் நாவல் - கருப்பாயி என்கிற நூர்ஜஹான் -அன்வர் பாலசிங்கம்	15
III	தமிழ் இலக்கியவரலாறு (பக்திஇலக்கியம்,சிற்றிலக்கியம் தொடர்பானபகுதிகள்)	15
IV	இலக்கணம் சொல்லின் இலக்கணம்-பெயர் ,வினை, இடை,உரிச்சொற்கள் பிறமொழிச் சொற்களைத் தமிழில் வழங்கும் முறை	15

V	மொழிபெயர்ப்பு ஆட்சிச் சொல்லகராதி - மரபுத் தொடர்கள் -பழமொழிகள் - திருக்குறள்	15
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TEXT BOOKS (பாடநூல்கள்)

1. தமிழ்த்துறைவெளியீடு - தூயசவேரியார் தன்னாட்சிக் கல்லூரி,பாளையங்கோட்டை.
2. வகைமைநோக்கில் தமிழ் இலக்கியவரலாறு - முனைவர்பாக்கியமேரி
3. கருப்பாயின்கிறநூர்ஜஹான் -அன்வர் பாலசிங்கம்

REFERENCE BOOKS (பார்வைநூல்கள்)

- தமிழ் இலக்கியவரலாறு - சிற்பி. பாலசுப்பிரமணியன்
- புதியநோக்கில் தமிழ் இலக்கியவரலாறு - தமிழண்ணல்
- தமிழ் இலக்கியவரலாறு- சேதுராமன்

WEB SOURCES (இணையதளங்கள்)

- Tamil Heritage Foundation- www.tamilheritage.org
- Tamil virtual University Library- [www.tamilvu.org/ library](http://www.tamilvu.org/library) <http://www.virtualvu.org/library>
- Project Madurai - www.projectmadurai.org.
- Chennai Library- www.chennailibrary.com .
- Tamil Universal Digital Library- www.ulib.prg .
- Tamil E-Books Downloads- [tamilebooksdownloads. blogspot.com](http://tamilebooksdownloads.blogspot.com)

பொதுத்தமிழ் - III
26UGTL31

Sem	Course Code	Course Category	Hours	Credit	MARK FOR EVALUATION		
					CIA	ESE	TOTAL
III	26UGTL31	GT	6 Hrs	3	100	100	100
COURSE TITLE		பொதுத்தமிழ் - III					

COURSE OUTCOMES (பயன்கள்)

CO1	மாணவர்கள் காப்பியம், உரைநடை, ஊடகத்தமிழ், இலக்கணம், யாப்பு ஆகியவற்றின் அடிப்படைக் கருத்துக்கள்,பண்புகள், வரலாற்றுப் பின்னணிகளை அறிதல். (K1)
CO2	மாணவர்கள் தமிழ் இலக்கியவடிவங்கள் (காப்பியம்,உரைநடை) மற்றும் இலக்கணக் கூறுகளைப் (எழுத்து,சொல்,பொருள்,யாப்பு) புரிந்துகொண்டு அவற்றின் தனித்துவங்களைவிளங்கிக் கொள்ளல். (K2)
CO3	மாணவர்கள் கற்ற இலக்கணவிதிகள் மற்றும் யாப்புமுறைகளைப் பயன்படுத்தி சரியான தமிழ் வாக்கியங்களையும் செய்யுள்களையும் உருவாக்கப் பயிற்சியளித்தல். (K3)
CO4	மாணவர்கள் காப்பியங்கள் மற்றும் உரைநடைப் படைப்புகளைப் பகுத்து, ஆய்வுசெய்து,அதன் கருத்து,கட்டமைப்பு, இலக்கியநயம் ஆகியவற்றை ஆராய்தல். (K4)
CO5	மாணவர்கள் இலக்கியப் படைப்புகளைதரம்,மொழிநடை, இலக்கணஅமைப்பு ஆகியவற்றைவிமர்சனமுறையில் மதிப்பீடுதல், (K5)
CO6	மாணவர்கள் தமிழ் இலக்கணம் மற்றும் யாப்புஅடிப்படையில் சுயமாக செய்யுள்,கட்டுரை,உரைநடைப் படைப்புகளைஉருவாக்கப் பயிற்சியளித்தல்;.(K6)

UNITS	SYLLABUS CONTENTS	HOURS
I	1. சிலப்பதிகாரம் - வழக்குரைக் காதை. 2. மணிமேகலை- ஆபுத்திரன் திறம் அறிவித்தகாதை. 3. சீவகசிந்தாமணி- பதுமையர் இலம்பகம். 4. கம்பராமாயணம் - மந்தரைச் சூழ்ச்சிப் படலம்.	30
	1. சூளாமணி 2. உதயணகுமாரகாவியம் 3. இயேசுகாவியம் 4. மருமக்கள் வழி மான்மியம்	
II	ஊரைநடை 1. காளத்திவேடனும் கங்கைவேடனும். 2. தீமையை இயற்றும் தன்மையினர் கூனி இயாகோ. 3. சிலம்புகாட்டும் சீர்மிகு சிந்தனைகள். 4. மணிமேகலை காப்பியத்தில் மானுட விழுமியங்கள். நாடகம் - வேலைக்காரி - அறிஞர் அண்ணா.	15
III	தமிழ் இலக்கிய வரலாறு (காப்பியங்கள்)	15
IV	இலக்கணம் - யாப்பு,எழுத்து, அசை. சீர்,தளை, அடி,தொடை,பா வகைகள்	15
V	ஊடகத்தமிழ் - விளக்கம், வகைகள்,செயல்பாடுகள் 1.இதழ்கள்	15

	2.வானொலி 3.தொலைக்காட்சி 4.திரைப்படம்	
TEXT BOOKS (பாடநூல்கள்)		
- தமிழ்த்துறைவெளியீடு-தூயசவேரியார்க் கல்லூரி,(தன்னாட்சி) பாளையங்கோட்டை. - வகைமைநோக்கில் தமிழ் இலக்கியவரலாறு-பாக்கியமேரி		
REFERENCE BOOKS (பார்வைநூல்கள்)		
- தமிழ் இலக்கியவரலாறு-சிற்பிபாலசுப்பிரமணியன் - புதியநோக்கில் தமிழ் இலக்கியவரலாறு-தமிழண்ணல் - தமிழ் இலக்கியவரலாறு-சேதுராமன்		
WEB SOURCES (இணையதளங்கள்)		
- Tamil Heritage Foundation – www.tamilheritage.org<http://www.tamilheritage.org> - Tamil Virtual University Library – www.tamilvu.org/library http://www.virtualvu.org/library - Project Madurai – www.projectmadurai.org - Chennai Library – www.chennailibrary.com<http://www.chennailibrary.com> - Tamil University Library – www.ulib.prg<http://www.ulib.prg> - Tamil E-books downloads – tamilebooksdownloads.blogspot.com - Tamil Books online – books.tamilcube.com - Catalogue of the Tamil Books in the library of British congress archive.org		

பொதுத்தமிழ் - IV
26UGTL41

Sem	Course Code	Course Category	Hours	Credit	MARK FOR EVALUATION		
					CIA	ESE	TOTAL
IV	26UGTL41	GT-IV	6 Hrs	3	100	100	100
COURSE TITLE		பொதுத்தமிழ்- IV					
COURSE OUTCOMES (பயன்கள்)							
CO1:	பழந்தமிழ் இலக்கியவரலாற்றறிவைப் பெறுதல் (K1, K2)						
CO2:	சங்க இலக்கிய அறிமுகங்களின் ஊடாகத் தமிழர் வாழ்வியல் நெறிகளை உணர்தல். (K2,K3)						
CO3:	தமிழ் இலக்கியங்களின் செய்யுள் உருவம்,உள்ளடக்கம், படைப்பியல் கொள்கைகளைப் புரிந்துகொள்ளுதல். (K4)						
CO4:	அகத்திணை,புறத்திணைவாழ்வியல் நெறிப்பாடுகளின் ஊடாகத் தமிழர்ப்பண்பாட்டு அடிப்படைகளை மதிப்பிடும் திறன் பெறுதல். (K2,K3)						
CO5:	மொழித்திறன்,படைப்புத்திறன் பெறுதல். (K3,K4)						
CO6:	நாடக இலக்கியஅனுபவத்தின் வழியாகதமிழ்ச் சமூகநிலைகளை இலக்கியமாக்கும் நுட்பங்களைப் பெறுதல். (K2,K6)						

UNITS	SYLLABUS CONTENTS	HOURS
I	செய்யுள் பகுதி 1 1. நற்றிணை (5பாடல்கள்) 2. குறுந்தொகை (5பாடல்கள்) 3. அகநானூறு (2பாடல்கள்) 4. புறநானூறு (5பாடல்கள்)	30
	செய்யுள் பகுதி 2 1. நெடுநல்வாடை முழுமையும் 2. திருக்குறள் (விருந்தோம்பல், நட்பாராய்தல், குறிப்பறிதல்) 3. நாலடியார் (கல்வி)	
II	உரைநடைக் கட்டுரைகள் 1. ஊரும் பேரும் - ரா.பி. சேதுபிள்ளை 2. தமிழர் பண்பாடும்அதன் சிறப்பியல்புகளும் - தனிநாயகம் அடிகளார் 3. இலக்கியஉருவாக்கமும் பயனும் - சேதுமணிமணியன் பயண இலக்கியம் 1. மண் புதிது - சுப்பராத்மிமணியன்	15
III	தமிழ் இலக்கியவரலாறு 1. சங்ககாலம் 2. சங்கம் மருவியகாலம்	15
IV	இலக்கணம் -பொருள் 1. அகப்பொருள் 2. புறப்பொருள் 3. அணியிலக்கணம் (உவமை,உருவகம்,பிறிதுமொழிதல்,வஞ்சப்புகழ்ச்சி,தற்குறிப்பேற்ற அணி)	15
V	மொழிப்பயிற்சி 1. ஒப்பும் மறுப்பும் (ஒருகருத்தினை வெட்டி,ஒட்டி எழுதும் பயிற்சி) 2. விண்ணப்பம் எழுதுதல் (பயிற்சி) 3. தமிழில் தன்விவரக் குறிப்புவரைதல் (பயிற்சி) 4. மேடைப்பேச்சு நுட்பங்கள் (நேர்முகப் பயிற்சிமற்றும் மதிப்பீடு)	15

TEXT BOOKS (பாடநூல்கள்)
1. பொதுத்தமிழ் பாடநூல், தமிழ்த்துறை வெளியீடு ,தூய சுவேரியார் கல்லூரி,பாளையங்கோட்டை. 2. பாக்கியமேரி,தமிழ் இலக்கியவரலாறு,பதினொன்றாம் பதிப்பு - 2025 ,பூவேந்தன் பதிப்பகம்,மயிலாப்பூர்,சென்னை. 3. சுப்பரபாரதிமணியன்இமண் புதிது,முதல் பதிப்பு 2018 அறிவுப்பதிப்பகம்,சென்னை.
REFERENCE BOOKS (பார்வைநூல்கள்)
பார்வை நூல்கள் 1. மது.ச.விமலானந்தம்தமிழ் இலக்கியவரலாறு, 2. மு. வரதராசனார்,தமிழ் இலக்கியவரலாறு, 3. தமிழண்ணல்,புதியநோக்கில் தமிழ் இலக்கியவரலாறு.
WEB SOURCES (இணையதளங்கள்)
• Tamil Heritage Foundation – www.tamilheritage.org<http://www.tamilheritage.org> • Tamil Virtual University Library – www.tamilvu.org/library http://www.virtualvu.org/library • Project Madurai – www.projectmadurai.org • Chennai Library – www.chennailibrary.com<http://www.chennailibrary.com • Tamil University Library – www.ulib.prg<http://www.ulib.prg> • Tamil E-books downloads – tamilebooksdownloads.blogspot.com • Tamil Books online – books.tamilcube.com • Catalogue of the Tamil Books in the library of British congress archive.org

HINDI

SEMESTER 1

UNIT I: GRAMMAR

- Swar(स्वर),
- Vyanjan(व्यंजन),
- Barah Khadi(बारहखड़ी),
- Shabd aur Vakya Rachna (शब्द और वाक्य रचना)

UNIT II: SUBODH HINDI RACHNA

- Binna binna arth(भिन्न भिन्न अर्थ),
- Numbers (गिनती1-100),
- Vaakyong mein Prayag kijiye (वाक्यों में प्रयोग कीजिये)
- Rishto ke Naam (रिश्तो के नाम)
- Gharelu padartho ke Naam (घरेलु पदार्थों के नाम)

UNIT III: PROSE

- Sadharan Vakya aur Sangya (संज्ञा),
- Sarvanaam(सर्वनाम)
- Visheshan(विशेषण)
- Kriya (क्रिया)

UNIT IV: SHORT STORIES

- Bacho ki Kahaniya

UNIT V: COMPREHENSION

- Sant Tiruvalluvar, संत तिरुवल्लुवर,
- Hamara desh, (हमारा देश,)
- Paryavaran Sanrakshan, (पर्यावरण संरक्षण)
- Naari Sashaktikaran, (नारी सशक्तिकरण)
- Rastriya janvar(राष्ट्रीय जानवर)

Reference Books

Hindi sentences - Chaturbhuj Sahay

Subodh Hindi Grammar - Phoolchand Jain

Sankshipt Hindi Grammar - Kamta Prasad

Practical Hindi - Nagappa

Abhinav Hindi Grammar – Nagappa

Saral Hindi Grammar - Shyamchandra Kapur

Grammar Pradeep - Ramdev

Laghu Bal Kathaye - Ramashankar

Captivating Stories - Premchand

CONCISE GRAMMAR OF THE HINDI LANGUAGE - H.C Scholberg

Hindi Grammar - Edwin Greaves

SEMESTER II

UNIT I: Hindi Ekankiya

- Sooryodhaya(सूर्योदय),
- Mayoppiya (मायोपिया),
- Udhayan (उदयन),
- Upendranath Ashk – Lakshmi ka Swagat

Characters: (Tippani)

- Nirjarani (निर्झरणी),
- Sudhi(सुधी)
- Thathagath(तथागत),
- Udhayan (उदयन),

UNIT II: Hindi Kahaniya

- Premchand – Bade Ghar ki Beti
- Malathi Joshi – Vo Tera Ghar Yah Mera Ghar
- Gyanranjan - Pita

UNIT III: ANCIENT POETRY

- Pathya Chayanika– KabeerDhoha–Saaki (साखी) 1 to 10.

UNIT IV: Vyakaran

- Kriya Visheshan (क्रियाविशेषण),
- Sambandh Bodhak (संबंधबोधक),
- Samuchay Bodhak (समुच्चयबोधक)
- Vismayadi Bodhak (विस्मयादिबोधक) aadi shabdo ka prayog

UNIT V:

Pratiyogi Pariksha par aadharit Nimnalikhit Vishayo se sambandhit Prashikshan Karya

- Tamil Bhasha: Mahakavi Bharatiyar
- Sanket Vikas dwara Lekhan kala aur Kahani Lekhan ka Vikas
- Gadyansh dekhkar sahi Shirshak chunna
- Pathit Vyakaran par aadharit Vakya rachna
- Vibhinna Pratiyogi parikshao ke bare mein suchna pradan dena

Reference Books

- Sooryodaya (Dakshin Bharat Hindi Pracharsabha publications)
- Aath Ekanki Natak - Ed. Dr. Ramkumar Verma
- Das Ekanki

SEMESTER III

Niji Patra – Arth aur Bhed, Pitaji/Mataji ke naam patra, Mitra, Bhai aadi ke naam patra

UNIT I: Niji Patra Lekhan

- Niji Patra - Arth aur Bhed
- Pitaji/Mataji ke naam patra
- Mitra, Bhai aadi ke naam patra
- Paribhashik Shabdawali - 20 words

Unit II

- Samajik Patra Lekhan
- Aavedan Patra - Noukri, Chutti aadi
- Dak Adhikari ke naam patra
- Paribhashik shabdawali - 20 words

Unit III

- Vyavasayik Patra Lekhan
- Vyavasayik Patra - Arth aur Bhed
- Prakashak ke naam patra
- Shikayathi
- Paribhashik shabdawali - 20 words

Unit IV

- Samanya Parichay
- Sarkari Patra
- Ardh-Sarkari Patra
- Gyapan, Paripatra
- Anusmarak
- Paribhashik Shabdawali - 20 words

Unit V

- Precis Writing And Applied Grammar (Ling, Vachan and Karak)
- Karak (कारक)
- Vachan badaliye(वचन बदलिए),
- Ling badaliye(लिंग बदलिए)

Reference Books

- Viyavaharik Hindi, Hindi Prachar press, T.Nagar, Madras-600 017
- Alekhan aur Tippan - Prof. Viraj
- Alekhan Kichlu

SEMESTER IV

UNIT I: STORIES (दक्षिणी कथाएं)

- Meri pathni(मेरी पत्नी),
- Thotha aur Mynah(तोता और मैना),
- Noorunisha(नूरनिशा),
- Mruthudhand (मृत्यु दंड),
- Karmaveer(कर्मवीर) and their Characters.

UNIT II: Proud yogiki aur Hindi

- Unicode
- Dewanagari Lipi
- Hindi ki Vibhinna Website - Ek Parichay

UNIT III: POETRY (काव्यशास्त्र)

Ras :

- Kavyaras (काव्यरस),
- Veer ras (वीररस),

Sandh:

- Chowpayi (चौपाई),
- Rola(रोला),

Alankar:

- Yamakalankar (यमकअलंकार),
- Upmaalankar (उपमाअलंकार).

UNIT IV:

AUTOBIOGRAPHY (Sathya ka Swar–Gandhiji ki Jeevani)

- Ma, bap aur Janma(मां, बाप और जन्म)
- Ladakpan (लड़कपन)
- High school mein (हाई स्कूल में)
- Vivah aur Mamsabhakshan(विवाह और मांस भक्षण)
- Ankhen Kuli (आंखें खुली)

Unit V :Pratiyogi priksa par aadharit Computer sambandhit prashikshan Karya

- Hindi mein Powerpoint banana
- Hindi mein Google Document taiyar karna
- Hindi mein Google form taiyar karna
- Vibhinna pratiyogi pariksha ke bare mein suchna pradan karna

Reference Books

- Social Networking: Naye Samay ka Samvad – Ed. Sanjay Dwivedi
- Jansanchar aur Maas Culture - Jagdeeshwar
- Media: Bhumandalikaran aur Samaj - Ed. Sanjay Dwivedi
- Naye Jamane ki Patrakarita - Sourabh Shukla
- Patrakarita se Media tak - Manoj Kumar

French semester-I

UNIT. I

Communication:	Decrire la salle de classe et le professeur.
Grammaire :	Les articles indefinis et defines, les verbes reguliers et irreguliers.
Culture:	Les symbols de la France.
Projet:	Desiner les objets dans le sac et dans la trousse.

UNIT. II

Communication:	Parler de la journee.
Grammaire :	Les verbes pronominux,Affirmatif Negatif et interrogatif
Culture:	Les Frontieres de la France.
Projet:	Faire un rapport sur la journee des parents.

UNIT. III

Communication:	se presenter, parler de la nationlite, dire son numero de telephone.
Grammaire :	Les prepositions , Accord adjective nom, verbes aller venir.
Culture:	Les fete en France trditions et multiculturalisme.
Projet:	faire une liste des camarades et noter leurs numeros de telephone a

haute

voix et demander a un ami de verifier.

UNIT. IV

Communication:	parler de la nourriture et des repas simples et sains.Decrire les
Grammaire :	L'impertif,Les articles partitifs,
Culture:	Les plats francais.
Projet:	Dessiner et decrire l nourriture que les gens mangent dans leur pays,

UNIT. V

Communication:	Exprimer ses gouts.
Grammaire :	Les adjectifs qulificatifs, les adjectifs possessifs, La negation.
Culture:	La France et ses regions.
Projet:	qu'est-ce que tu aimes faire pendant ton temps libre?

- Lecon 1.** La vie scolaire de luc
- Lecon 2.** La vie quotidienne de luc
- Lecon 3.** Le monde multiculturel
- Lecon 4.** La bonne nourriture
- Lecon 5.** Parlons de nos preferences

Ref.Avenir method de francais 3

**French
Semester-II**

UNIT. I

Communication:	Demander et donner les directions , Situer un endroit (sur la carte)
Grammaire :	Les prepositions L'interrogation.
Culture:	Les vetements francais.
Projet:	Faire une carte de la ville imaginaire.

UNIT. II

Communication:	Parler de la semaine ,Parler des activites faites pendant la semaine.
Grammaire :	Les articles contractes,Les adjectifs demonstratifs, les expressions avec les verbes Faire et Avoir.
Culture:	Les villes connues en France.
Projet:	Preperer un employ du temps avec des activites faites pe dant la semaine.

UNIT. III

Communication:	Parler du passe, Raconter le week end dernier.
Grammaire :	Le passe compose avec l'auxilaire avoir, La formation du participle passe.
Culture:	Noel
Projet:	Faire un petit dossier sur les activites faites pendant les vacances d'ete.coller les photos de ces activites faites.

UNIT. IV

Communication:	Parler du passe, Rconter les vacances dernieres
Grammaire :	Le passe compose avec l'auxilaire etre.
Culture:	Les montagnes en France.
Projet:	Preparer un dossier sur la fete favorite celebree l'annee derniere.

UNIT. V

Communication:	Parler de la ville de demain , Exprimer des projets et des predictions.
Grammaire :	Le future proche, Le future simple.
Culture:	Les monuments en France.
Projet:	Imginer et presenter la ville du future

- Lecon 6.** Sara cherche son chemin
Lecon 7. Ma semaine en action
Lecon 8. Mon weekend dernier
Lecon 9. Mon sejour a Annecy
Lecon 10. La ville du futur

Ref.Avenir method de francais 3

French

semester-III

UNIT. I

Communication:	Decrier ce que les Francais aiment faire , Parler de la vie des Francais.
Grammaire :	Les articles indefinis et defins ,Les articles partitifs,Les articles contractes.
Culture:	La France dans le Coeur des Francais.
Projet:	Preparer un dossier sur ce que les gens du pays aiment faire.

UNIT. II

Communication:	Comparer la vie des adolescents d'autrefois et d'aujourd'hui.
Grammaire :	Le negation, Les articles.
Culture:	Les sous cultures adolescents.
Projet:	Decrivez la vie des adolescents d'hier et d'aujourd'hui.

UNIT. III

Communication:	Parler d'un sport.
Grammaire :	L'imperatif,L'interrogation questions/reponses,Lesconjonctins.
Culture:	Le sport en France.
Projet:	Parler du sport favort.

UNIT. IV

Communication:	Decriver les vacances,Racontredes experiences,Envoyerles mails.
Grammaire :	Le passe compose.
Culture:	La France ,une destination touristique.
Projet:	Dessiner ou coller les images de l'anniversaire fete l'annee derniere, rediger un petit texte pour raconter ce jour.

UNIT. V

Communication:	Parler d'une sortie scolaire,Ecrire un e-mail.
Grammaire :	Le passe recent, le futur proche .
Culture:	Les penitures celebres du muse du Louvre.
Projet:	Ecris sur une visite au muse.

- Lecon 1.** Esprit Francais.
- Lecon 2.** Les ados modernes
- Lecon 3.** Une grande aventure a velo
- Lecon 4.** Un sejour a nice
- Lecon 5.** La sortie au muse scientifique

Ref.Avenir method de francais 4

French
Semester-IV

UNIT. I

Communication:	Parler de l'automobile
Grammaire :	Les adjectifs les verbes .
Culture:	Les automobiles en France.
Projet:	Faire un dossier sur ta voiture .Coller une photo de cette voiture et decrire cette voiture.

UNIT. II

Communication	Reflechir aux villes a venir,Parler des projets d'avenir.
Grammaire :	Le futur simple ,le futur proche.
Culture:	Les projets d'avenir en France
Projet:	preparer un dossier sur les changements attendus dans la ville .

UNIT. III

Communication:	partager la recette , Parler de la nourriture.
Grammaire :	Les adverbs de quantite,l'adjectif indefini.
Cultur	les fetes et les traditions.
Projet:	Preparerun dossier sur un dessert prefereet parle de son origine.

UNIT. IV

Communication:	Discuter les avantages d'internet,Ecrire un blog.
Grammaire :	Les adjectifs demonstratifs , Les adjectifs possessifs ,Les prepositions.
Culture:	Les principaux medias francais.
Projet:	Faire un rapport sur les avantages et les inconvenients d'internet.

UNIT. V

Communication:	Rediger des invitations , Ecrire des .messages les consignes, Repondre a une invitation.
Grammaire :	Les verbes pronominaux , les verbes pronominaux a l'impertif.
Culture:	Les arts du spectacle en France.
Projet:	Rediger une belle invitation pour feter l'anniversaire d'un grand parent.

Lecon 6. Le monde des automobiles

Lecon 7. La vie en 2050

Lecon 8. L'epiphanie en France

Lecon 9. La vie en ligne

Lecon 10. On fait quoi ce week-end?

Ref.Avenir method de francais 4

GENERAL ENGLISH

DEPARTMENT OF ENGLISH

UG – PART II - GENERAL ENGLISH

(The Seven-Tier Pattern recommended by UGC Curriculum Development Centre and Identified as Best Practice by NAAC)

	Stream A (For learners of high entry level proficiency)	Stream B (For learners of average entry level proficiency)	Stream C (For learners of low entry level proficiency)
Courses in Semester I	IV 26UGEL14	III 26UGEL13	I 26UGEL11
Courses in Semester II	V 26UGEL25	IV 26UGEL24	II 26UGEL22
Courses in Semester III	VI 26UGEL36	V 26UGEL35	III 26UGEL33
Courses in Semester IV	VII 26UGEL47	VI 26UGEL46	IV 26UGEL44

GENERAL COURSE OUTCOMES

CO1 Acquire the four language skills (Listening, Speaking, Reading, and Writing)

CO2 Develop the skill of independent reading and interpreting of graded texts

CO3 Expand and consolidate active and passive vocabulary

CO4 Acquire the skills needed to participate in a conversation that builds knowledge collaboratively

CO5 Acquire a clear understanding of English Grammar to facilitate the accuracy of communication.

CO6 Develop the skills of formal written communication to be used in academic and career-related contexts

TEXTS

Course I – *SPARK I: An Integrated Course Text for General English*, Department of English, St. Xavier's College (Autonomous), Palayamkottai.

Course II - *SPARK II: An Integrated Course Text for General English*, Department of English, St. Xavier's College (Autonomous), Palayamkottai.

Course III - *SPARK III: An Integrated Course Text for General English*, Department of English, St. Xavier's College (Autonomous), Palayamkottai.

Course IV - *SPARK IV: An Integrated Course Text for General English*, Department of English, St. Xavier's College (Autonomous), Palayamkottai.

Course V - *SPARK V: An Integrated Course Text for General English*, Department of English, St. Xavier's College (Autonomous), Palayamkottai.

Course VI – *SPARK VI: An Integrated Course Text for General English*, Department of English, St. Xavier's College (Autonomous), Palayamkottai.

Course VII - *SPARK VII: An Integrated Course Text for General English*, Department of English,
St. Xavier's College (Autonomous), Palayamkottai.
Courses I –VI –*Intermediate English Grammar* by Raymond Murphy. Cambridge University Press,
1999.

EXTERNAL EXAMINATION

❖ External Examination has two components:

1) Written Examination and 2) Spoken English Viva Voce

❖ A three-hour written examination will be conducted for 100 marks for all General English papers and the scores will be converted to 40 marks, with a pass minimum of 16 marks.

❖ At the end of every semester, Spoken English Viva Voce will be conducted for all the students for 100 marks (four components) and the scores will be converted to 10 marks, with a required pass minimum of 4 marks.

❖ To pass in any General English paper, a student must secure the pass minimum of 40 out of 100 (16/40 in Written Examination and 4/10 in Spoken English Viva Voce Examination).

Distribution of marks: **Written Exam** (100 marks) Converted to 40 marks
 Spoken English Viva voce (100 marks) Converted to 10 marks
 TOTAL (40+10) = 50 marks

INTERNAL ASSESSMENT

❖ Two Internal Examinations shall be conducted for 50 marks each along with the Continuous Internal Assessments for 30 marks.

❖ The internal assessment for the courses may include skill-based activities such as seminar presentation/spoken English /critical podcast/ video essay/ creating a 5–8 slides on a topic/ composing a poem/ submitting a relevant photo with description etc.

In both the Internal Examinations and Semester Written Examination, 40% of the mark is allotted for literature-based questions, and 60% of the mark is allotted for grammar and composition exercises.

General English Evaluation Procedure

Internal Examination			Converted to	Total
CIA 1 (Written)	50	Converted to 70	50	100
CIA 2 (Written)	50			
Two Classroom Assessments (Spoken/Skill-based Activities) 2x 15	30	30		
External Examination			Converted to	
Semester Exam (Written)	100	Converted to 40/ (Pass Min. 16)	50	
Semester Viva Voce 4x25 (Spoken)	100	Converted to 10/ (Pass Min. 4)		

Course I

Hours: 6

Course Code: 26UGEL11

Credits: 3

LEARNING OUTCOMES

LO1 To provide an ambience to acquire the basic language skills, listening, speaking, reading, and writing

LO2 To make the learners learn the basic elements of grammar

LO3 To enable them to involve in basic communicative activities

LO4 To develop basic vocabulary

LO5 To help the learners comprehend and respond in English

LO6 To build confidence in using English to communicate

UNIT – I POETRY (READING AND WRITING SKILLS)

1. Sarojini Naidu- “Indian Weavers”
2. Robert Burns – “My Love is like a Red Red Rose”

UNIT – II SHORT STORIES (READING AND WRITING SKILLS)

1. W. Somerset Maugham – “The Ant and the Grasshopper”
2. Guy De Maupassant – “The Necklace”

UNIT –III GRAMMAR AND VOCABULARY SKILLS

1. Use of Verbs: Verb Grid (Positive, Negative & Question), Regular Verbs, Irregular Verbs & Modal
2. Tenses: Active Voice Tenses & Passive Voice Tenses
3. Use of Nouns: Forms of Personal Pronouns, Use of Nouns as Subject, Object, Complement and Object of the Preposition
4. Sentence Patterns: SV, SVO, SVC, SVA, SVOA, SVIODO
5. Punctuation and Capitalisation
6. Reading Comprehension (5 Anecdotes and 5 Wisdom Stories)

UNIT – IV LISTENING AND SPEAKING SKILLS

1. Listening Practice –Listen and Do exercises: Listening to English songs, simple Indian short stories, homonyms/homophones
2. Pronunciation Practice: Vegetables, Fruits, Flowers, Trees, Spices, Eatables
3. Introducing Oneself
4. Introducing Others

UNIT –V LISTENING AND SPEAKING SKILLS

1. Greetings
2. Making Request
3. Reading Aloud (From the text)
4. Describing a place / a picture (With hints)

COURSE OUTCOMES

Learners will be able to

CO1 Use grammatical structures in meaningful constructions

CO2 Use oral communication for day-to-day activities

- CO3 Use simple sentences for oral and written communication
 CO4 Use punctuation and capitalisation accurately
 CO5 Comprehend what they listen to, and respond to it at the primary level
 CO6 Read and appreciate simple stories and anecdotes

TEXT BOOKS

- *SPARK I: An Integrated Course Text for General English*, Department of English, St. Xavier's College (Autonomous), Palayamkottai.
- *Intermediate English Grammar* by Raymond Murphy. Cambridge University Press, 2019.

REFERENCE

- *Spoken English: A Foundation Course* by Kamalesh Sadanand and Susheela Punitha, Orient Longman Private Limited, 2008, ISBN 81-250-3467-6.
- *Spoken English for You* by G. Radhakrishna Pillai and K. Rajeevan, Emerald Publishers, 1987, ISBN 978-81-7966-023-2.
- *Better English Pronunciation* by Thakur KBP Sinha, Vijay Nicole Imprints, 2005, ISBN 81-8209-068-7.
- Bhatnagar, R. P. *English for Competitive Examinations*, India: Trinity Press, 2017
- Sinha, R. P. *Current English Grammar and Usage with Composition*. India: Oxford University Press, 2018.

QUESTION PATTERN

SEMESTER EXAMINATION	Marks
PART A - MCQs (7 from each of the Units I, II & 6 from Unit III)	20
PART B - Compulsory - Units I, II & III (5X3)	15
• Unit I - Short answer/ ERC • Unit II - Short answer/ ERC • Verb Grid (be verb) • Verb Grid (possessive) • Verb Grid (action/passive)	
PART C – Compulsory- Unit III (5x7)	35
• Use of Verbs: Verb Grid • Tenses • Use of Nouns • Sentence Patterns • Punctuation and Capitalisation	
PART D - (3x10)	30
• Essay (250 words) Unit I (Either/or) • Essay (250 words) Unit II (Either/or) • Compulsory -Comprehension	
TOTAL	100

INTERNAL EXAMINATIONS		Marks
PART A - MCQs 6X1(2 from each of the Units I, II & III)		6
PART B- Compulsory - one question from each of the Units I, II & III		
1 Short answer/ 1 ERC / Grammar (3X3)		9
PART C –Compulsory (Unit III) (3X5)		15
PART D- (2X10)		20
• Essay - Either /or Units – I & II 250 words • Compulsory- Grammar/ Composition		
TOTAL		50

INTERNAL ASSESSMENTS Marks

Skill-based activity - 2x15 30
 (Seminar presentation/Spoken English/Critical Podcast/ Video Essay/ Creating a 5–8 slide on a topic/
 Composing a poem/ Submitting a relevant photo with description, etc.)
TOTAL 30

Viva Voce Components: 100 Marks

1. Introducing Oneself / Others (25)
2. Reading Aloud (From the text) (25)
3. Describing a place / a picture (With hints) (25)
4. Conversation with the examiner (Greetings/ Making Request) (25)

COURSE II

Hours: 6

Course Code: 26UGEL22

Credits: 3

LEARNING OUTCOMES

LO1 To provide an ambience to acquire the basic language skills, listening, speaking, reading, and writing

LO2 To make the learners frame questions and answers

LO3 To enable them to involve in basic communicative activities

LO4 To develop a comprehensible use of adjectives

LO5 To help the learners comprehend and respond in English

LO6 To develop oral communication for day-to-day activities

UNIT – I POETRY (READING AND WRITING SKILLS)

1. Rabindranath Tagore – “Leave this Chanting and Singing”
2. Gerard Manley Hopkins- “God’s Grandeur”

UNIT – II SHORT STORIES (READING AND WRITING SKILLS)

1. Sister Nivedita - “The Judgement Seat of Vikramaditya”
2. Stephen Leacock - “With the Photographer”

UNIT – III GRAMMAR AND VOCABULARY SKILLS

1. Use of Adjectives
2. Use of Conditional ‘If’ (Probable & Improbable Conditions)
3. Use of ‘who’, ‘which’, ‘where’ & ‘that’ in combining sentences
4. Framing questions – ‘Wh –’ & ‘Yes’ / ‘No’ Questions
5. Prefixes and Suffixes
6. Developing Hints into a Paragraph

UNIT – IV LISTENING AND SPEAKING SKILLS

1. Listening Practice – Listen and Do exercises: Sound patterns and words ending ‘s’ endings and ‘d’ endings, and Listening to English songs and Indian short stories
2. Pronunciation Practice: Medical Terms/ Names of Ailments/People /Currency/ Countries and Capitals/World-famous Cities
3. Making Requests
4. Offering help

UNIT – V LISTENING AND SPEAKING SKILLS

1. Seeking Permission
2. Expressing Gratitude
3. Reading Aloud (from the Prescribed Text)
4. Narrating a Story (from Hints)

COURSE OUTCOMES

Learners will be able to

CO1 Use grammatical structures in meaningful contexts

CO2 Use oral communication for day-to-day activities

CO3 Use simple sentences for oral and written communication

CO4 Use enhanced vocabulary

CO5 Comprehend and respond to what they listen to at the secondary level

CO6 Read and appreciate simple pieces of fiction and non-fiction

TEXT BOOKS

- *SPARK II: An Integrated Course Text for General English*, Department of English, St. Xavier's College (Autonomous), Palayamkottai.
- *Intermediate English Grammar* by Raymond Murphy. Cambridge University Press, 2019.

REFERENCE

- *Spoken English: A Foundation Course* by Kamalesh Sadanand and Susheela Punitha, Orient Longman Private Limited, 2008, ISBN 81-250-3467-6.
- *Spoken English for You* by G. Radhakrishna Pillai and K. Rajeevan, Emerald Publishers, 1987, ISBN 978-81-7966-023-.
- *Better English Pronunciation* by Thakur KBP Sinha, Vijay Nicole Imprints, 2005, ISBN 81-8209-068-7.
- Bhatnagar, R. P. *English for Competitive Examinations*, India: Trinity Press, 2017.
- Sinha, R. P. *Current English Grammar and Usage with Composition*. India: Oxford University Press, 2018.

QUESTION PATTERN

SEMESTER EXAMINATION

Marks

PART A – MCQs (7 from each of the Units I, II, and 6 from Unit III)	20
PART B – Compulsory Units I, II & III - Short answers/ ERC/Grammar (5X3)	15
• Unit I - Short answer/ ERC • Unit II - Short answer/ ERC • Prefixes • Suffixes • Adjectives	
PART C – Compulsory Unit III (5x7)	35
• Adjectives • Use of 'who' & 'where' in combining sentences • Use of 'which' & 'that' in combining sentences • Framing questions – 'Wh –' & 'Yes' / 'No' Questions • Developing Hints into a Paragraph	
PART D – (3x10)	30
• Essay (250 words) Unit I (Either/or) • Essay (250 words) Unit II (Either/or) • Compulsory -Use of Conditional 'If' (Probable & Improbable Conditions)	

TOTAL

100

INTERNAL EXAMINATIONS		Marks
PART A - MCQs 6X1(2 from each of the Units I, II & Unit III)		6
PART B- Compulsory-one question from each of the Units I, II & III		
1 Short answer/ 1 ERC/ Grammar (3X3)		9
PART C –Compulsory (Unit III) (3X5)		15
PART D – (2X10)		20
• Essay - Either /or Units – I & II 250 words • Compulsory - Grammar/ Composition		
TOTAL		50

INTERNAL ASSESSMENTS Marks

Skill based activity – 2x15 30
 (Seminar presentation/Spoken English/Critical Podcast/ Video Essay/ Creating a 5–8 slide on a topic/
 Composing a poem/ Submitting a relevant photo with description, etc.)
TOTAL 30

Viva-Voce Components: 100 Marks

1. Pronunciation: Medical Terms/ Names of Ailments/People /Currency/ Countries and Capitals/
World famous Cities (25)
2. Conversation: Making Requests/Offering help/Seeking Permission /Expressing Gratitude (25)
3. Reading Aloud (from the Prescribed Text) (25)
4. Narrating a Story (from Hints) (25)

COURSE III

Hours: 6

Course Code: 26UGEL13, 26UGEL33

Credits: 3

LEARNING OUTCOMES

LO1 To involve the learners in reading and interpreting English in poetry and prose (Fiction and Non-fiction)

LO2 To enable learners to write about prescribed literature

LO3 To help learners learn the appropriate use of articles, prepositions and adverbs

LO4 To help learners develop vocabulary register through homonyms, homophones and homographs

LO5 To facilitate in learners, the ability to create a narration based on hints

LO6 To build confidence in the learners to speak English for specific purposes

UNIT – I POETRY (READING AND WRITING SKILLS)

1. William Shakespeare – “All the World’s a Stage”
2. P. B. Shelley – “Ozymandias”
3. Oliver Goldsmith – “The Village Schoolmaster”

UNIT – II SHORT STORIES/ PROSE (READING AND WRITING SKILLS)

1. O. Henry – “The Gift of the Magi”
2. Katherine Mansfield – “A Cup of Tea”
3. Mark Twain – “A Day at Niagara”

UNIT – III GRAMMAR AND VOCABULARY SKILLS

1. Articles
2. Prepositions
3. Adverbs
4. Spotting Errors (Articles/ Prepositions / Adverbs)
5. Homonyms, Homophones, Homographs
6. Constructing a story using hints

UNIT –IV LISTENING AND SPEAKING SKILLS

1. Listening Practice: Listen and Do exercises: Listening to short passages , short stories (Indian and British) , English songs, *Mind your Language* (Episodes:1-2)
2. Pronunciation Practice : Words related to professions
3. Words generally mispronounced
4. Telephonic Conversation
5. Making Suggestions

UNIT – V LISTENING AND SPEAKING SKILLS

1. Complimenting / Congratulating
2. Expressing Sympathy
3. Reading aloud
4. Describing a picture/ Describing a process
5. Personal Conversation (Habits, Hobbies, Future Plan)

COURSE OUTCOMES

Learners will be able to

CO1 Read and understand English in poetry and prose (Fiction and Non-Fiction)

CO2 Write coherent essays about the prescribed literature

CO3 Use articles, prepositions and adverbs appropriately

CO4 Use homonyms, homophones, and homographs appropriately, ensuring clarity and precision in their spoken and written English

CO5 Create a narration from hints

CO6 Speak English confidently in a descriptive as well as expository style

TEXT BOOKS

- *SPARK III: An Integrated Course Text for General English*, Department of English, St. Xavier's College (Autonomous), Palayamkottai.
- *Intermediate English Grammar* by Raymond Murphy. Cambridge University Press, 2019.

REFERENCE

- *Spoken English: A Foundation Course* by Kamalesh Sadanand and Susheela Punitha, Orient Longman Private Limited, 2008, ISBN 81-250-3467-6.
- *Spoken English for You* by G. Radhakrishna Pillai and K. Rajeevan, Emerald Publishers, 1987, ISBN 978-81-7966-023-2.
- *Better English Pronunciation* by Thakur KBP Sinha, Vijay Nicole Imprints, 2005, ISBN 81-8209-068-7.
- Bhatnagar, R. P. *English for Competitive Examinations*, India: Trinity Press, 2017.
- Sinha, R. P. *Current English Grammar and Usage with Composition*. India: Oxford University Press, 2018.

QUESTION PATTERN

SEMESTER EXAMINATION

Marks

PART A - MCQs (7 from each of the Units I, II, and 6 from Unit III)

20

PART B - Compulsory - Units I, II & III (5X3)

15

- Unit I - Short answer/ ERC
- Unit II - Short answer/ ERC
- Articles
- Prepositions
- Adverbs

PART C – Compulsory - Unit III (5x7)

35

- Articles
- Prepositions
- Adverbs
- Homonyms, Homophones, Homographs
- Constructing a story using hints

PART D - (3x10)

30

- Essay (250 words) Unit I (Either/or)

- Essay (250 words) Unit II (Either/or)
- Compulsory -Spotting Errors (Articles/ Prepositions / Adverbs)

TOTAL **100**

INTERNAL EXAMINATIONS

Marks

PART A - MCQs 6X1(2 from each of the Units I, II &Unit III)

6

PART B- Compulsory one question from each of the Units I, II & III

1 Short answer/ 1 ERC/ Grammar (3X3)

9

PART C – Compulsory- (Unit III) (3X5)

15

PART D- (2X10)

20

- Essay - Either /or Units – I & II 250 words

- Compulsory- Grammar/ Composition

TOTAL **50**

INTERNAL ASSESSMENTS Marks

Skill based activity – 2x15 30

(Seminar presentation/Spoken English/Critical Podcast/ Video Essay/ Creating a 5–8 slide on a topic/
Composing a poem/ Submitting a relevant photo with description etc.)

TOTAL 30

Viva-Voce Components: 100 Marks

1. Pronunciation: Words related to professions /Words generally mispronounced (25)
2. Conversation: Making Suggestions /Complimenting / Congratulating /Expressing Sympathy /
Habits, Hobbies, Future Plan (25)
3. Reading aloud (25)
4. Describing a picture/ Describing a process (25)

COURSE IV

Hours: 6

Course Code: 26UGEL14, 26UGEL24, 26UGEL44

Credits: 3

LEARNING OUTCOMES

LO1 To make learners read and understand intermediate level poetry and prose

LO2 To encourage learners to continue building a vocabulary register as the students interpret, speak, and write about prescribed literature

LO3 To make learners use tenses and concord in meaningful constructions

LO4 To enable learners to employ appropriate synonyms and antonyms in written and spoken communication

LO5 To help learners learn the different types of letters, resumes and the art of composing e-mails and the use of appropriate language

LO6 To build confidence in students to speak English naturally and clearly, moving from basic sounds and reading practice to advanced conversations about books and real-world issues

UNIT – I POETRY (READING AND WRITING SKILLS)

1. John Milton – “On His Blindness”
2. Lewis Carroll – “The Walrus and the Carpenter”
3. Rudyard Kipling – “If”

UNIT – II SHORT STORIES /DRAMA (READING AND WRITING SKILLS)

1. Rabindranath Tagore – “The Postmaster”
2. Ernest Hemingway– “Cat in the Rain”
3. Fritz Karinthy – “The Refund”

UNIT – III GRAMMAR AND VOCABULARY SKILLS

1. Tenses
2. Concord
3. Spotting Errors (Tenses and Concord)
4. Describing a thing / a place / an event
5. Synonyms and Antonyms (Bhatnagar)
6. Letter Writing (Formal & Informal), Resumes and Composing emails

UNIT – IV LISTENING AND SPEAKING SKILLS

1. Listening Practice: Listen and Do exercises: Listening to conversations, announcements, interviews of popular personalities, and *Mind your Language* (Episodes: 3-4)
2. Complaining
3. Apologising
4. Offering encouragement and responding to them
5. Warning Someone

UNIT –V LISTENING AND SPEAKING SKILLS

1. Pronunciation Practice: Vowels and Diphthongs & Strong and Weak forms of words
2. Reading Aloud
3. Issue-based conversation
4. Speaking about prescribed literature

5. Speaking on a given topic

COURSE OUTCOMES

Learners will be able to

CO1 Read, interpret, and analyse intermediate level of English in poetry, prose, and fiction

CO2 Write coherent essays on prescribed literature

CO3 Use the various tense forms accurately with proper subject - verb agreement

CO4 Compose logically organized descriptive paragraphs, formal letters, professional resumes and emails

CO5 Use synonyms and antonyms appropriately, allowing for more expressive, varied, and accurate communication

CO6 Speak English fluently with confidence in an expository as well as analytical style

TEXTBOOKS

- *SPARK IV: An Integrated Course Text for General English*, Department of English, St. Xavier's College (Autonomous), Palayamkottai.
- *Intermediate English Grammar* by Raymond Murphy. Cambridge University Press, 1999.

REFERENCE

- *Spoken English: A Foundation Course* by Kamalesh Sadanand and Susheela Punitha, Orient Longman Private Limited, 2008, ISBN 81-250-3467-6.
- *Spoken English for You* by G. Radhakrishna Pillai and K. Rajeevan, Emerald Publishers, 1987, ISBN 978-81-7966-023-2.
- *Better English Pronunciation* by Thakur KBP Sinha, Vijay Nicole Imprints, 2005, ISBN 81-8209-068-7.
- Bhatnagar, R. P. *English for Competitive Examinations*. India: Trinity Press, 2017.
- Sinha, R. P. *Current English Grammar and Usage with Composition*. India: Oxford University Press, 2018.

QUESTION PATTERN

SEMESTER EXAMINATION	Marks
PART A - MCQs (7 from each of the Units I, II, and 6 from Unit III)	20
PART B- Compulsory- Units I, II & III (5X3)	15
• Unit I - Short answers/ ERC • Unit II - Short answers/ ERC • Tenses • Concord • Spotting Errors (Tenses and Concord)	
PART C – Compulsory- Unit III (5x7)	35
• Tenses • Concord • Spotting Errors (Tenses and Concord)	

- Describing a thing / a place / an event
- Synonyms(4) and Antonyms(3)

PART D - (3x10) 30

- Essay (250 words) Unit I (Either/or)
- Essay (250 words) Unit II (Either/or)
- Compulsory- Letter Writing/Resumes/ Composing emails

TOTAL 100

INTERNAL EXAMINATIONS

Marks

PART A - MCQs 6X1(2 from each of the Units I, II & Unit III)

6

PART B- Compulsory one question from each of the Units I, II & III

1 Short answers/ 1 ERC/ Grammar (3X3)

9

PART C –Compulsory (Unit III) (3X5)

15

PART D- (2X10)

20

- Essay - Either /or Units – I & II 250 words
- Compulsory- Grammar/ Letter writing/ Composition

TOTAL 50

INTERNAL ASSESSMENTS Marks

Skill based activity – 2x15

30

(Seminar presentation/Spoken English/Critical Podcast/ Video Essay/ Creating a 5–8 slide on a topic/ Composing a poem/ Submitting a relevant photo with description, etc.)

TOTAL 30

Viva-Voce Components: 100 Marks

1. Reading Aloud (25)
2. Issue-based conversation (25)
3. Speaking about prescribed literature (25)
4. Speaking on a given topic (25)

COURSE V

Hours: 6

Course Code: 26UGEL25, 26UGEL35

Credits: 3

LEARNING OUTCOMES

LO1 To introduce learners to the intermediate level of English through prescribed literature

LO2 To make learners read, interpret, and write about prescribed pieces of literature

LO3 To make learners learn complex language structures, the appropriate use of conjunctions and voice forms

LO4 To help learners become familiar with the accurate use of language with an awareness of common errors in language use

LO5 To make learners understand the logical sequence of ideas within a paragraph

LO6 To make learners speak English fluently with confidence, argue both sides of a topic with confidence, and discuss difficult modern issues with logic and ease

UNIT – I POETRY (READING AND WRITING SKILLS)

1. William Wordsworth – “The Solitary Reaper”
2. H.W. Longfellow – “A Slave’s Dream”
3. Robert Frost – “The Road Not Taken”

UNIT – II PROSE/ DRAMA (READING AND WRITING SKILLS)

1. Oscar Wilde - “The Model Millionaire”
2. A. A. Milne – “The Boy Comes Home”
3. Francis Bacon – “Of Friendship”

UNIT – III GRAMMAR SKILLS

1. Synthesis and Transformation of Sentences (Simple, Compound & Complex)
2. Conjunctions
3. Active – Passive Voice
4. Spotting Errors (Simple, Compound & Complex sentences/ Conjunctions/ Active – Passive Voice)

UNIT – IV ADVANCED WRITING/ VOCABULARY AND ANALYTICAL SKILLS

1. Expansion of Ideas / Proverbs
2. Dialogue Writing
3. Words often confused (Bhatnagar)
4. Sentence Arrangement

UNIT – V LISTENING AND SPEAKING SKILLS

1. Listening Practice - Listen and Do exercises: Listening to news reading, directions, stories in American English, and watching movies
2. Pronouncing Words ending with common Inflections (like – ‘logy’ ‘- graphy’ ‘-ation’ etc.), Pronouncing ‘R’ in different positions

3. Reading and Interpreting
4. Turncoat
5. Expand a Proverb
6. Issue-Based Conversation

COURSE OUTCOMES

Learners will be able to

CO1 Read, interpret and analyse poetic English to understand open possibility of inferences

CO2 Write logically planned essays to address specific questions concerning prescribed literature

CO3 Understand the forms and structural differences in different types of sentences and their specific purposes

CO4 Use complex language structures with appropriate conjunctions and voice forms

CO5 Use vocabulary actively with an awareness of words often confused

CO6 Use Spoken English fluently with confidence and accuracy for specific purposes such as analytical, argumentative, and expository talks

TEXT BOOKS

- *SPARK V: An Integrated Course Text for General English*, Department of English, St. Xavier's College (Autonomous), Palayamkottai.
- *Intermediate English Grammar* by Raymond Murphy. Cambridge University Press, 1999.

REFERENCE

- *Spoken English: A Foundation Course* by Kamalesh Sadanand and Susheela Punitha, Orient Longman Private Limited, 2008, ISBN 81-250-3467-6.
- *Spoken English for You* by G. Radhakrishna Pillai and K. Rajeevan, Emerald Publishers, 1987, ISBN 978-81-7966-023-2.
- *Better English Pronunciation* by Thakur KBP Sinha, Vijay Nicole Imprints, 2005, ISBN 81-8209-068-7.
- Bhatnagar, R. P. *English for Competitive Examinations*. India: Trinity Press, 2017.
- Sinha, R. P. *Current English Grammar and Usage with Composition*. India: Oxford University Press, 2018.

QUESTION PATTERN

SEMESTER EXAMINATION

Marks

PART A - MCQs (8 from Unit I, 7 from Unit II, and 5 from Unit III)	20
PART B- Compulsory Units I & II – 3 Short answers/ 2 ERC (5X3)	15
PART C – Compulsory - Unit III & IV (5x7)	35

- Synthesis and Transformation of Sentences (Simple, Compound & Complex)
- Conjunctions
- Active – Passive Voice
- Expansion of Ideas / Proverbs

- Words often confused

PART D - (3x10)	30
• Essay (250 words) Unit I & II (Either/or) • a) Dialogue Writing (5) b) Sentence Arrangement (5) • Compulsory -Spotting Errors (Simple, Compound & Complex sentences/ Conjunctions/ Active – Passive Voice)	
TOTAL	100

INTERNAL EXAMINATIONS Marks

PART A - MCQs 6X1(1 from Units I & II , 5 from Units III & IV)	6
PART B- Units I & II – 2 Short answers/ 1 ERC (3X3)	9
PART C –Compulsory (Units III & IV) (3X5)	15
PART D- (2X10)	20
• Essay - Either /or Units – I & II 250 words • Compulsory -Grammar/ Letter writing/ Composition	
TOTAL	50

INTERNAL ASSESSMENTS Marks

Skill based activity – 2x15	30
(Seminar presentation/Spoken English/Critical Podcast/ Video Essay/ Creating a 5–8 slide on a topic/ Composing a poem/ Submitting a relevant photo with description, etc.)	
TOTAL	30

Viva-Voce Components: 100 Marks

1. Reading and Interpreting (25)
2. Turncoat (25)
3. Expand a Proverb (25)
4. Issue-Based Conversation (25)

COURSE VI

Hours: 6

Course Code: 26UGEL36, 26UGEL46

Credits: 3

LEARNING OUTCOMES

LO1 To introduce learners to the advanced level of poetic English through representative pieces, to make them understand the oblique use of language

LO2 To make them read and understand classical English novel

LO3 To familiarise them with advanced language structures and the use of idioms and phrasal verbs

LO4 To make them understand and use different degrees for comparison, and use language for reporting speech

LO5 To acquaint them with the skills of expanding or developing, condensing ideas and responding to advertisements

LO6 To make them organize their professional knowledge into clear speeches, and discuss important world issues with confidence and logic

UNIT –I POETRY (READING AND WRITING SKILLS)

1. John Keats – “La Belle Dame Sans Merci”
2. John Donne – “Death Be Not Proud”
3. Walt Whitman – “O Captain! My Captain!”

UNIT - II FICTION (READING AND WRITING SKILLS)

George Orwell –*Animal Farm*

UNIT – III GRAMMAR AND VOCABULARY SKILLS

1. Degrees of Comparison
2. Direct- Indirect Speech
3. Spotting Errors/Correcting Errors (Comprehensive)
4. Idioms and Phrasal Verbs (Bhatnagar)

UNIT – IV ADVANCED WRITING AND ANALYTICAL SKILLS

1. Précis Writing
2. Essay Writing
3. Responding to the given advertisement
4. Cloze Test

UNIT – V LISTENING AND SPEAKING SKILLS

1. Listening Practice - Listen and Do exercises: Listening to famous speeches, poetry renditions, sports commentary, and TED Talks
2. Pronunciation Practice: Words generally often mispronounced
3. Reading and Interpretation
4. Issue-Based Conversation
5. Public speaking on a subject topic
6. Extempore

COURSE OUTCOMES

Learners will be able to

CO1 Read and interpret the oblique language of poetry and write appreciative essays on the prescribed literature

CO2 Read, interpret, and write analytical essays about prescribed literature

CO3 Use advanced grammar structures to report speech and use the three degrees of comparison for intended emphasis

CO4 Use advanced nuances of language such as idioms and phrasal verbs

CO5 Write reflective, descriptive, expository and imaginative essays with appropriate content, and condense material to a précis

CO6 Use English fluently and accurately for public speaking, extempore and other specific purposes

TEXT BOOKS

- *SPARK VI: An Integrated Course Text for General English*, Department of English, St. Xavier's College (Autonomous), Palayamkottai.
- Orwell, George. *Animal Farm*. Maple Classics, 2013.
- *Intermediate English Grammar* by Raymond Murphy. Cambridge University Press, 1999.

REFERENCE

- *Spoken English: A Foundation Course* by Kamalesh Sadanand and Susheela Punitha, Orient Longman Private Limited, 2008, ISBN 81-250-3467-6.
- *Spoken English for You* by G. Radhakrishna Pillai and K. Rajeevan, Emerald Publishers, 1987, ISBN 978-81-7966-023-2.
- *Better English Pronunciation* by Thakur KBP Sinha, Vijay Nicole Imprints, 2005, ISBN 81-8209-068-7.
- Bhatnagar, R. P. *English for Competitive Examinations*. India: Trinity Press, 2017.
- Sinha, R. P. *Current English Grammar and Usage with Composition*. India: Oxford University Press, 2018.

QUESTION PATTERN

SEMESTER EXAMINATION

Marks

PART A - MCQs (7 from Unit I, 8 from Unit II, and 5 from Unit III)	20
PART B – Compulsory -2 ERC from Unit I / 3 Short answers from Units II	15
PART C – Compulsory- Unit III & IV (5x7)	35
• Degrees of Comparison • Direct- Indirect Speech • Précis Writing • Essay Writing • Responding to the given advertisement	
PART D - (3x10)	30
• Essay (250 words) Unit I & II (Either/or) • Compulsory- Spotting Errors (5) Correcting Errors(5) (Comprehensive) • Compulsory- a) Idioms and Phrasal verbs (5) b) Cloze Test (5)	

TOTAL **100**

INTERNAL EXAMINATIONS

Marks

PART A - MCQs 6X1(1 from Units – I & II , 5 from Units III)

6

PART B- Compulsory Units I & II

1 ERC from Unit I /2 Short answers from Units I & II (3X3)

9

PART C –Compulsory (Unit III & IV) (3X5)

15

PART D- (2X10)

20

- Essay - Either /or Units – I & II 250 words
- Compulsory- Grammar/ Composition

TOTAL **50**

INTERNAL ASSESSMENTS Marks

Skill based activity - 2x15 30

(Seminar presentation/Spoken English/Critical Podcast/ Video Essay/ Creating a 5–8 slide on a topic/
Composing a poem/ Submitting a relevant photo with description, etc.)

TOTAL 30

Viva-Voce Components: 100 Marks

1. Reading and Interpretation (25)
2. Issue Based Conversation (25)
3. Public speaking on subject related topic (25)
4. Extempore (25)

COURSE – VII

Hours: 6

Course Code: 26UGEL47

Credits: 3

LEARNING OBJECTIVES

LO1 To facilitate learners' reading advanced English through representative pieces of Literature

LO2 To help learners infer and interpret prescribed literature and write coherent, analytical essays

LO3 To help learners analyse a selected dramatic scene to identify how dialogue and stage directions reveal character motivation and advance the central conflict

LO4 To encourage learners in using English skillfully and creatively to discuss, brainstorm or debate a topic, through active practice

LO5 To equip learners with the soft skills necessary for employability

LO6 To help learners to produce structured reports, engaging blogs and original creative pieces by adapting their writing style to suit different purposes and audiences

UNIT –I DRAMA (READING AND WRITING SKILLS)

1. *Julius Caesar* – Act III, Scene I
2. *Othello* – Act V, Scene II
3. *Hamlet*- Act I, Scene III

UNIT –II FICTIONS (READING AND WRITING SKILLS)

H. G. Wells –*Time Machine*

UNIT –III SOFT SKILLS AND SPEAKING SKILLS (Theory and Practice)

1. Interview Skills*
2. Group Discussion*
3. Debate*
4. Interpersonal Skills*

(* Included for Spoken English Viva Voce and Internal Assessments)

UNIT –IV SOFT SKILLS

1. Time Management
2. Problem-Solving Techniques
3. Teamwork
4. Leadership

UNIT –V ADVANCED WRITING SKILLS

1. Report Writing
2. Blog writing
3. Creative Writing (poem/short story)

COURSE OUTCOMES

Learners will be able to

CO1 Read and understand advanced forms of English in Literature

CO2 Interpret and write analytical essays on topics concerning prescribed pieces of literature

CO3 Speak English fluently and accurately in professional contexts

CO4 Use English effectively and creatively for interviews, group discussions, etc.

CO5 Behave, react, and handle situations connected to employability, using the acquired knowledge of soft skills

CO6 Demonstrate versatility in written communication by producing structured technical reports, engaging digital content for blogs, and original creative works that employ evocative language and narrative techniques

TEXT BOOKS

- *SPARK VII: An Integrated Course Text for General English*, Department of English, St. Xavier's College (Autonomous), Palayamkottai.
- Wells, H. G. *Time Machine*. Oxford University Press, 2017 Ed.
- Alphonse S. J., Xavier. *We Shall Overcome: A Textbook on Life Coping Skills*. ICRDDCE Publication, 2004.

REFERENCE

- Sijwalii B.S. and Indu Sijwali, *General Interview Skills for Both Government and Private Sectors*. Arihant Publications, 2023.
- Soman, Ashok M, *Graduates and Postgraduates Entering the Corporate World*. Himalaya Publishing House, 2023.
- Patnaik, Priyadarshi, *Communication, Logical Thinking, and Public Speaking*. Cambridge University Press, India, 2016.

QUESTION PATTERN

SEMESTER EXAMINATION	Marks
PART A - MCQs (5 from each of the Units I, II, III & IV)	20
PART B- Compulsory - (5X3) ERC from Unit I/ Short answers from Units II, III & IV	15
• Unit I • Unit II • Units III • Units IV • Units III/ IV	
PART C –Compulsory- Units I, II, III, IV & V (5x7)	35
• Short Essay (200 words)/ Annotation Unit I • Short Essay Unit II (200 words) • Short Essay Unit III (200 words) • Short Essay Unit IV (200 words) • Creative Writing (poem/short story)	
PART D - (3x10)	30
• Essay (250 words) Unit I & II (Either/or) • Compulsory -Report writing (250 words) • Compulsory - Blog writing (250 words)	
TOTAL	100

INTERNAL EXAMINATIONS		Marks
PART A - MCQs 6X1 (1 from Units I & II , 5 from Units III & IV)		6
PART B- Units I & II – 2 Short answers from Units I & II/ 1 ERC from Unit I (3X3)		9
PART C –Compulsory (Unit III & IV) (3X5)		15
PART D- (2X10)		20
1. Essay - Either /or Units – I & II 250 words		
2. Compulsory - Report writing / Blog writing/ Creative Writing (Unit V)		
TOTAL		50

INTERNAL ASSESSMENTS Marks

Skill based activity – 2x15 30
 (Seminar presentation/ Video Essay/ Creating a 5–8 slide on a topic/ writing a poem, short story/Mock Interview /Group Discussion/Debate etc.)

TOTAL 30

Viva-Voce Components: 100 Marks

1. Interview Skills: Mock Interview (25)
2. Group Discussion (25)
3. Debate (25)
4. Interpersonal Skills: Conversation (25)

DEPARTMENT OF HUMAN EXCELLENCE
St. Xavier's College (Autonomous), Palayamkottai
Courses Offered

Semester	Category	Course Code	Course Title
I	FC	26UHER11/ 26UHEE11	Religion: Catholic Doctrine / Ethics
II	SEC3	26UHEI21	Integrated Personality Development
III	SEC4	26UHEL31	Life Coping and Entrepreneurial Skills Management
IV	EVS	26UEVS41	Environmental Studies
V	VE	26UVEH51	Human Rights and Social Analysis

NME

Semester	Category	Course Code	Course Title
I	Library	26ULBN11	Foundations of Library Science
I	XRF	26UXRN11	Traditional Knowledge of Indian Medicinal Systems
II	Library	26ULBN21	Information Resources
II	STAND	25USTN21	Rural Development Studies
II	XRF	26UXRN21	Indian Traditional Medicinal Foods
III	XRF	26UXRN31	Food Microbiology
IV	XRF	26UXRN41	Herbal Resources and Their Conservation
IV	MAX Forum	26UMXN41	Society, Economy and Politics in Contemporary India

Common Question Pattern

Internal Test

Part A	Answer ALL the questions in one or two lines	5 x 2 = 10
Part B	Answer ALL the questions, each in a paragraph	3 x 5 = 15
Part C	Write an essay on the following	1 x 10 = 10

Semester Exam

Part A	Answer ALL the questions in one or two lines	10 x 3 = 30
Part B	Answer ALL the questions, each in a paragraph	5 x 8 = 40
Part C	Write an essay on each the following	2 x 15 = 30

RELIGION: CATHOLIC DOCTRINE

(26UHER11)

SEMESTER: I	VE	HOURS: 2	CREDITS: 2	TOTAL HOURS: 30
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Course Outcomes:

Upon completion of the course the students will be able to

CO1: Recite the Sacraments (K1)

CO2: Identify the challenges of the present day church (K1)

CO3: Associate Old and New testaments of the bible (K2)

CO4: Explain the Church history (K2)

CO5: Discuss the Marian worship (K2)

CO6: Summarize the catholic social teachings (K2)

Unit I: Introduction to Bible

(6 Hours)

Bible as a Word of God, its inspiration, the Canon - Old and New Testaments and their interconnectedness - Traditional and modern interpretations

Unit II: Jesus and His Teachings

(6 Hours)

Parables of Jesus – Important Teachings of Jesus: Kingdom of God – God’s Mercy – Trust in Providence – Two Commandments of love – Be committed – No condemnation of wealth – No condemnation of sinners – Love of enemies; Prayer: Jesus’ Prayer – Types of Prayer; Jesus the Healer – Types of Miracles of Jesus – Jesus the Liberator

Unit III: A Brief History of the Church & Changes and Challenges of the Modern World

(6 Hours)

The beginnings of the Church - Medieval period and its challenges - The importance of the Second Vatican Council and their decrees – Synodality; Casteism – Ecumenical unity and Inter Religious harmony – Digital world and Religious Faith - Catholic Social Teachings

Unit IV: Introduction to the Sacraments and Trinity

(6 Hours)

The origin of the seven sacraments - Their practices and meanings – Trinity: The Father – The Son and the Holy Spirit

Unit V: Introduction to Mariology

(6 Hours)

Mary, Mother of God and Jesus - Mary, our Mother and in the Gospels - Mariology in the history of the Church – Mary as a Prophet of revolution

REFERENCES:

- “Faith Matters” material prepared by the Department of Human Excellence.
- Second Vatican Council Documents.

ETHICS
(26UHEE11)

SEMESTER:I	VE	HOURS:2	CREDITS: 2	TOTALHOURS:30
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Course Outcomes

After completing this course, the learner will be able to know/understand: Cognitive Level (K-Level)

- CO-1** Describe the Ethical foundations and human values (K2)
- CO-2** Identify Ethics and its relationship with religions (K1)
- CO-3** Evaluate the personal ethical codes in day-to-day life (K5)
- CO-4** Associate ethics in family and society (K3)
- CO-5** Apply moral, professional, and personal ethics in academic, workplace, and daily life situations. (K3)
- CO-6** Analyse the modern ethical issue (K4)

Unit-I Introduction to Ethics and Human Interface

(6 Hours)

Meaning, Nature and Scope of Ethics-Challenges and Importance of ethics-Basic ethical foundations-Human values: Tolerance, Compassion, Rationality, Objectivity. Scientific Attitude, Integrity, Respecting Conscience and Empathy. Mahatma Gandhi and Ethical practices: Non violence, Truth, Non-hatred and love for all, concern for the poorest, objectivity nationalism and Education for man making relation between ends and means.

Unit-II Ethics and Major religions and civilizations (6 Hours)

Ethics and its relationship with Religions- Ten Commandments: Christianity and Judaism tradition-Hinduism- Dharma and Mokhya (out of 4 goals of life Dharma, Artha, Kama and Mokhya),concept of Purusartha, Nisakama Karma (work without attachment to results), Concept of Basudev Kutumba and Peace(Whole including all animals, plants, inanimate beings and human form one world)-Islamic Ethics: Justice, Goodness, Kindness, Forgiveness, Honesty, Purity and piety- Buddhism - Arya AstangikaMarg: Right view, Thought , Speed, Action, Livelihood, Efforts, Attention and Concentration.

Unit-III Personal and Professional ethics (6 Hours)

Moral percepts -Dynamics of personal morality-Moral Conscience-Ethical aspects of Thirukural-Evils of corruption- Professional ethics- Nature, Characteristics, scope, type. Professional Value: Trusteeship, Inclusiveness, Commitment, Sustainability, Accountability, Transparency, Impartiality.

Unit-IV Governance, Family and Social Ethics (6 Hours)

Concept of Good Governance-Principles: Transparency, Accountability, Rule of Law- Ethical Leadership and Public Responsibility-Corruption and Integrity in Public Life-Role of Family in ethical formulations-Respecting persons-Peace and Justice-Human Duties-Respecting Persons and Human Dignity-Equality, Justice and Fairness -Peace, Non-violence and Social Harmony-Tolerance, Pluralism and Social Inclusion.

Unit- V Judicious Use of Technology (6 Hours)

Judicious use of Mobile Phones, Electrical machines, Plastics, Television, Computers and their harmful effects. Ethics and Use of Digital Technology: Cyber ethics-, Ethics of social media: WhatsApp, Face book, Twitter and others.

Recommended Books/e-resources:

- R.R. Gaur, R Sangal, G.P. Bagaria (2009): A Foundation Course in Human Values and Professional Ethics, Excel Books.
- D.R. Kiran (2014) Professional Ethics and Human Values, McGraw Hill Education (India).
- Vivian L Vignoles (2017): Identity: Personal and Social, Chapter to appear in Oxford Handbook of Personality and Social Psychology (2nded.), edited by Kay Deaux and Mark Snyder.
- https://cdn.visionias.in/value_added_material/3b896-ethics.pdf

- Sargolzaei, E., & Nikbakht, M. (2017). The Ethical and Social Issues of Information Technology: A Case Study. *International Journal of Advanced Computer Science and Applications*, 8(10), 138–146. <https://doi.org/10.14569/ijacsa.2017.081019>
- Mirghaderi, L., Sziron, M., & Hildt, E. (2023). Ethics and Transparency Issues in Digital Platforms: An Overview. *AI (Switzerland)*, 4(4), 831–843. <https://doi.org/10.3390/ai4040042>
- Müller, V. C. (2022). The History of Digital Ethics. *Digital Dreams Have Become Nightmares: What We Must Do*. <https://doi.org/10.1145/3640479.3640499>
- Course Material Prepared by Department of Human Excellence.

INTEGRATED PERSONALITY DEVELOPMENT
(26UHEI21)

SEMESTER: II	SEC3	HOURS: 2	CREDITS: 2	TOTAL HOURS: 30
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Course Outcomes:

After completing this course, students will be able to:

CO1: Analyze individual personality traits, habits, and attitudes by utilizing self-awareness frameworks such as SWOC and the Johari Window. (K4)

CO2: Formulate actionable plans to build self-confidence, a positive mindset, and healthy self-esteem for continuous personal growth. (K6)

CO3: Implement self-management techniques, including mindfulness, yoga, and distraction control, to regulate stress and improve discipline. (K3)

CO4: Demonstrate effective interpersonal skills, including rapport building, assertiveness, and conflict management, within group discussions and team environments. (K3)

CO5: Design a systematic roadmap of realistic personal and academic goals using structured goal-setting methodologies. (K6)

CO6: Integrate ethical values, social responsibility, and gender sensitivity into professional conduct and real-life decision-making. (K4)

UNIT-I: Self-Knowledge

(6 Hours)

Exploring Habits, Attitudes, Self Awareness – Self introspection - SWOC analysis – Johari Window’s Self identity. Enhancing one’s Self image, Self -Esteem, Building self Confidence and Positive Mind Set.

UNIT-II: Self Management

(6 Hours)

Understanding of One’s Life Story- Focusing on Internal Narratives – Self-Talk, Self-Discipline- Managing Change, -Adaptation to change, Managing Distractions, Yoga and Mindfulness -Overcoming Inferiority Complex

UNIT-III: Personal Competence and Goal Setting

(6 Hours)

Developing Rapport - Giving and Receiving Constructive Feedback - Assertiveness and Conflict Management Skills - Group Discussion Skills –Goal Setting.

UNIT-IV: Personality Development

(6 Hours)

Recognizing the growth in different dimension of Holistic and Integrated Personality Development-Ethical Behavior-Gender Sensitivity and Respect- Civic Responsibility-Social Media Responsibility

UNIT-V: Emotional Well-Being

(6 Hours)

Meaning -Types of Emotions- Expressing Emotions- Managing Difficult Emotions -Self-Control-Healthy Relationships- Building Resilience & Coping Skills - -Mental Health Awareness.

Reference Books:

1. Dr.Xavier Alphonse S.J ,We Shall Overcome, ICRDEC Publications,Chennai,2004.
2. Harold R Wallace and L. Ann Masters, Personality Development South- Western Cengage Learning India PL,NewDelhi,2006.
3. Course Material Prepared by Department of Human Excellence.

**LIFE COPING AND ENTREPRENEURIAL SKILLS MANAGEMENT
(26UHEL31)**

SEMESTER:III	SEC 4	HOURS:2	CREDITS:2	TOTAL HOURS:30
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Course Outcomes:

After completion of the Course, the students will be able to

- CO1:** Explain holistic health including physical, mental, and social wellbeing. (K2)
- CO2:** Apply healthy lifestyle practices including nutrition, hygiene, and digital wellbeing. (K3)
- CO3:** Analyze social and professional situations using empathy and ethical reasoning. (K4)
- CO4:** Apply structured decision-making and problem-solving skills in real-life situations. (K3)
- CO5:** Demonstrate coping strategies for stress, crisis, and uncertainty. (K3)
- CO6:** Evaluate addiction risks and design strategies for a healthy lifestyle. (K5)

Unit I: Holistic Health & Lifestyle Management (6 Hours)

WHO's definition of Health – Dimensions of Health – Adolescent Health and Women's Health – Understanding Physical Self – Personal Hygiene and Grooming – Balanced Diet and Nutrition – Healthy Habits and Lifestyle – Lifestyle Diseases and Prevention – Digital Wellbeing (Screen Time, Sleep Cycle, Mental Balance) – Public Health Awareness.

Unit II: Social Intelligence & Relationship Management (6 Hours)

Family Relationship: Values in family relationship, nuclear family, Joint Family, Dependence, Overdependence, Happy family, Broken Family - Caring Elders - Rapport Building with Peers/Friends, Strangers, Transgenders - Professional Relationship: Officials, Mentors, Staff & Service Personnel- Other centeredness and others point of view and Empathy.

Unit III: Decision-Making & Problem-Solving Skills (6 Hours)

Types of Problems (Academic, Personal, Financial, Social) – Problem-Solving Strategies – Decision-Making Process – Rational and Intuitive Decision-Making – Ignatian Discernment Process – Lateral Thinking and Creativity – Basic Financial Literacy (Needs vs Wants, Saving, Budgeting).

Unit IV: Coping with Stress, Crisis & Change (6 Hours)

Meaning and Types of Stress – Causes of Stress (Academic, Social, Digital) – Stress Management Techniques – Emotional Regulation Strategies – Time Management and Productivity – Crisis Management (Failure, Uncertainty, Loss) – Building Resilience and Adaptability.

Unit V: Addiction Awareness & Personal Safety (6 Hours)

Meaning and Types of Addiction – Substance Addiction – Digital and Internet Addiction – Causes and Effects of Addiction – Prevention and Control Measures – Self-Regulation Techniques – Cyber Safety and Responsible Internet Usage – Seeking Help and Counselling Support.

Activity Collaborators: Anti-drug Club, Women's Forum.

Reference Books:

1. Dr. Xavier Alphonse S.J., We Shall Overcome, ICRDEC Publications, Chennai, 2004.
2. Covey Sean, Seven Habits of Highly Effective Teens, New York, Fireside Publishers, 1998.
3. Carnegie Dale, How to win Friends and Influence People, New York: Simon & Schuster, 1998.
4. Clear, James. 2018. Atomic Habits: An Easy & Proven Way to Build Good Habits & Break Bad Ones. New York: Avery
5. Atomic Habits – James Clear, Avery, 2018.
6. The 7 Habits of Highly Effective People – Stephen R. Covey, Free Press.
7. Emotional Intelligence – Daniel Goleman, Bantam Books.
8. Thinking, Fast and Slow – Daniel Kahneman, Penguin Books.
9. Course Material prepared by the Department of Human Excellence.

ENVIRONMENTAL STUDIES

(26UEVS41)

SEMESTER:IV	EVS	HOURS:2	CREDITS:2	TOTAL HOURS:30
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Course Outcomes:

The students will be able to:

CO1: Describe various natural resources and the fundamental principles of sustainable development to explain resource interdependence. (K1)

CO2: Explain the relationship between biodiversity and various conservation approaches to maintain ecological balance. (K2)

CO3: Apply prevention and mitigation strategies to address specific environmental issues and ecosystem degradation. (K3)

CO4: Illustrate the adverse health impacts of different types of pollution on human populations and ecosystems. (K3)

CO5: Evaluate environmental quality indicators and the effectiveness of climate change mitigation risks. (K5)

CO6: Summarize major international environmental treaties and national legislations aimed at environmental protection. (K2)

Unit I: Natural Resources

(6 Hours)

Environment – Definition; Overview of natural resources: definition, types of natural resources. Biotic and abiotic, renewable and non-renewable resources. Water resources: types, over-exploitation, issues, challenges, water scarcity, conflicts. Soil and mineral resources: important minerals, problems, soil as a resource. Energy resources: sources, conventional and non-conventional, implications. (IKS- Traditional water conservation methods (e.g., temple tanks, ooranis, johads). Indigenous agricultural practices and soil conservation methods.)

Unit II: Environmental pollution and Health

(6 Hours)

Natural and man-made disasters and their impacts of environment and management. Pollution: definitions, natural and man-made pollution. Different types of pollution- Air, Water, Soil, Noise, Radioactive and solid waste pollution: Sources of pollution, different types of pollutants, effects of pollution in environment and human health, prevention and control of pollution. (IKS- Traditional waste management practices. Herbal and indigenous methods to reduce pollution impacts.)

Unit III-Conservation of Biodiversity and Ecosystems

(6 Hours)

Biodiversity and its distribution: Levels and types, India and world, hotspots, threat categories. Ecosystems and ecosystem services: major types in India, basic characteristics, significance. Threats to biodiversity and ecosystems: land use, commercial exploitation of species and invasive species. Types of Biodiversity conservation (*In-situ and Ex-situ*). (IKS- Sacred groves and community-based conservation practices, Role of indigenous communities in biodiversity protection)

Unit IV: Climate change: Impacts, Adaptation and Mitigation

(6 Hours)

Climate change: structure and different layers of atmosphere, Impacts, vulnerability and adaptation to climate change. Mitigation of climate change: GHGs types, sources, impacts and control. Importance of 1.5 °C and 2.0 °C Global warming and Ozone depletion. Concept of carbon intensity, energy intensity and carbon neutrality; policy instruments, carbon capture and storage, climate justice. Anthropogenic factors - Human over population, over consumption, pollution, Mining, Transport, Environmental degradation and Impact of human activities. (IKS- Traditional climate-resilient farming practices. Indigenous housing designs for climate adaptation.)

Unit V: Environmental Treaties, Legislation and Sustainable Development

(6 Hours)

Overview of instruments of international cooperation: bilateral, multilateral, conventions and protocols, COPs. Major International Environmental Agreements: CBD, CITES, UNCCD, UNFCCC. Major Indian Environmental Legislations: acts, rules, sites, areas, zones and judgments. Introduction to sustainable development: SDGs, targets and indicators, challenges and strategies.

Principle of sustainable development, international efforts of sustainable development and sustainable development in India: Perspective and strategies. (IKS- Community based natural resource management models.)

Skill-Based Activities:

Unit-I	➤ Field observation of local water bodies ➤ Preparation of a household resource audit report ➤ Case study analysis on sustainable practices
Unit-II	➤ Air and water quality observation survey ➤ Preparation of eco-friendly products (natural cleaners, composting) ➤ Awareness campaign design
Unit-III	➤ Biodiversity documentation of campus/local area ➤ Preparation of herbarium or digital biodiversity register
Unit-IV	➤ Carbon footprint calculation (individual/department level) ➤ Tree plantation and climate awareness drive
Unit-V	➤ Mock COP session ➤ Policy analysis and presentation ➤ Preparation of sustainability action plan for the campus

General Suggestions:

- Educational visit to Xavier Solai be organized as a common activity for all students.
- Include activity based and project based assignments.
- Conduct orientation programs for EVS faculty on IKS and skill based pedagogy.
- Students examine environmental problems in their local communities and develop solutions to address them.

Reference Books:

1. Singh, J.S., Singh, S.P., Gupta, S.R. (2006). Ecology, Environment and Resource Conservation. Anamaya Publications.
2. Harris, Frances (2012). Global Environmental Issues, 2nd Edition. Wiley- Blackwell.
3. Krishnamurthy, K.V. (2003). Textbook of Biodiversity, Science Publishers, Plymouth, UK.
4. Ahluwalia, V. K. (2015). Environmental Pollution, and Health. The Energy and Resources Institute (TERI).
5. Pittock, Barrie (2009). Climate Change: The Science, Impacts and Solutions. 2nd Edition. Routledge.
6. Ministry of Environment, Forest and Climate Change (2019). A Handbook on International Environment Conventions & Programmes.
7. KanchiKohli, Manju Menon (2021). Development of Environment Laws in India, Cambridge University Press.

HUMAN RIGHTS AND SOCIAL ANALYSIS
(26UVEH51)

SEMESTER:IV	VE	HOURS:2	CREDITS:2	TOTAL HOURS:30
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Course Outcomes:

Upon completion of the course, the students will be able to

CO1: Recall key concepts of rule of law, democracy, equality, human dignity, citizenship, social justice, secularism and human rights.(K1)

CO2: Explain the Preamble to the Constitution of India, Fundamental Rights, Directive Principles, civil and political rights, socio-economic and cultural rights and collective rights.(K2)

CO3: Apply constitutional principles and human rights concepts to contemporary social issues. (K3)

CO4: Analyze interrelationships among inequalities, social structures, social problems, and reform initiatives in India. (K4)

CO5: Evaluate the effectiveness of constitutional provisions in promoting equality and social justice.(K5)

CO6: Design strategies fostering equality, communal harmony, responsible democratic citizenship and civic participation. (K6)

Unit I: Understanding basic concepts (6 Hours)

Understanding of key concepts, their meaning and significance in today's context – Rule of law, democracy, equality, human dignity, citizenship, social justice, secularism, human rights, fundamental rights and constitutional values.

Unit II: Classification of Human Rights (6 Hours)

Civil and Political rights, socio-economic and cultural rights collective rights or group rights – Preamble to the Constitution of India, Fundamental Rights - Equality rights, personal freedom and right to life, rights against arbitrary arrest and illegal detention, Rights against exploitation, Religion Freedom, Minority rights and Fundamental Duties (Art. 51A)

Unit III: Indian Social System (6 Hours)

Social Analysis - Social system and its components, Inequalities, caste structures and manifestation, Patriarchy and violence against women, Gender and sexual Minorities– A land of cultural linguistic and religious diversity –secular ethos – religious -fundamentalism-Indian politics -Interdependence of human being and society

Unit IV: Social Problems (6 Hours)

Indian Economic inequality and Poverty - Caste Discrimination : Untouchability, honour killing - Reservation policy, and Dalit empowerment - illiteracy and its effects Child labour, child abuse, bonded labour and their effects

Unit V: Social Reformers (6 Hours)

Promoting social justice and equality, women's rights, and eradication of caste discrimination - Dr. B. R. Ambedkar, Mahatma Gandhi, Dr. Muthulakshmi Reddy, Savitribai Phule, Fathima Sheikh, Pandita Ramabai and E. V. Ramasamy - Focusing on service to the marginalized, healthcare, education, and human values

Reference Books:

1. P.N. Sharma, "Social problems and issues in India", Bharat Book Centre, 2014, New India
2. The Reality Reloaded, Gurjot S. Kaler, Chandigarh, India, 2018
3. Course Material Prepared by the Department of Human Excellence
4. Activity-based learning will be conducted in collaboration with the Democracy Forum and Electoral Literacy Club to promote democratic values, constitutional awareness, and responsible citizenship.

PROGRAMMING IN C AND C++

(26UCSC11)

SEMESTER:I	CORE –T1	HOURS:5	CREDITS:5	TOTAL HOURS:75
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Course Outcomes:

Upon completion of the course, the students will be able to:

CO1	Remember the syntax of the basic constructs of C languages	K1
CO2	Differentiate different constructs of C and C++ languages	K2
CO3	Apply arrays, structures, pointers and OOP concepts in suitable situations	K3
CO4	Analyze and understand programs written in C and C++ languages	K4
CO5	Evaluate and debug programs written in C and C++ languages	K5
CO6	Design algorithm and write program using inheritance, polymorphism, files and generic programming	K6
K1-Remember; K2-Understand; K3-Apply; K4-Analyze; K5-Evaluate; K6-Create		

UNIT I

(15 Hours)

Overview of C: Basic Structure of C Programs-Programming Style. **Constants, Variables and Data Types:** Character set-C Tokens-Keywords and Identifiers-Constants-Variables-Data Types-Declaration of Variables-Declaration of Storage Class-Assigning values to variables-Defining symbolic constants-Declaring a Variable as Constant. **Operators and Expressions:** Operators-Arithmetic Expressions-Evaluation of Expressions-Precedence of Arithmetic Operators-Operator Precedence and Associativity.

Managing Input and Output Operations: Reading a character-Writing a character-Formatted Input-Formatted Output. **Decision making and Branching:** Decision making with IF –Simple IF Statement-The IF-ELSE statement-nesting of IF—ELSE Statements –The IF-ELSE Ladder-The Switch statement-The Ternary operator-The GOTO statement.

UNIT II

(15 Hours)

Decision Making and looping: The WHILE statement-The DO Statement-The FOR Statement-Jumps in loops. **Arrays:** One-Dimensional Arrays-Two-Dimensional Arrays-Multi-dimensional Arrays. **User –Defined Functions:** User-defined functions-Definition of function-function calls-Function Declaration-Recursion-Passing Arrays to functions.

UNIT III

(15 Hours)

Structure and Union: Defining Structure-Declaring structure variables-Accessing Structure members-Structure Initialization-copying and comparing structure variables-Operations on individual members-Array of Structures-Array within Structures- Structure and functions-unions. **Pointers:** Understanding Pointers-Accessing the address of a Variable-Declaring Pointer Variables-

Initialization of pointer Variables-Accessing a variable through its pointer. **File Management in C:** Defining and Opening a File-Closing a File-Input/Output Operations on Files - Handling-I/O Operations.

UNIT IV

(15 Hours)

Principles of Object Oriented Programming: Object Oriented Programming Paradigm – Basic Concepts of Object Oriented Programming - Benefits of OOP - Applications of OOP. C++ Statements - Structure of C++ program. **Tokens, Expressions and Control Structures:** Basic Data Types – User Defines Data Types -Reference variables – Operators in C++ - Scope resolution operators. **Functions in C++:** Function Prototyping - Call by Reference – Inline functions – Function overloading – Friend functions. **Classes and objects:** Specifying a class - Defining member functions – A C++ Program with class.

UNIT V

(15 Hours)

Constructors and Destructors: Constructors - Parameterized Constructors – Copy Constructor – Dynamic Constructor – Destructor. **Operator overloading and Type Conversions:** Defining Operator Overloading – Overloading Unary and Binary Operators – Rules for Operator Overloading – Type conversions. **Inheritance:** Defining Derived Classes – Single, Multilevel, Multiple, Hierarchical, Hybrid. Template function.

Text Books:

1. E. Balagurusamy, "Programming in ANSI C", Tata McGraw Hill Education India Pvt, Ltd., Eighth Edition, 2019.
2. E. Balagurusamy, "Object Oriented Programming with C++", Tata McGraw Hill, Seventh Edition, 2017

Reference Books:

1. Yashavant Kanetkar, "Let us C", BPB Publications; 19th Edition, 2019
2. Salim Y. Amdani, " 'C' Programming " Laxmi Publications; First edition, 2016
3. D.Ravichandran, "Programming with C++", Tata McGraw Hill, Third Edition, 2012.
4. Robert Lafore, "Object Oriented Programming with C++", Galgotia Publications Pvt Ltd., Fourth Edition, 2002.
5. Herbert Schildt, "C++ the Complete Reference ", Tata McGraw Hill Fourth Edition, 2006.

Web Resources: Web content from NDL / SWAYAM or open source web resources.

PRACTICAL – C and C++ PROGRAMMING

(26UCSC12)

SEMESTER-I CORE-P1 HOURS-5 CREDITS-5 TOTAL HOURS: 75

Course Outcomes:

Upon completion of the course, the students will be able to

CO1:	Develop C programs for simple applications using Control Structures	K6
CO2:	Develop C programs using arrays and functions	K6
CO3:	Develop C programs involving structures and pointers	K6
CO4:	Develop programs using simple object-oriented concepts	K6
CO5:	Develop programs using the concept of inheritance and polymorphisms	K6
CO6:	Develop programs using files and generic programming	K6

List of Practical

1. Simple C programs
2. Programs based on conditional structures (if, if-else, nested if-else, else if ladder)
3. Programs using loop structures (for, while, do-while)
4. Program using Arrays
5. Program using function and recursive function
6. Program using Structure
7. Program using pointers

List of Practical

1. Program using inline function
2. Program using default arguments
3. Program using Function Overloading
4. Program using class with member functions defined inside and outside
5. Array of objects.
6. Program using Static members
7. Object as function argument
8. Program using Constructors and destructor
9. Program using Operator Overloading
10. Program using Friend Function
11. Type conversions
12. Program using Inheritance (Different forms)

DISCRETE MATHEMATICS

(26UCSE11)

SEMESTER I EC-T1 HOURS: 4 CREDITS: 3 TOTAL HOURS: 60

Course Outcomes:

Upon completion of the course, the students will be able to

CO1	Recall and explain the fundamental concepts of set theory, relations, and mathematical induction used in discrete structures.	K2
CO2	Apply functions, sequences, recursive definitions, and algorithmic concepts to solve computational problems.	K3
CO3	Analyze propositional logic, logical equivalences, arguments, and quantified statements to construct valid logical reasoning.	K4
CO4	Apply vector and matrix operations, determinants, and Gaussian elimination to solve mathematical and computational problems.	K3
CO5	Solve complex problems using counting principles, permutations, combinations, pigeonhole principle, and inclusion–exclusion principle.	K3
CO6	Evaluate and apply discrete mathematical techniques including sets, logic, matrices, and counting methods to model and solve problems in computer science applications.	K5

UNIT I

(12 Hours)

SET THEORY: Introduction – sets and elements – universal set and empty set – Subsets – Venn Diagrams – set operations – Algebra of sets and duality – finite sets, counting principle – class of sets, power sets, partitions – mathematical induction.

RELATIONS: Introduction – product sets – relations – pictorial representations of relations – composition of relations – types of relations – closure properties – equivalence relations – partial ordering relations – n-ary relations.

UNIT II

(12 Hours)

FUNCTIONS AND ALGORITHMS: Introduction – functions – One – to – one – Onto and Inevitable functions – mathematical functions, exponential and logarithmic functions – sequences, indexed classes of sets – recursively defined functions – cardinality – algorithms and functions – complexity of algorithms.

UNIT III

(12 Hours)

LOGIC AND PROPOSITIONAL CALCULUS: Introduction – propositions and compound propositions – Basic logical operations – propositions and truth tables – tautologies and contradictions – logical equivalences – algebra of propositions – conditional and biconditional statements – arguments – logical implication – propositional functions, Quantifiers – Negation of quantified statements

UNIT IV

(12 Hours)

VECTORS AND MATRICES: Introduction – Vectors – Matrices – Matrix Addition and Scalar Multiplication – Matrix Multiplication – Transpose – Square Matrices – Invertible (Nonsingular) Matrices, Inverses – Determinants – Elementary Row Operations, Gaussian Elimination – Boolean (Zero-One) Matrices

UNIT V

(12 Hours)

COUNTING: Introduction – Basic counting principles – factorial Notation – Binomial coefficients – permutations – combinations – the pigeonhole principle – the inclusion - exclusion principle – ordered and unordered partitions.

Text Book:

1. Seymour Lipschutz, Marc Lipson, Discrete Mathematics, Tata McGraw Hill, 3rd Edition, 2010.

Reference Books:

1. J. L. Mott, A. Kandel, and T. P. Baker, Discrete Mathematics for Computer Scientists and Mathematicians, 2nd Edition, Pearson, 2015.
2. K.D.Joshi, “Foundation of Discrete Mathematics”, Wiley Eastern Ltd, 2019.

Web Resources:

1. <https://ocw.mit.edu/courses/6-042j-mathematics-for-computer-science/>
2. <https://www.codecademy.com/learn/discrete-math>

NUMERICAL METHODS

(26UCSE11)

SEMESTER I

EC-T1

HOURS: 4

CREDITS: 3

TOTAL HOURS: 60

Course Outcomes:

Upon completion of the course, the students will be able to

CO1	Recall basic concepts of numerical computation and sources of numerical errors.	K1
CO2	Explain numerical methods used to solve algebraic and transcendental equations.	K2
CO3	Apply numerical techniques to solve systems of linear equations.	K3
CO4	Use interpolation methods to approximate function values from discrete data.	K3
CO5	Analyze numerical differentiation and integration techniques to approximate solutions.	K4
CO6	Implement numerical methods to solve ordinary differential equations.	K3
K1-Remember; K2-Understand; K3-Apply; K4-Analyze; K5-Evaluate; K6-Create		

UNIT I:

(12 Hours)

Introduction and Numerical Errors: Importance of numerical methods in computer science – Floating-point representation – Sources of numerical errors – Truncation and round-off errors – Absolute, relative, and percentage errors – Accuracy and stability (introductory concepts).

UNIT II:

(12 Hours)

Solution of Nonlinear Equations Roots of algebraic and transcendental equations – Bisection method – Fixed-point iteration method – Newton–Raphson method – Convergence criteria and comparison of methods.

UNIT III:

(12 Hours)

Systems of Linear Equations: Linear equation solving in ancient Indian astronomy – Simultaneous equations used in planetary position calculations – Formulation of linear systems – Gaussian elimination method – Gauss–Jordan method – Iterative methods – Jacobi method – Gauss–Seidel method – Convergence of iterative methods.

UNIT IV:

(12 Hours)

Interpolation and Approximation: Interpolation concepts – Polynomial interpolation – Lagrange interpolation formula – Newton’s forward and backward interpolation formulas – Applications of interpolation in data approximation.

UNIT V:

(12 Hours)

Numerical Differentiation and Integration: Numerical differentiation using interpolation – Trapezoidal rule – Simpson’s 1/3 rule.

Numerical Solution of Ordinary Differential Equations: Initial value problems – Euler’s method – Modified Euler method – Introduction to Runge–Kutta method (Fourth Order).

Text Book:

1. Elementary Numerical Mathematics for Programmers and Engineers, Springer, 2024.

Reference Books:

1. Chapra, S. C., Canale, R. P., Numerical Methods for Engineers, McGraw-Hill Education, 2021.
2. Burden, R. L., Faires, J. D., Numerical Analysis, Cengage Learning, 2010.

Web Resources:

1. <https://ocw.mit.edu/courses/18-335j-introduction-to-numerical-methods-spring-2019>
2. <https://www.geeksforgeeks.org/>

WORD PROCESSING APPLICATIONS

(26UCSN11)

SEMESTER-I SEC1 HOURS-2 CREDITS-2 TOTAL HOURS: 30

Course Outcomes:

Upon completion of the course, the students will be able to

CO1	Apply the software tools in computer systems.	K1
CO2	Create the basic concepts of a word processing for package development.	K2
CO3	Apply the basic concepts of electronic spreadsheet software.	K3
CO4	To apply the basic concepts of database management system. (K4)	K4
CO5	Create a presentation using Power Point tool. (K5)	K5
CO6	To process text, images, data tables in a systematic manner. (K5)	K5

UNIT I (6 Hours)

Introductory concepts: Memory unit – CPU-Input Devices: Key board, Mouse and Scanner. Output devices: Monitor, Printer. Introduction to Operating systems & its features: DOS – UNIX– Windows. Introduction to Programming Languages.

UNIT II (6 Hours)

Word Processing: Open, Save and close word document; Editing text – tools, formatting, bullets; Spell Checker - Document formatting – Paragraph alignment, indentation, headers and footers, numbering; printing – Preview, options, merge.

UNIT III (6 Hours)

Spreadsheets: Excel – opening, entering text and data, formatting, navigating; Formulas – entering, handling and copying; Charts – creating, formatting and printing, analysis tables, preparation of financial statements, introduction to data analytics.

UNIT IV (6 Hours)

Database Concepts: The concept of data base management system; Data field, records, and files, Sorting and indexing data; Searching records. Designing queries, and reports; Linking of data files; Understanding Programming environment in DBMS; Developing menu drive applications in query language (MS – Access).

UNIT V (6 Hours)

Power point: Introduction to Power point - Features – Understanding slide typecasting & viewing slides – creating slide shows. Applying special object – including objects & pictures – Slide transition – Animation effects, audio inclusion, timers.

Recommended Texts

1. Peter Norton, “Introduction to Computers” Tata McGraw-Hill: New York, 2018.

Reference Books

2. Jennifer Ackerman Kettel, Guy Hat-Davis, Curt Simmons, “Microsoft 2013”, Tata McGraw- Hill: New York.

Web resources: Web content from NDL / SWAYAM or open source web resources.

LIST OF PRACTICAL

MS-WORD

1. Creating an Error Free Neat Document.
2. Creating Formatted Document using Formatting Attributes (Bullets and Numbering, Header and Footer)
3. Creating Documents with Columns.
4. Preparing Invitation using Word Art and Pictures.
5. Table Creation.
6. Mail Merge.

MS-EXCEL

1. Preparing Payroll.
2. Preparing Charts.

MS-ACCESS

1. Creating Table.
2. Formatting Worksheets.
3. Using Formulas.

MS-POWER POINT

1. Simple Presentation.
2. Presentation using Animation and Transition effect.

DATA STRUCTURES AND PYTHON PROGRAMMING

(26UCSC21)

SEMESTER II

HOURS-5

CREDITS-5

TOTAL HOURS-75

Course Outcomes:

Upon completion of the course, the students will be able to

CO1	Describe core Python concepts such as syntax, data types, operators, control statements and indentation.	K1
CO2	Explain Python functions, modules, strings, and built-in data structures using program execution.	K2
CO3	Apply Python constructs & linear data structures such as arrays, stacks and queues to solve problems.	K3
CO4	Analyze non-linear data structures (linked lists, trees, binary trees, graphs) using representations and traversals.	K5
CO5	Evaluate data structures and algorithms for efficiency and appropriate problem solving.	K5
CO6	Design efficient solutions by integrating Python programming with suitable data structures and algorithms.	K6

UNIT I

(15 Hours)

Basics of Python Programming: Features of Python-History of Python Future of Python-Literal Constants-Variables and Identifiers-Input Operation-Comments-Reserved Words-Indentation-Keywords- Operators and Expressions in Python-Data Types-Type conversion. Control Statements: Selection/Conditional Branching statements-Iterative Statements-nested loops- break, continue and pass statements-the else statement used with loops.

UNIT II

(15 Hours)

Functions: Function Definition – Function Call – Variable Scope and Lifetime-Return Statement- Lamda Functions (Anonymous Functions)-Function composition in Python-Recursive Functions-Built-in Functions. Modules: The import statement— Defining own modules. Python String: Built-in String methods and functions-Python String formatting. Python Data Structures: List-Tuple-set-Dictionaries

Unit III

(15 hours)

Data Structure Introduction: History of Algorithms- Definitions – Structure and Properties of Algorithms – Development of an algorithm – Data Structures and Algorithms- Indian stepwise algorithm design - Data Structure Definition and Classification. Arrays: Introduction – Array Operations – Number of elements in an array – Representation of arrays in memory – Applications.

Unit IV**(15 hours)**

Stacks: Introduction – Stack operations – Applications. Queues: Introduction – operations on Queues – Circular Queues – Other Types of Queues – Applications. Linked Lists : Introduction – Singly linked list – Circularly linked list – Doubly linked list – Applications.

Unit V**(15 hours)**

Trees and Binary Trees: Introduction – Trees: Definition and basic terminology – Representation of Trees – Binary Trees: Basic Terminology and types – Representation of Binary Trees – Binary Tree Traversal– Applications. Graphs: Introduction – Definition and Basic Terminology – Representation of Graphs – Graph Traversals- Applications.

Text Books:

1. **Reema Thareja**, *Python Programming Using Problem Solving Approach*, Oxford University Press, **Third Edition, 2025. (Units 1 & 2: Chapters 1, 2, 4, 5, 6, 7).**
2. **G. A. V. Pai**, *Data Structures and Algorithms: Concepts, Techniques and Applications*, Tata McGraw Hill Publishing Company Limited, New Delhi, **Paperback Edition, 2017. (Units 3, 4 & 5: Chapters 1, 2, 3, 4, 5, 6, 7).**

Reference Books:

1. Sheetal Taneja and Naveen Kumar, *Python Programming: A Modular Approach*, Pearson India, 2025.
2. Reema Thareja, *Data Structures and Algorithms*, Oxford University Press India, 2025.
3. **Bradley N. Miller and David L. Ranum**, *Problem Solving with Algorithms and Data Structures Using Python*, Pearson India, **Second Edition, 2024.**
4. Divakaran, P. P. *The Mathematics of India: Concepts, Methods, Connections*. Springer, 2016.

Web References:

1. <https://www.geeksforgeeks.org/python-data-structures-and-algorithms/>
2. <https://www.coursera.org/learn/python-data>
3. <https://www.codecademy.com/learn/learn-data-structures-and-algorithms-with-python>
4. <https://realpython.com/tutorials/data-structures/>

PRACTICAL - DATA STRUCTURES AND PYTHON PROGRAMMING
(26UCSC22)

SEMESTER II

HOURS-5

CREDITS-5

TOTAL HOURS-75

Course Outcomes:

Upon completion of the course, the students will be able to

CO 1	Identify basic Python concepts including data types, operators, expressions, and control statements.	K1
CO 2	Describe the use of functions, recursion, lambda functions and modules in Python programs.	K2
CO 3	Apply Python constructs to implement problem-solving logic using loops and control flow.	K3
CO 4	Analyze and implement linear data structures such as stacks, queues, and linked lists using Python.	K4
CO 5	Evaluate non-linear data structures including trees, binary search trees and graphs through implementation.	K5
CO 6	Design and implement efficient Python programs by integrating appropriate data structures.	K6
K1-Remember; K2-Understand; K3-Apply; K4-Analyze; K5-Evaluate; K6-Create		

List of Practical

1. Python programs using basic data types, operators and expressions.
2. Python programs using decision-making statements
3. Python programs using looping statements
4. Python programs using break, continue, pass, and loop–else statements.
5. Python Programs using user-defined functions with parameters and return values.
6. Python Programs demonstrating recursive functions.
7. Python Programs using lambda functions and built-in functions.
8. Python Programs using modules (built-in modules and user-defined modules)
9. Python Programs using Python data structures (list, tuple, set, dictionary).
10. Implementation of Stack using Python
11. Implementation of Queue and Circular Queue using Python
12. Implementation of Linked List using Python
13. Implementation of Binary Tree using Python
14. Implementation of Binary Search Tree using Python
15. Implementation of Graph traversal algorithms using Python.

COMPUTER ARCHITECTURE AND MICROPROCESSOR

(26UCSE21)

SEMESTER-II

EC-T2

HOURS-4

CREDITS-3

TOTAL HOURS:60

Course Outcomes:

Upon completion of the course, the students will be able to

CO1:	List the basic organization of computer system architecture.	K1
CO2:	Illustrate the principles of digital logic circuits and components.	K2
CO3:	Apply principles of data representation and computer arithmetic to perform conversions, representations, and arithmetic operations.	K3
CO4:	Examine various input-output organization mechanisms and memory organization techniques.	K4
CO5:	Summarize the design and operational effectiveness of Intel Pentium with its architectural features and performance.	K5
CO6:	Construct efficient microprocessor-based solutions using the Intel 8086 by creating structured assembly programs.	K6

UNIT I

(12 Hours)

Introduction: Basic organization of a computer: Historical Perspective. Digital Logic Circuits: Digital Computers – Logic Gates - Boolean Algebra – Map Simplifications – Combinational Circuits – Flip Flops. Digital Components: Decoders – Encoders – Multiplexers – Registers – Shift Registers – Binary Counters.

UNIT II

(12 Hours)

Data Representation: Data Types – Complements – Fixed point Representation – Conversion of Fractions – Floating-Point Representation – Other Binary Codes– Error Detection Codes. Computer Arithmetic: Introduction – Addition and Subtraction – Decimal Arithmetic Unit – Decimal Arithmetic Operations.

UNIT III

(12 Hours)

Input-Output Organization: Peripheral Devices – Input-Output Interface – Asynchronous Data Transfer – Modes of Transfer – Direct Memory Access - Input-Output Processor. Memory Organizations: Memory Hierarchy – Main Memory – Auxiliary Memory- Cache Memory – Virtual Memory – Memory Management.

UNIT IV

(12 Hours)

Salient Features of 80586 (Pentium) -A Few Relevant Concepts of Computer Architecture System Architecture-Branch Prediction - Enhanced Instruction Set of Pentium - What is MMX? - Intel MMX Architecture - MMX Data Types -MMX Instruction Set-Salient Points about Multimedia Application Programming-Pentium-Pro and Pentium-II - Pentium III (P-III). Pentium 4: Genesis of Birth of Pentium 4 - Salient Features of Pentium 4.

UNIT V

(12 Hours)

Intel 8086: Classification of 8086 Instructions – Binary Address of 8086 Registers – Description of 8086 Instructions - Data Transfer – Arithmetic – Logical – Rotate – Shift – Branch – Flag Manipulation – Processor Control. Assembler Directives: Symbols, Variables and Constants – To Assign Names to variables, Constants and Addresses - Assembler Directives for Intel 8086 Microprocessor.

Text Books:

1. M. Moris Mano, “Computer System Architecture, Revised Third Edition, Pearson, 2017. (Units - I, II, III)
2. K. Bhurchandi, A. K. Ray “Advanced Microprocessor and Peripherals”, Mc Graw Hill Publications, Third Edition, 2017. (Unit - IV)
3. B. Ram, “Fundamentals of Microprocessor and Microcomputers”, Dhanpat Raj Publications, Sixth Edition, 2021. (Unit - V)

Reference Books:

1. Ramesh S. Goankar, “Microprocessor Architecture, Programming and Applications with 8085”, Sixth Edition, Penram International Publishing Pvt. Ltd., 2013.
2. William Stallings, “Computer Organization and Architecture”, Eleventh Edition, Pearson. 2021.

Web Resources:

1. <http://www.mhhe.com/ray/microprocessors3>
2. <https://himpub.com/product/indian-knowledge-system-bhartiya-gyan-parampara/>.

MICROCONTROLLER

(26UCSE21)

SEMESTER-II

EC-T2

HOURS-4

CREDITS-3

TOTAL HOURS:60

Course Outcomes:

Upon completion of the course, the students will be able to

CO1:	Recall the fundamentals of microprocessors and microcontrollers, including the architecture, features, memory organization, and interrupt structure of the Intel 8051.	K1
CO2:	Explain the 8051- instruction set, addressing modes, instruction formats with simple sequence programs.	K2
CO3:	Use assembly language programs for the 8051 microcontrollers to implement basic operations such as looping, subroutines, I/O port programming, and data transfer.	K3
CO4:	Analyze interface devices (external memory, I/O, display units and sensors) with the 8051 microcontrollers for effective data acquisition and control.	K4
CO5:	Evaluate different data transfer techniques, timer/counter approaches, and serial communication methods for embedded system applications.	K5
CO6:	Implement microcontroller-based embedded systems integrating hardware and software to solve real-time problems.	K6

UNIT I:

(12 Hours)

Introduction: Microprocessors versus Microcontrollers - Microcontroller Features - Educational Need - Survey of Microcontrollers - Applications of Microcontrollers. Architecture of the Intel 8051: On-chip Oscillator and CPU Timing - Memory Organization - Register Organization - Multifunction I/O Ports - ALU Capability of 8051 - Reset Operation -Interrupt Structure.

UNIT II:

(12 Hours)

Instruction Set: Data and Its Representation - Instruction Formats - Addressing Modes - Organization of the Instruction Set. Assembly Language Programming: Software Design Steps - Assembly Language Format - Simple Sequence Programs - Program Looping - Subroutine Linkage.

UNIT III:

(12 Hours)

Interfacing External Memory: Program Memories - Data Memories - Important Memory Characteristics - Interfacing External Memory to 8051. Data Transfer Techniques and I/O ports: Synchronous Mode- Asynchronous Mode - Interrupt-driven Mode - I/O Port -8051 I/O Port Programming.

UNIT IV: (12 Hours)

Interfacing for Human Interaction: Interfacing of DIP Switches – Keyboard - Interfacing of Display Devices - Liquid Crystal Displays. Interfacing of Transducers, Sensors and Actuators: Transducers - Analog-to-Digital Converters - Data Acquisition Systems.

UNIT V: (12 Hours)

Timer/Counter operations: Software-based Approach - Hardware-based Approach - Combined Hardware–Software-based Approach. Serial Mode of Data Transfer: Serial Transmission Fundamentals – Standard Interfaces – 8051 Serial Interface - Universal Serial Bus.

Text Book:

Ajit Pal,” Microcontrollers: Principles and Applications”, PHI Learning Private Limited, 2011.

Reference Books:

1. Muhammad Ali Mazidi, "The 8051 Microcontroller and Embedded Systems", 2nd Edition, Pearson Education, 2013.
2. Krishna Kant, “Microprocessors and Microcontrollers: Architecture, Programming and System Design 8085, 8086, 8051, 8096”, PHI Learning Private Limited, 2010.
3. Raj Kamal, “Microcontrollers Architecture, Programming, Interfacing and System Design”, [Pearson Education](#), 2009.

Web Resources:

1. <https://www.mikroe.com/ebooks/architecture-and-programming-of-8051-mcus>
2. https://onlinecourses.nptel.ac.in/noc24_ee46/preview

ADVANCED EXCEL

(26UCSN21)

SEMESTER-II SEC2 HOURS-2 CREDITS-2 TOTAL HOURS: 30

Course Outcomes:

Upon completion of the course, the students will be able to

CO1	Recall and define fundamental Excel concepts and features, including cell referencing and functions	K1
CO2	Summarize the use of lookup functions like VLOOKUP for organizing and Consolidating data	K2
CO3	Apply conditional formatting, data filters, and formula-based tasks to real-world datasets.	K3
CO4	Analyze PivotTables and chart functionalities to compare and interpret business data	K4
CO5	Evaluate forecasting and scenario tools (Goal Seek, Data Tables) to support decision making.	K5
CO6	Create dynamic reports using advanced Excel features and integrate charts with PowerPoint/Word	K6

UNIT I

(6 Hours)

Basics of Excel- Customizing common options- Absolute and relative cells- Protecting and un-protecting worksheets and cells- Working with Functions - Writing conditional expressions - logical functions - lookup and reference functions- VLOOKUP with Exact Match, Approximate Match- Nested VlookUP with Exact Match- VlookUP with Tables, Dynamic Ranges- Using VLookUP to consolidate Data from Multiple Sheets.

UNIT II

(6 Hours)

Creating Pivot tables Formatting and customizing Pivot tables- advanced options of Pivot tables- Pivot charts- Consolidating data from multiple sheets and files using Pivot tables- external data sources- Running Total, Compare with Specific Field- Viewing Subtotal under Pivot- Creating Slicers.

UNIT III

(6 Hours)

More Functions Date and time functions- Text functions- Database functions- Power Functions - Formatting Using auto formatting option for worksheets- Using conditional formatting option for rows, columns and cells- What If Analysis - Goal Seek- Data Tables- Scenario Manager.

UNIT IV

(6 Hours)

Data Structuring and Table Management – Creating and managing Excel Tables; defining structured references; data validation techniques; removing duplicates; maintaining data integrity; using named ranges; dynamic named ranges

Charts - Formatting Charts- 3D Graphs- Bar and Line Chart together- Secondary Axis in Graphs- Sharing Charts with PowerPoint / MS Word, Dynamically- New Features Of Excel Sparklines, Inline Charts, Data Charts- Overview of all the new features.

Text Books

1. Dalgleish, Debra, and Bill Jelen. *Microsoft Excel 2019 Pivot Table Data Crunching*. Microsoft Press, 2019.

Reference Book

1. Walkenbach, John. *Excel 2019 All-in-One for Dummies*. John Wiley & Sons, 2018.

Web Resources

1. <https://support.microsoft.com/excel>
2. <https://www.w3schools.com/excel/index.php>

List of Practical

1. **Basic Operations in Excel:** To work with basic arithmetic operations and fundamental Excel functions (Addition, subtraction, multiplication, division, SUM, AVERAGE, MIN, and MAX on a sample sales dataset)
2. **Cell Referencing and Formula Application:** To implement relative, absolute, and mixed cell referencing in Excel formulas. (Calculate profit margins and tax computations using different referencing techniques.)
3. **Logical Functions Implementation:** To develop formula-based decision-making using IF, AND, OR, and nested IF functions. (Classify student grades or employee bonuses based on conditions)
4. **Lookup Functions:** To implement lookup functions such as VLOOKUP for data consolidation. (Retrieve employee or product details from structured tables)
5. **Working with Filters and Sorting:** To work with data filters and sorting tools to organize large datasets. (Filter sales data based on region, date, or revenue thresholds.)
6. **Working with Date Functions:** To develop date-based calculations using functions such as TODAY(), NOW(), DATEDIF(), YEAR(), MONTH(), and DAY().(compute age, project deadlines, and financial quarter summaries.)
7. **Conditional Formatting:** To implement conditional formatting rules for highlighting trends and anomalies. (Highlight top performers, overdue payments, and low inventory levels.)
8. **Descriptive Statistics and Histogram:** To analyze datasets using descriptive statistics and generate histograms. (Students will compute mean, median, standard deviation, and create frequency distributions.)
9. **Graphs and Charts Creation:** To develop graphical representations using column charts, line charts, pie charts, and bar graphs. (Compare quarterly sales performance using visual analytics).
10. **PivotTables and Scenario Analysis:** To create PivotTables and implement Goal Seek/Data Tables for business forecasting. (Students will analyze regional sales trends and perform break-even analysis.)

PROGRAMMING IN JAVA

(26UCSC31)

SEMESTER–III CORE-T3 HOURS–5 CREDITS–5 TOTAL HOURS: 75

Course Outcomes:

Upon completion of the course, the students will be able to

CO1	Define the evolution, features, buzzwords, and JVM architecture of Java along with fundamental data types, operators, and control statements	K1
CO2	Describe object-oriented programming concepts such as classes, objects, constructors, inheritance, packages, and interfaces using Java syntax	K2
CO3	Apply Java programming constructs to develop programs using arrays, methods, exception handling, and multithreading techniques	K3
CO4	Analyze Java programs involving inheritance hierarchies, dynamic method dispatch, synchronization, and event-handling mechanisms	K4
CO5	Design efficient Java solutions by selecting appropriate OOP features, exception-handling strategies, and multithreading models for given problems	K5
CO6	Develop GUI-based Java applications using AWT and Swing components with proper event handling	K6

UNIT I

(15 Hours)

Evolution of Java – Java Buzzwords - An overview of Java: Object-oriented Programming – JVM Architecture. **Data Types, Variables and Arrays:** The primitive types– Integers - Floating point types – Characters – Boolean – a close look at literal – variables - Type Conversion and casting – Automatic type promotion in expressions – Arrays – Type inference with local variables. **Operators:** Arithmetic operators - the bitwise operator - relational operator – Boolean logical operator the assignment operator – the ?: Operator – operator precedence – using parenthesis. **Control statements:** Java selection statements – Iteration statements – Jump statements.

UNIT II

(15 Hours)

Introducing Classes: Class fundamentals – Declaring objects – Assigning object reference variables – Introducing methods – Constructors- The this keyword – Garbage collection – The finalized method – A stack class. **Inheritance:** Inheritance basics - Using super – Creating a multilevel hierarchy – when constructors are called – method overriding – dynamic method dispatch – Using abstract classes - Using final with inheritance - The object class.

Packages and Interfaces: Packages – Importing Packages-Access protection – Interface – default interface methods – private interface methods.

UNIT III

(15 Hours)

Exception Handling: Fundamentals - Exception types – Uncaught exceptions – Using try and catch clauses – Multiple Catch-Nested try statements – throw –throws- Java's built in exceptions. **Multithreaded Programming :** The Java Thread Model – The Main Thread – Creating Thread –

Creating Multiple Threads – Using isAlive() and join() – Thread Priorities – Synchronization – Interthread Communication – Suspending, Resuming and stopping Threads – Using Multithreading.

UNIT IV

(15 Hours)

The Java **Library**: String handling – String constructors – Special String operations – String Buffer. **Event handling**: The delegation event model – Event classes – The KeyEvent Class – Event listener interfaces – Using the delegation event model – Adapter classes – Inner classes.

UNIT V

(15 Hours)

Introducing AWT: AWT Classes - Window fundamentals – Frame windows – Working with graphics, color and fonts. **Using AWT Controls, Layout Manager**: Labels-Using Buttons-Applying Check boxes-Using List. **Introducing Swing**: Components and Containers – Exploring swing - JButton - JCheckBox - JComboBox - JLabel - JList - JRadioButton - JScrollPane – JtabbedPane - JTable - JTextField - JToggleButton – Jtree.

Text book:

Herbert Schildt, “The Complete Reference Java 2”, McGraw Hill Publication (India), Twelfth Edition, 2021.

Chapters: 1, 2, 3, 4, 5, 6, 8, 9, 10, 11, 18, 25, 26, 32, 33.

Reference Books:

1. John Zukowski, “Mastering Java2”, BPB Publications, First Indian Edition, 2000
2. Aaron Walsh and John Fronckowiak, “Java Programming Bible”, IDG Books World wide Inc, First Edition, 2000.
3. Cay S. Horstmann and Garry Cornell, “Core Java 2”, Pearson Education Asia, First Edition, 2001.

Web References:

1. Oracle Java Official Website
Official website for Java platform, Java SE, JDK downloads, and Java technologies.
2. Oracle Java Documentation
Official Java documentation including language basics, OOP concepts, multithreading, exception handling, AWT, and Swing.
3. Open JDK Official Website
Official open-source implementation of the Java Platform.
4. Java Tutorials by Oracle
Official tutorials covering classes, inheritance, packages, interfaces, GUI programming, collections, and event handling.

PRACTICAL: PROGRAMMING IN JAVA

(26UCSC32)

SEMESTER–III CORE-P3 HOURS–5 CREDITS–5 TOTAL HOURS: 75

Course Outcomes:

Upon completion of the course, the students will be able to

CO1	Identify basic Java programming concepts and syntax	K1
CO2	Describe object-oriented features and string handling in Java	K2
CO3	Apply Java programming to solve basic computational problems	K3
CO4	Analyze Java programs using exception handling and multithreading	K4
CO5	Evaluate event handling and GUI components using AWT and Swing	K5
CO6	Create simple Java applications using GUI and multithreading concepts	K6

List of Practical

1. Write a Java program that prompts the user for an integer and then prints out all the prime numbers up to that Integer.
2. Write a Java program to multiply two given matrices.
3. Program using Constructor and Method overloading.
4. Program using Inheritance
5. Program using Interfaces
6. Program using Packages
7. Write a program to do String Manipulation using Character Array and perform the Following string operations:
 - a. String length
 - b. Finding a character at a particular position
 - c. Concatenating two strings
8. Write a program to perform the following string operations using String class:
 - a. String Concatenation
 - b. Search a substring
 - c. To extract a substring from the given string
9. Write a program to demonstrate the use of the following exceptions.
 - a. Arithmetic Exception
 - b. Number Format Exception
 - c. Array Index Out of Bound Exception
 - d. Negative Array Size Exception
10. Write a Java program that implements a multi-thread application that has three threads. The first thread generates a random integer every 1 second and if the value is even, the second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of the cube of the number.

11. Write a program to work with Graphics and fonts.
12. Write a Java program that handles all mouse events.
13. Write a Java program to handle all keyboard events.
14. Write a Java program that works as a simple calculator using Swing. Use a grid layout to arrange buttons for the digits and for the +, -, *, % operations. Add a text field to display the result. Handle any possible exceptions like divide by zero.
15. Write a Java program that simulates a traffic light. The program lets the user select one of three lights: red, yellow, or green with radio buttons. On selecting a button, an appropriate message with “stop” or “ready” or “go” should appear above the buttons in a selected color. Initially there is no message shown.

OPERATION RESEARCH

(23UCSE31)

SEMESTER-III

EC-T3

HOURS-4

CREDITS-3

TOTAL HOURS: 60

Course Outcomes:

Upon completion of the course, the students will be able to

CO1	Understand the models and phases of Operation Research	K1
CO2	Solve LPP, Transshipment Problems and Assignment problems	K2
CO3	Find the optimal solutions for Games and decision trees	K3
CO4	Identify the Critical Path and to determine the Project completion time	K4
CO5	Develop the problem-solving skills in Operations Research	K5
CO6	Estimate cost and time spent on developing projects	K6

UNIT I

(12 Hours)

LINEAR PROGRAMMING– formulation of LP model – Graphics solution to two variables

LP problems - Simplex method – Big M method – Two phase method – degeneracy in simplex method.

UNIT II

(12 Hours)

TRANSPORTATION MODEL – definitions–Formulation and solution of transportation models– finding basic feasible solutions–finding optimal solution–degeneracy in transportation models.

ASSIGNMENT MODEL– Comparison with Transportation model – Mathematical model – Formulation and Solution–Variations of the Assignment problems.

UNIT III

(12 Hours)

THEORY OF GAMES – rules for game theory – Two-person zero-sum game – algebraic methods for finding optimum strategies – mixed strategies – graphical method for 2*2 or m*2 games - mixed strategies (3*3 games).

UNIT IV

(12 Hours)

REPLACEMENT MODELS – Replacement of Items that deteriorate – replacement of Items that fail suddenly – Group replacement policy – mortality and staffing problems.

UNIT V

(12 Hours)

PERT and CPM – Phases of project management – Work breakdown Structure – Network Logic – Numbering in the events – Activity on node diagram – Forward pass computations – Backward pass computations – Representation in tabular form – Slack – Critical path – Difference between CPM and PERT – CPM terms – Critical path (in CPM) – Float – Negative float and negative slack.

Text Book:

1. Prem Kumar Gupta, D.S Hira, “Operations Research”, S. Chand & Company Ltd (Reprint 2014), 7th Edition.

Reference Books:

1. J. K. Sharma, “Operations Research”, Macmillan India, 4th edition (2009).
2. Hamdy A. Taha, “Operations Research”, Pearson Education India; 9th edition (2014).

Web Resources:

Web content from NDL / SWAYAM or open source web resources.

PROBABILITY AND STATISTICS - THEORY

(23UCSE31)

SEMESTER-III EC-T3 HOURS-4 CREDITS-3 TOTAL HOURS: 60

Course Outcomes:

Upon completion of the course, the students will be able to

CO1	Identify a random variable that describes randomness or an uncertainty	K1
CO2	Learn important probability distributions like: in the discrete case	K2
CO3	Build the linear relationship between two variables through Correlation	K3
CO4	Interpret the types of sampling, sampling distribution of means and variance	K4
CO5	Apply statistical testing of hypothesis to make decisions under uncertainties	K5
CO6	Give comprehensive knowledge of probability theory to make inferences	K6

UNIT I

(12 Hours)

PROBABILITY CONCEPTS – Introduction – Important definitions – Approaches of measuring Probability – Bayes' theorem. Random Variables and Distribution Functions – Random Variable – Discrete Random Variable – Continuous Random Variable – Probability Density Function – Cumulative Distribution Function - Various Measures of Central Tendency, Dispersion, Skewness and Kurtosis for Continuous Distribution - Expectation.

UNIT II

(12 Hours)

PROBABILITY DISTRIBUTION – Binomial distribution – properties, mean, variance and recurrence formula for Binomial distribution, Poisson distribution – Poisson distribution as Limiting case of Binomial distribution, properties, mean variance and recurrence formula for Poisson distribution, Normal distribution – mean, variance, median, mode and characteristics of Normal distribution.

UNIT III

(12 Hours)

CORRELATION AND REGRESSION - Correlation – Coefficient of correlation – Rank correlation – Regression – Regression coefficients, **SAMPLING** - Sampling: Definitions - Types of sampling - Expected values of sample mean and variance, - Standard error - Sampling distribution of means and variance. Estimation - Point estimation and Interval estimation.

UNIT IV

(12 Hours)

TESTING OF HYPOTHESIS FOR LARGE SAMPLES - Testing of hypothesis: Null and Alternative hypothesis - Type I and Type II errors, Critical region - confidence interval - Level

of significance, One tailed and two tailed test. - Large sample Tests: Test of significance - Large sample test for single mean, difference of means, single proportion, and difference of proportions.

UNIT V

(12 Hours)

TESTING OF HYPOTHESIS FOR SMALL SAMPLES - Small samples: Test for single mean, difference of means, paired t-test, test for ratio of variances - (F-test), Chi- square test for goodness of fit and independence of attributes.

Text Book:

1. Dr. J. Ravichandran, “Probability and Statistics for Engineers”, Wiley India Private Ltd, 2010
2. SC Gupta and V. K. Kapoor, “Fundamentals of Mathematical Statistics”, Sultan Chand & Sons, 2014.

Reference Books:

1. Sheldon M. Ross, “Introduction to Probability and Statistics for Engineers and Scientists”, Academic Press, 6th Edition, 2020.
2. Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, Keying Ye, "Probability & Statistics for Engineers & Scientists", Pearson Education International, Eighth Edition, 2024

Web Resources:

Web content from NDL / SWAYAM Open source web resources.

CLOUD APPLICATIONS

(26UCSN31)

SEMESTER-III SEC5 HOURS-2 CREDITS-2 TOTAL HOURS: 30

Course Outcomes:

Upon completion of the course, the students will be able to

CO1	Remember the fundamental concepts and technologies in Cloud Computing.	K1
CO2	Apply various cloud service types and evaluate their uses and limitations.	K3
CO3	Explain cloud applications and their working mechanisms.	K2
CO4	Analyze the design and collaborative aspects of cloud-based applications.	K4
CO5	Evaluate case-based uses of cloud computing solutions.	K5
CO6	Apply cloud applications for collaborative and productivity tasks.	K3

UNIT I

(Hours 6)

Understanding Cloud Computing-Cloud Computing for Everyone - Centralizing Email Communications - Collaborating on Schedules - Collaborating on Grocery Lists - Collaborating on To-Do Lists.

UNIT II

(Hours 6)

Collaborating on Household Budgets - Collaborating on Contact Lists - Collaborating on School Projects - Sharing Family Photos - Cloud Computing for the Corporation - Managing Schedules – Managing Contact Lists

UNIT III

(Hours 6)

Collaborating on Reports - Collaborating on Marketing Materials - Collaborating on Expense Reports. - Collaborating on Calendars, Schedules, and Task Management - Exploring Online Calendar Applications.

UNIT IV

(Hours 6)

Collaborating on Word Processing - Web-Based Word Processing Works - Exploring Web- Based Word Processors – Collaborating on Spreadsheets - Web-Based Spreadsheets Work - Exploring Web-Based Spreadsheets - Collaborating on Databases-Discuss ethical sharing aligned with IKS principles

UNIT V

(Hours 6)

Collaborating on Presentations. - Preparing Presentations Online Evaluating Web-Based

Presentation Applications - Storing and Sharing Files and Other Online Content - Sharing Digital Photographs - Online Photo-Editing Applications- Introduction to Google Scholar as a cloud-based academic search engine- Searching scholarly articles and citation tracking - Collaborative academic knowledge dissemination through cloud platforms

TEXT BOOK

1. Michael Miller, “Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online”, Que Publishing, 2008.

REFERENCE BOOKS

1. Toby Velte, Anthony Velte, Robert C. Elsenpeter, “Cloud Computing: A Practical Approach”, Tata McGraw-Hill, 2009
2. David Crookes, “Cloud Computing in Easy Steps”, In Easy Steps Limited, 2012.

WEB REFERENCES

1. <https://www.teachthought.com/pedagogy/teachers-guide-to-cloud-based-word-processing/>
2. <https://edu.gcfglobal.org/en/googledocuments/#>
3. <https://ai-ethics-and-governance.institute/2023/10/23/ethical-principles-and-guidelines-for-digital-technology-draft-for-comments/>

List of Practical

1. To create and manage centralized email communication using a cloud-based email platform.
Tasks: Create a Gmail/Outlook account, Configure folders and labels, Share and manage email threads
2. To implement collaborative scheduling and task management using cloud tools.
Tasks: Create shared Google Calendar, Assign tasks using Google Tasks/Microsoft To Do. Share and edit task lists
3. To develop a shared household budget using a cloud-based spreadsheet.
Tasks: Create shared Google Sheet, Use basic formulas (SUM, AVERAGE), Apply sharing permissions
4. To manage contacts and collaborate on a project using cloud platforms.
Tasks: Create shared contact list, Create shared project document, Track progress collaboratively
5. To create and collaboratively edit a report using cloud-based word processing tools.
Tasks: Create document in Google Docs, enable version history, Add comments and suggestions
6. To prepare and share an expense report using cloud spreadsheets.
Tasks: Record expense entries, Use formulas for totals, Share file with editing/view-only permissions.

7. To create and manage a simple online database using cloud tools.
Tasks: Create Google Form for data collection, Store responses in Google Sheets, Filter and sort collected data
8. To design and share an online presentation collaboratively.
Tasks: Create presentation using Google Slides, Insert charts and images, Share and present in collaboration mode.
9. To explore scholarly resources using Google Scholar as a cloud application.
Tasks: Search for research articles, Create Scholar profile.
10. To apply cloud storage and evaluate responsible data sharing practices.
Tasks: Upload files to Google Drive/OneDrive, Share with controlled permissions,

RDBMS AND ORACLE

(26UCSC41)

SEMESTER IV CORE –T4 HOURS - 4 CREDITS- 4 TOTAL HOURS – 75

Course Outcomes:

Upon completion of the course, the students will be able to

CO 1	Explain the purpose, architecture, components, and users of a database system including the relational model and relational operations.	K2
CO 2	Illustrate the entity-relationship model and apply normalization techniques for effective relational database design.	K3
CO 3	Apply SQL commands for creating, modifying, and manipulating database objects and records.	K3
CO 4	Analyze advanced SQL features such as joins, subqueries, set operations, views, transactions, and indexing to retrieve and manage data efficiently.	K5
CO 5	Develop PL/SQL blocks, procedures, functions, and triggers to perform server-side programming and transaction control	K5
CO 6	Design and implement a complete database-driven application by integrating SQL and PL/SQL concepts to solve real-world problems.	K6
K1-Remember; K2-Understand; K3-Apply; K4-Analyze; K5-Evaluate; K6-Create		

UNIT I

(Hours 12)

Purpose of database systems – view of data – database languages – relational database – database architecture – database users and administrators Structure of relational database – database schema – keys – schema diagrams – relational query languages – relational operations.

UNIT II

(Hours 12)

Overview of design process – ER model — E-R diagrams – extended E-R features Features of good relational design – atomic domains and first normal form – decomposition using functional dependencies – functional dependency theory – more normal forms-database design process.

UNIT III

(Hours 12)

Naming rules and conventions – data types – constraints – creating table – displaying information – altering existing table – dropping, renaming and truncating a table. Adding new records – updating and deleting records – retrieving data from table – arithmetic operations – where clause – sorting – CASE.

UNIT IV

(Hours 12)

Built-in functions – grouping data – join – set operators – subquery – top-N analysis – correlated subquery – views – sequences – synonyms – index – transactions – locking rows for update – controlling access.

UNIT V

(Hours 12)

Fundamentals of PL/SQL – PL/SQL block structure – comments – data types – variable declaration – bind variable – control structures– SQL in PL/SQL – data manipulation in PL/SQL – cursors – exception handling – procedure – function – packages – trigger.

Text Books:

1. Abraham Silberschatz, Henry F. Korth and S. Sudarsan, "Database system concepts", Seventh edition, McGraw Hill, 2020. (For UNIT I & II)
2. Nilesh Shah, "Data systems using Oracle A simplified guide to SQL and PL/SQL", Prentice Hall of India, 2016. (For UNIT III, IV & V)

References:

1. Alexis Leon and Mathews Leon, Fundamentals of Database Management Systems, Vijay Nicole Imprints, 2010.
2. Scott Urman, "Oracle 9i PL/SQL programming", Tata McGraw Hill, 2006
3. Ivan Bayross, "SQL, PL/SQL, The programming language of Oracle", BPB Publications, 2010.

Web References:

1. <https://docs.oracle.com/en/database/oracle/oracle-database/19/sqlrf/>
2. <https://www.geeksforgeeks.org/dbms/dbms/>

PRACTICAL: RDBMS AND ORACLE

(26UCSC42)

SEMESTER IV CORE –P4 HOURS - 3 CREDITS- 3 TOTAL HOURS – 75

Course Outcomes:

Upon completion of the course, the students will be able to

CO 1	Illustrate the use of SQL commands for creating, modifying, and managing tables with constraints.	K2
CO 2	Apply SQL queries using various clauses, functions, joins, and subqueries to retrieve and manipulate relational data effectively.	K3
CO 3	Implement database integrity and transaction control using constraints, group functions, and nested queries.	K4
CO 4	Develop PL/SQL programs using control structures, cursors, and exception handling for procedural database operations	K5
CO 5	Create stored procedures, functions, and triggers to automate database operations and enforce business rules	K6
CO 6	Design and implement a complete database-driven application by integrating SQL and PL/SQL concepts to solve real-world problems.	K6

List of Practical

1. Creating, modifying and dropping Tables.
2. Creating tables with referential and check constraints.
3. Inserting, modifying, deleting rows.
4. Dropping, disabling /enabling constraints
5. Retrieving rows with operators in where Clause.
6. Retrieving rows with Character functions.
7. Retrieving rows with Number and Date functions.
8. Retrieving rows with Group functions and HAVING.
9. Joining Tables. (Inner and Outer).
10. Retrieving rows with Sub Queries.
11. Simple PL/SQL programs.
12. PL/SQL programs with control structures.
13. PL/SQL programs with Cursors.
14. PL/SQL programs with Exception Handling.

OPERATING SYSTEMS AND SHELL PROGRAMMING

(26UCSE41)

SEMESTER – 4 EC - T4 HOURS – 3 CREDITS – 3 TOTAL HOURS: 45

Course Outcomes:

Upon completion of the course, the students will be able to

CO 1	Explain the operating system concepts, structures and operations	K2
CO 2	Mastering various process management	K4
CO 3	Mastering the Scheduling and Deadlock concepts	K5
CO 4	Analyse Operating Systems for Handheld Systems	K5
CO 5	Analyse Operating Systems like Unix	K6
CO 6	Design and implement a complete database-driven application by integrating SQL and PL/SQL concepts to solve real-world problems.	K6

UNIT I

(9 Hours)

Operating Systems: What is an Operating System? – Objectives – Functions—Computer System Organization-Operating System Structure-Operating system Operations-System Calls-System Programs.

UNIT II

(9 Hours)

Process: Process Concept – Process Scheduling-Operations on Process – Inter Process Communication. Process Synchronization: The Critical Section Problem-Semaphores- Classic Problems of Synchronization – Monitors. Case study: Windows 10 Operating System.

UNIT III

(9 Hours)

CPU Scheduling: Scheduling Criteria – Scheduling Algorithms. Dead locks: Deadlock Characterization – Methods for Handling Deadlocks-Deadlock Prevention-Deadlock Avoidance-Deadlock Detection-Recovery from Deadlock. Case Study: MAC Operating System.

UNIT IV

(9 Hours)

Main Memory: Swapping – Contiguous Memory Allocation, Segmentation, Paging. Virtual Memory: Demand Paging-Page Replacement-Allocation of frames -Thrashing. Case Study: Android Operating system. Mass Storage Structure-Disk Structure -Disk scheduling -Disk Management –Managing I/O devices – Accessing Files. Case Study: LINUX OS

UNIT V

(9 Hours)

Introduction to Unix and Linux Operating System - Shell and Types of Shells (sh, bash, csh, ksh) - Shell Script Structure - Creating and Executing Shell Scripts - Variables and Environment Variables

- Command Line Arguments - Input and Output Redirection Arithmetic and Relational Operators - Conditional Statements (if, if-else, case) - Looping Statements (for, while, until) - Functions in Shell Script - Basic File and Directory Operations - Exit Status and Debugging.

Text Books:

1. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, “Operating System Concepts”, 9th Edition, John Wiley & Sons Inc., 2012.
2. Richard Peterson, “Linux: The complete Reference”, 6th Edition, Tata MC Graw Hill, 2008.

Reference Books:

1. Andrew S. Tanenbaum, “Modern Operating Systems”, 4th edition, prentice Hall, Wesley, 2014.
2. William Stallings, “Operating systems – Internals and Design Principles”, 7th Edition Prentice Hall, 2011.
3. Harvey M. Deitel, “Operating systems”, 7th Edition, Prentice Hall, 2003.
4. D M Dhamdhare, “Operating systems: A Concept-Based Approach”, 2nd Edition, Tat McGraw Hill Education, 2007.
5. Charles Crowley, “Operating systems: A Design-Oriented Approach”, Tata Mc Graw Hill Education, 1996.

Web References:

1. https://onlinecourses.nptel.ac.in/noc20_cs04/preview
2. <http://www.tutorial points.com/operating System/>
3. <https://www.udacity.com/course/advanced-operating-systems--ud189>
4. <https://minnie.tuhs.org/CompArch/Resources/os-notes.pdf>

PRACTICAL: SHELL PROGRAMMING

(26UCSE42)

SEMESTER – 4 EC – P1 HOURS – 2 CREDITS – 2 TOTAL HOURS: 30

Course Outcomes:

Upon completion of the course, the students will be able to

CO 1	Demonstrate knowledge of UNIX/Linux shell environment and basic command usage.	K2
CO 2	Develop shell scripts using conditional statements and looping constructs.	K3
CO 3	Apply shell scripting to solve basic mathematical and logical problems.	K3
CO 4	Use shell commands and scripts for file and directory manipulation.	K3
CO 5	Implement functions and command-line arguments in shell scripts.	K3
CO 6	Design menu-driven and modular shell programs for practical applications.	K6

List of Practical:

1. Write a shell script to display current date, time, logged user, and working directory.
2. Write a shell script to read a number and check whether it is even or odd.
3. Write a shell script to find the largest of three numbers.
4. Write a shell script to check whether a given year is a leap year.
5. Write a shell script to generate Fibonacci series.
6. Write a shell script to find factorial of a number.
7. Write a shell script to check whether a given number is prime.
8. Write a shell script to reverse a number.
9. Write a shell script to count number of characters, words, and lines in a file.
10. Write a shell script to check whether a file exists and display its permissions.
11. Write a shell script to copy, move, and delete a file using menu-driven approach.
12. Write a shell script to search a pattern in a file using grep.
13. Write a shell script to print multiplication table of a given number.
14. Write a shell script using functions to perform addition, subtraction, multiplication, and division.
15. Write a shell script to accept command-line arguments and display them.

LINUX PROGRAMMING

(26UCSE41)

SEMESTER – 4 ELECTIVE- T4 HOURS – 3 CREDITS – 3 TOTAL HRS: 45

Course Outcomes:

Upon completion of the course, the students will be able to

CO 1	Explain Linux architecture and basic commands.	K2
CO 2	Develop shell scripts using control structures and functions.	K3
CO 3	Apply system calls for file and directory operations.	K3
CO 4	Implement process creation and signal handling in Linux.	K3
CO 5	Demonstrate IPC, memory management, and threading concepts.	K4
CO 6	Design small Linux-based applications integrating shell scripting and system programming concepts.	K4

UNIT I

(Hours 9)

History and features of Linux - Linux architecture - File system hierarchy - Basic commands - File permissions - Filters and redirection - vi editor

UNIT II

(Hours 9)

Shell basics - Writing shell scripts - Variables and operators - Conditional statements - Looping statements – Functions - Command-line arguments

UNIT III

(Hours 9)

File descriptors - open(), read(), write(), close() - lseek() - stat() - Directory handling - Low-level I/O.

UNIT IV

(Hours 9)

Process concept - fork() and exec() - wait() and exit() - Zombie and orphan processes – Signals

UNIT V

(Hours 9)

Pipes and FIFO - Message queues - Shared memory – Semaphores - Memory allocation - Threads and pthreads – Synchronization.

TEXT BOOKS

1. Y. Kanetkar, Unix and Linux Programming. New Delhi, India: BPB Publications, 2016.
2. W. R. Stevens and S. A. Rago, Advanced Programming in the UNIX Environment, 3rd ed. Boston, MA, USA: Addison-Wesley Professional, 2013.

REFERENCE BOOKS

1. S. Das, UNIX Concepts and Applications, 4th ed. New Delhi, India: Tata McGraw-Hill Education, 2017.
2. R. Love, Linux System Programming: Talking Directly to the Kernel and C Library, 2nd ed. Sebastopol, CA, USA: O'Reilly Media, 2013.

WEB REFERENCES:

1. National Institute of Standards and Technology (NIST) Cryptography Standards Official standards and guidelines for encryption, hash functions, digital signatures, and cybersecurity.
2. Internet Engineering Task Force (IETF) Security Standards Official networking and internet security protocol standards including TLS, IPsec, SSH, and HTTPS.
3. Open SSL Official Website Official implementation of SSL/TLS cryptographic protocols.

PRACTICAL: LINUX PROGRAMMING

(26UCSE42)

SEMESTER – 4 ELECTIVE - T4 HOURS – 3 CREDITS – 3 TOTAL HOURS: 30

Course Outcomes:

Upon completion of the course, the students will be able to

CO 1	Explain the architecture, components, and functionalities of the Linux operating system.	K2
CO 2	Apply Linux commands for effective file management, process control, and system monitoring	K3
CO 3	Develop shell scripts to automate routine system administration tasks.	K3
CO 4	Implement C programs using Linux system calls for file handling and process management.	K3
CO 5	Analyze and apply inter-process communication and synchronization mechanisms in Linux.	K4
CO 6	Design, build, and debug Linux-based applications using standard development tools.	K5

List of Practical:

1. Basic Linux commands
2. Shell scripting programs
3. Menu-driven shell program
4. File handling using system calls
5. fork () implementation
6. Signal handling
7. Pipe communication
8. Shared memory
9. Thread creation
10. Producer–consumer problem

SOFTWARE ENGINEERING

(23UCSS42)

SEMESTER-IV EC-T5 HOURS-4 CREDITS-4 TOTAL HOURS: 60

Course Outcomes:

Upon completion of the course, the students will be able to

CO 1	Gain basic knowledge of analysis and design of systems	K1
CO 2	Understand software engineering principles and techniques	K2
CO 3	Ability to apply software engineering principles and techniques	K3
CO 4	Model a reliable and cost-effective software system	K4
CO 5	Ability to design an effective model of the system	K5
CO 6	Perform Testing at various levels and produce an efficient system.	K6

Unit I (12 Hours)

Introduction: The Software Engineering Discipline – Software Development Projects - Emergence of Software Engineering. **Software Life Cycle Models:** Basic concepts - Waterfall Model and Its Extensions - Rapid Application Development (RAD)

Unit II (12 Hours)

Requirements Analysis and Specification: Requirements Gathering and Analysis - Software Requirements Specification (SRS). **Software Design:** Overview of the Design Process – Characterizing a Good Software Design - Cohesion and Coupling

Unit III (12 Hours)

Function-Oriented Software Design: Overview of SA/SD methodology - Structured Analysis - Developing the DFD Model of a System- Structured Design - Detailed Design – Design Review.

Unit IV (12 Hours)

Coding and Testing: Coding - Code Review – Software Documentation – Testing - Unit Testing - Black-Box Testing - White-Box Testing – Debugging - Integration Testing - System Testing.

Unit V (12 Hours)

Software Project Management: Software Project Management Complexities - Responsibilities of a Software Project Manager - Project Planning – Metrics for Project Size Estimation - Project Estimation Techniques - Empirical Estimation Techniques - COCOMO—A Heuristic Estimation Technique.

Text Books

1. Rajib Mall, Fundamentals of Software Engineering, Fifth Edition, Prentice-Hall of India, 2018.

Reference Books

1. Ian Sommerville, Software Engineering, 9th Edition, Pearson Education Asia, 2011.
2. Richard Fairley, Software Engineering Concepts, Tata McGraw-Hill publishing company

- Ltd, Edition 1997.
3. Roger S. Pressman, Software Engineering, Seventh Edition, McGraw-Hill.
 4. James A. Senn, Analysis & Design of Information Systems, Second Edition, McGraw-Hill International Editions.

Web Resources: Web content from NDL / SWAYAM /Open source web resources.

V SEMESTER
FULL STACK DEVELOPMENT
(26UCSC51)

SEMESTER:V	CORE –T5	HOURS:5	CREDITS:5	TOTAL HOURS:75
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Course Outcomes:

Upon completion of the course, the students will be able to

CO 1	Explain the basics of web development using HTML, CSS, web servers, UNIX commands, and Git/GitHub.	K2
CO 2	Use JavaScript, AJAX, jQuery, and JSON to create interactive web pages.	K2
CO 3	Apply React JS and Redux concepts and methods to build single-page applications.	K3
CO 4	Apply MVC architecture and Spring Framework to develop web applications	K3
CO 5	Analyse relational database structures and use SQL to connect and interact with them through Spring JDBC	K4
CO 6	Analyze agile development processes and cloud infrastructure to deploy scalable web applications.	K4

UNIT - I (15 Hours)

Web Development Basics: Web development Basics - HTML & Web servers Shell - UNIX CLI
Version control - Git & GitHub HTML, CSS

UNIT - II (15 Hours)

Frontend Development: JavaScript basics OOPS Aspects of JavaScript Memory usage and Functions
in JS AJAX for data exchange with server jQuery Framework jQuery events, UI components etc.
JSON data format.

UNIT - III (15 Hours)

REACT JS: Introduction to React Router and Single Page Applications React Forms, Flow
Architecture and Introduction to Redux More Redux and Client-Server Communication

UNIT - IV (15 Hours)

Java Web Development: JAVA PROGRAMMING BASICS, Model View Controller (MVC) Pattern
MVC Architecture using Spring RESTful API using Spring Framework Building an application using
Maven

UNIT - V (15 Hours)

Databases & Deployment: Relational schemas and normalization Structured Query Language (SQL)
Data persistence using Spring JDBC Agile development principles and deploying application in
Cloud

TEXT BOOKS:

1. Professional Javascript for Web Developers, 3ed (WROX) 2012 by Nicholas C. Zakas
2. Learning PHP, MySQL & JavaScript, Sixth Edition A Step-By-Step Guide to Creating Dynamic Websites, 2021, by Robin Nixon Published by Shroff/O'Reilly
3. Full Stack JavaScript: Learn Backbone.js, Node.js and MongoDB. Copyright © 2015 BYAZAT MARDAN

REFERENCE BOOKS:

1. Full-Stack JavaScript Development by Eric Bush, Red Sky, 2016.

WEB REFERENCES:

1. <https://aws.amazon.com/what-is/full-stack-development/>
2. <https://fullstackopen.com/en/#course-contents>

PHP PROGRAMMING

(23UCSE51)

SEMESTER: V	CORE –T6	HOURS:5	CREDITS:5	TOTAL HOURS:75
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Course Outcomes:

Upon completion of the course, the students will be able to

CO 1	Understand dynamic web technologies and PHP concepts	K2
CO 2	Develop PHP programs using control structures and functions	K2
CO 3	Design database-driven web applications	K3
CO 4	Implement MySQL connectivity using PHP	K3
CO 5	Apply Object Oriented Programming in PHP	K4
CO 6	Develop secure and real-time PHP applications	K4

UNIT I

(15 Hours)

Basics of PHP: Introduction to Web Technologies-Introduction to PHP and Installation (XAMPP/WAMP) Basic Syntax of PHP-Data Types-Variables and Constants Operators and Expressions-Conditional Statements (if, if-else, switch) Looping Statements (for, while, do-while) Arrays (Indexed & Associative)-Including Files (include, require)-*Introduction to PHP 8 Features (Nullsafe Operator, Match Expression).*

UNIT II

(15 Hours)

Functions and String Handling: User -Defined Functions-Call by Value and Call by-Reference Default Arguments-Recursive Functions-String Creation and Accessing String Searching and Replacing String Formatting- String Library Functions Indexed and Associative Arrays Array Looping (foreach)-Array Related Library Functions-*Working with JSON Data in PHP.*

UNIT III

(15 Hours)

HTML Forms and MySQL: HTML Form Design-Form Handling in PHP GET and POST Methods isset() and empty(). PHP Superglobals (\$_GET, \$_POST, \$_REQUEST) Introduction to MySQL-MySQL Database-Creation MySQL Table Creation MySQL Connect using PHP Insert Data-Select Data Update Data Delete Data Limit Clause-*Prepared Statements and SQL Injection Prevention.*

UNIT IV

(15 Hours)

Session, Cookies and File Handling: Introduction to Session Control-Creating and Destroying Sessions Session -Variables Working with Cookies Setting and Deleting Cookies-File Handling (open, read, write, close)- Working with Directories-Copying, Renaming and Deleting Files Creating and Deleting Folders-File Uploading and Downloading-*PHP Security Best Practices*

(Input Validation, Password Hashing).

UNIT V

(15 Hours)

Object Oriented PHP: Introduction to OOP-Classes and Objects Declaring a Class new Keyword-Constructor and Destructor. Access Modifiers (Public, Private, Protected) Static Properties and Methods-Class Constants Inheritance Polymorphism-Parent:: and self:: Keywords instance of Operator-Abstract Classes and Methods Interfaces-Final Keyword-Exception Handling (try, catch, throw)-*Introduction to MVC Architecture in PHP.*

Text Books:

Paul Hudson, PHP in a Nutshell, O'Reilly Publications. Andy Harris, PHP/MySQL Programming for the Absolute Beginner, Thomson, 2020.

Reference Books:

1. Robin Nixon, Learning PHP, MySQL and JavaScript, O'Reilly. K. Meena, R. Sivakumar, A.B., 2020.
2. Karthick Anand Babu, Web Programming using PHP and MySQL, Himalaya Publishing, 2020. House.

Web Resources:

1. W3 Schools PHP Tutorial Syllabus: https://www.w3schools.com/php/php_syllabus.asp
2. Official PHP Manual (Language Reference): php.net
3. PHP: The Right Way (Modern Best Practices): phptherightway.com
4. Tutorials point PHP Syllabus: tutorialspoint.com
5. Geeks for Geeks PHP Programming Language: geeksforgeeks.org

**PRACTICAL: FULL STACK DEVELOPMENT
(26UCSC53)**

SEMESTER:V	CORE –P5	HOURS:5	CREDITS:3	TOTAL HOURS:75
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Course Outcomes:

Upon completion of the course, the students will be able to

CO 1	Identify and explain the usage of various front-end and back-end tools used in web application development	K2
CO 2	Apply appropriate front-end and back-end technologies to design basic web interfaces and application workflows	K3
CO 3	Design responsive and user-friendly websites using standard web development principles and frameworks	K5
CO 4	Develop complete web-based applications using suitable client-side and server-side code	K5
CO 5	Implement effective database access and connectivity in web applications using appropriate database technologies	K4
CO 6	Create and evaluate web applications independently by integrating UI, server logic, and database components	K6

List of Practical

1. Write a program to create a simple webpage using HTML.
2. Write a program to create a website using HTML CSS and JavaScript
3. Write a program to build a Chat module using HTML CSS and JavaScript
4. Write a program to create a simple calculator Application using React JS
5. Write a program to create a voting application using React JS
6. Write a program to create and Build a Password Strength Check using JQuery.
7. Write a program to create and Build a star rating system using JQuery.
8. Create a Simple Login form using React JS
9. Create a blog using React JS Using the CMS users must be able to design a web page using the drag and drop method. Users should be able to add extual or media content into placeholders that are attached to locations on the web page using drag and drop method.
10. Create a project on Grocery delivery application

PRCATICAL: PHP PROGRAMMING

(23UCSC54)

SEMESTER:V	CORE –P6	HOURS:5	CREDITS:3	TOTAL HOURS:75
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Course Outcomes:

Upon completion of the course, the students will be able to

CO 1	Write simple PHP programs.	K6
CO 2	Write programs using control structures.	K6
CO 3	Develop application using COOKIES.	K6
CO 4	Create database application.	K6
CO 5	Update knowledge to learn any future advanced version of language	K6
CO 6	Design a full-fledged dynamic website	K6

List of Practical

1. Simple PHP Program.
2. Sort an Array.
3. Program using if condition.
4. Palindrome.
5. Retrieve Form values and display.
6. Upload Files.
7. Session, Cookies and Query string
8. Create database and table using PHP.
9. Insert values in a database.
10. Display table data in Grid Format.
11. Update and delete table data.
12. Program using Files (Create, Read, Write and Modify).
13. Program using class.

DATA ANALYTICS USING PYTHON

(26UCSE51)

SEMESTER: V	EC –T5	HOURS:4	CREDITS:3	TOTAL HOURS:60
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Course Outcomes:

Upon completion of the course, the students will be able to

CO1	Explain the concepts of Big Data, its characteristics, evolution, challenges, and differences between traditional Business Intelligence and Big Data environments.	K2
CO2	Illustrate the role of Data Science, Data Scientists, analytics classifications, and tools used in Big Data environments.	K2
CO3	Apply NumPy and pandas data structures for array computation, data manipulation, and descriptive statistical analysis.	K3
CO4	Demonstrate techniques for data loading, storage, data cleaning, transformation, and handling different data formats using Python libraries.	K3
CO5	Analyze datasets using data wrangling techniques such as joining, merging, reshaping, and visualization using matplotlib, pandas, and seaborn.	K4
CO6	Evaluate and interpret data using aggregation, group operations, pivot tables, and time series analysis for meaningful insights.	K5

UNIT I

(12 Hours)

Classification of Digital Data, Structured and Unstructured Data - Introduction to Big Data: Characteristics - Evolution - Definition - Challenges with Big Data - Other Characteristics of Data - Why Big Data - Traditional Business Intelligence versus Big Data - Data Warehouse and Hadoop Environment - Big Data Analytics: Classification of Analytics - Challenges - Big Data Analytics importance - Data Science - Data Scientist - Terminologies used in Big Data Environments - Top Analytics Tools.

UNIT II

(12 Hours)

NumPy Basics: Arrays and Vectorized Computation - The NumPy ndarray: A Multidimensional Array Object - Pseudorandom Number Generation - Universal Functions: Fast Element-Wise Array Functions - Array-Oriented Programming with Arrays - File Input and Output with Arrays - Getting Started with pandas - Introduction to pandas Data Structures - Essential Functionality - Summarizing and Computing Descriptive Statistics.

UNIT III

(12 Hours)

Data Loading, Storage, and File Formats - Reading and Writing Data in Text Format - Binary Data Formats - Interacting with Web APIs - Interacting with Databases - Data Cleaning and Preparation -

Handling Missing Data - Data Transformation - Extension Data Types - String Manipulation - Categorical Data.

UNIT IV

(12 Hours)

Data Wrangling: Join, Combine, and Reshape - Hierarchical Indexing - Combining and Merging Datasets - Reshaping and Pivoting - Plotting and Visualization - A Brief matplotlib API Primer - Plotting with pandas and seaborn - Other Python Visualization Tools.

UNIT V

(12 Hours)

Data Aggregation and Group Operations - How to Think About Group Operations - Data Aggregation - Apply: General split-apply-combine - Group Transforms and “Unwrapped” GroupBys - Pivot Tables and Cross-Tabulation - Time Series - Date and Time Data Types and Tools - Time Series Basics - Date Ranges, Frequencies, and Shifting - Time Zone Handling - Periods and Period Arithmetic - Resampling and Frequency Conversion - Moving Window Functions.

TEXT BOOKS:

1. Seema Acharya, Subhashini Chellappan, “Big Data and Analytics”, Wiley Publications, 2019. (Unit 1)
2. Wes McKinney “Python for Data Analysis Data Wrangling with pandas, NumPy, and Jupyter”, Third Edition, Oreilly, 2022. (Units II to V)

REFERENCE BOOKS:

1. Anil Maheshwari, “Data Analytics Made Accessible”.
2. Michael Milton, “Head First Data Analysis”.
3. V.K. Jain, “Data Science and Analytics”.

WEB REFERENCES:

1. <https://analytics.google.com/analytics/academy/course/6>
2. <https://www.youtube.com/watch?v=D2YcHRiIzCk>
3. <https://online-learning.harvard.edu/subject/data-anaysis>.
4. <https://analytics.google.com/analytics/academy>

PRACTICAL: DATA ANALYTICS USING PYTHON

(26UCSE52)

SEMESTER:V	EC –P5	HOURS:4	CREDITS:3	TOTAL HOURS:60
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Course Outcomes:

Upon completion of the course, the students will be able to

CO1	Demonstrate the use of Python programming concepts and the Jupyter Notebook environment for data analysis tasks.	K2
CO2	Apply NumPy for array creation, mathematical operations, and statistical computations.	K3
CO3	Utilize pandas Series and DataFrame structures to store, manipulate, and analyze datasets.	K3
CO4	Perform data cleaning, filtering, and transformation techniques to prepare datasets for analysis.	K3
CO5	Analyze datasets using GroupBy operations, aggregation functions, and statistical analysis methods.	K4
CO6	Develop data visualizations and basic predictive models such as linear regression using Python libraries like Matplotlib and Seaborn.	K6

Laboratory List

1. Python basics and Jupyter Notebook
2. NumPy array creation and operations
3. NumPy statistical operations
4. Pandas Series and Data Frames
5. Data cleaning techniques
6. Data filtering and transformation
7. GroupBy and aggregation
8. Data visualization using Matplotlib
9. Visualization using Seaborn
10. Statistical analysis with Python
11. Linear regression model

VI SEMESTER
ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING
(26UCSC61)

SEMESTER:IV	CORE –T7	HOURS:5	CREDITS:4	TOTAL HOURS:75
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Course Outcomes:

Upon completion of the course, the students will be able to

Course Outcome		K Level
CO1	Recall the basic concepts of Artificial Intelligence and Search Techniques	K1
CO2	Explain state space representation and problem-solving methods in AI.	K2
CO3	Apply machine learning techniques to different types of learning problems.	K3
CO4	Analyze supervised, unsupervised, and reinforcement learning models.	K4
CO5	Evaluate Artificial Neural Network models and learning processes.	K5
CO6	Develop deep learning models using CNN, RNN	K6

UNIT I

(15 Hours)

INTRODUCTION: Definitions of Artificial Intelligence (AI) – AI problems - Topics of AI – Production Systems – State Space Representation - Branches of AI – Applications of AI. Heuristic search techniques: Generate and test - Hill Climbing - Search Techniques – Depth First Search, Breadth First Search, Greedy Method, Best First Search Algorithm, A* Algorithm - Problem Reduction – AND-OR Graphs, The AO* Algorithm.

UNIT II

(15 Hours)

INTRODUCTION TO MACHINE LEARNING- Learning- Types of Learning – Rote Learning- Learning by Parameter Adjustment-Learning by general problem solving- Concept learning- Learning by analogy-Machine Learning – Why machine learning?- Types of problems in machine learning- History of Machine Learning- Aspects of inputs to training- Learning systems- Machine Learning applications.

UNIT III

(15 Hours)

SUPERVISED AND UNSUPERVISED LEARNING: Supervised learning model- Unsupervised Learning model- Semi Supervised Learning-Association Learning- Basics of association- Apriori algorithm- FP Growth algorithm- Reinforcement Learning- Markov decision problem

UNIT IV

(15 Hours)

ARTIFICIAL NEURAL NETS ANN Basics - ANN—Learning Process - Types of Networks - Perceptron - Multilayer Perceptron- ANN-Recurrent Neural Network

UNIT V

(15 Hours)

DEEP LEARNING – Recurrent and recursive networks- Convolutional Neural Networks- Deep Reinforcement Learning- Application of Deep Learning- Tensor Flow.

TEXT BOOKS:

1. Vinod Chandra S.S “Machine Learning- A Practitioner’s Approach”, PHI Learning Private Limited, 1st Edition, 2021
2. Vinod Chandra S.S. and Anand Hareendran S., “Artificial Intelligence Principles and Applications”, PHI Learning Private Limited, Second Edition, 2023.

REFERENCE BOOK:

1. Elaine Rich and Kevin Knight, “Artificial Intelligence”, Tata McGraw Hill. Stuart Russell and Peter Norvig, “Artificial Intelligence: A Modern Approach”, 3rd Edition, Prentice Hall.

WEB RESOURCES:

1. <https://nptel.ac.in/courses/106106139>
2. <https://web.cs.hacettepe.edu.tr/~erkut/ain311.f21/index.html>
3. https://www.toolify.ai/?gclid=CjwKCAjwvdajBhBEEiwAeMh1U6tlqU1LXIRFbceghLMZVwICm_4PkIRcDRE-VYq_wTDcuaQeq_bCHnhoCcm4QAvD_BwE

COMPUTER GRAPHICS AND MULTIMEDIA SYSTEM

(26UCSC62)

SEMESTER:VI	CORE –T8	HOURS:5	CREDITS:4	TOTAL HOURS:75
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Course Outcomes:

Upon completion of the course, the students will be able to

CO1	Recall the components of computer graphics, different graphics systems.	K1
CO2	Interpret graphics applications with algorithms.	K2
CO3	Use of output primitives attribute and geometric transformations on graphics objects and their application in composite form.	K3
CO4	Illustrate a display port with different clipping methods and its transformation view with 2D and 3D.	K4
CO5	Test the concepts of visualization techniques to design effective interactive charts and graphical representations of data.	K5
CO6	Create interactive data visualizations using D3.js and SVG for meaningful visual representation.	K6

UNIT I

(15 Hours)

Overview of Graphics System: Raster scan systems – Random scan systems - Output primitives: Points and lines - Line Drawing algorithms – DDA algorithm – Bresenham's Line algorithm – Parallel line algorithm – Line Function – Circle Generating algorithms – Ellipse Generating algorithms – Other Curves - Curve Functions – Boundary Fill Algorithm – Flood Fill Algorithm.

UNIT II

(15 Hours)

Attributes of Output primitives: Line and Curve attributes – Color and Gray Scale Levels – Area fill Attributes – Character attributes – Bundled attributes. Two Dimensional geometric transformations: Basic transformations – Matrix representations and Homogeneous Coordinates – Composite Transformations – Transformation between Coordinate Systems – Transformation Functions – Raster Methods for Transformations.

UNIT III

(15 Hours)

Two-Dimensional Viewing: The Viewing Pipeline – Viewing co-ordinate reference Frame – Window-to-Viewport Coordinate Transformation – Two-Dimensional Viewing Functions – Clipping Operations – Point Clipping – Line Clipping – Curve Clipping – Text Clipping – Exterior Clipping. Three Dimensional Concepts: Three-Dimensional Display Methods – Three-Dimensional Graphics Package.

UNIT IV

(15 Hours)

Introducing D3: Origins and Context - Easy Charts - Graph Visualizations - Geomapping - Three-Dimensional - Tools Built with D3. Technology Fundamentals: The Web - HTML - Content Plus Structure. Adding Structure with Elements - Common Elements -Attributes - Classes and IDs - Comments. JavaScript: Variables -Other Variable Types-Arrays -Objects -Objects and Arrays -

Mathematical Operators -Comparison Operators -Control Structures -Functions -Comments - Referencing Scripts -

UNIT V

(15 Hours)

SVG: SVG - The SVG Element - Simple Shapes -Styling SVG Elements - Layering and Drawing Order - Transparency. Data:Generating Page Elements - Chaining Methods -One Link at a Time - The Hand-off - Going Chainless -Binding Data - In a Bind - Data -Please Make Your Selection - Bound and Determined -Using Your Data -High-Functioning -Drawing with Data: Drawing divs- Setting Attributes - A Note on Classes - Back to the Bars - Setting Styles - The Power of data () - Random Data - Drawing SVGs – Create the SVG - Data-Driven Shapes – Making a Bar Chart Color- Labels - Making a Scatterplot - The Data - The Scatterplot.

Text Books:

1. Donald Hearn and M. Pauline Baker, “Computer Graphics C Version”, Second Edition, Pearson Low Price Edition, 2014. (Units I, II and III)
2. Scott Murray, “Interactive Data Visualization for the Web”, First Edition O’Reilly Media, 2013. (Units IV and V)

Reference Books:

- 1.Foley Van Dam, Feiner Hughes “Computer Graphics Principles & Practice”, Second Edition., 2015.
2. Steven Harrington,” Computer Graphics”, Second Edition., 2016.
- 3 Elijah Meeks, “D3.js in Action” Second Edition, Manning Publications, 2017.

Web Resources:

1. https://onlinecourses.nptel.ac.in/noc20_cs90/preview
2. <https://using-d3js.com/>
3. <https://medium.com/better-programming/a-quick-look-at-d3-js-ecc7657556f4>

**PRACTICAL – MACHINE LEARNING PROGRAMS USING PYTHON
(26UCSC63)**

SEMESTER:VI	CORE –P7	HOURS:4	CREDITS:2	TOTAL HOURS:60
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Course Outcomes:

Upon completion of the course, the students will be able to

Course Outcome		K Level
CO1	Create Python programs for data preprocessing.	K6
CO2	Implement statistical computations and visualize datasets.	K3
CO3	Apply dimensionality reduction using PCA.	K3
CO4	Develop supervised learning models.	K6
CO5	Develop unsupervised learning models (K-Means)	K6
CO6	Apply regression models using Python libraries.	K3

LIST OF PRACTICAL

1. Write a program to implement Principal Component Analysis (PCA).
2. Write a program to implement a Decision Tree using the ID3 algorithm.
3. Write a program to implement Random Forest and compare results with 20, 50, 100, 200 and 500 trees.
4. Write a program to demonstrate preprocessing techniques: reshaping, filtering, merging, handling missing values, and normalization.
5. Write a program to compute Mean, Median, Mode, Variance, and Standard Deviation.
6. Write a Python program to implement Simple Linear Regression and plot the regression line.
7. Write a Python program to implement Logistic Regression using sklearn and plot the confusion matrix.
8. Build KNN Classification model for a given dataset. Vary the number of k values as follows and compare the results:
i) 1 ii) 3 iii) 5 iv) 7 v) 11
9. Implement Support Vector Machine for a dataset and compare the accuracy by
10. applying the following kernel functions:
i. i) Linear ii) Polynomial iii) RBF
11. Write a python program to implement K-Means clustering Algorithm. Vary the number of k values as follows and compare the results:
i. i) 1 ii) 3 iii) 5

**PRACTICAL: COMPUTER GRAPHICS AND MULTIMEDIA SYSTEM
(26UCSC64)**

SEMESTER:VI	CORE –P8	HOURS:4	CREDITS:2	TOTAL HOURS:60
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Course Outcomes:

Upon completion of the course, the students will be able to

CO1:	Define the output display of graphics system.	K1
CO2:	Associate graphical algorithms to draw a specific object.	K2
CO3:	Apply 2D Transformation techniques using coordinate movement.	K3
CO4:	Select the Window-to-Viewport Coordinate Transformation.	K4
CO5:	Recommend a tool draw a model using D3.JS.	K5
CO6:	Design a complete computer graphics-based visualization system with D3.JS.	K6

List of Practical

COMPUTER GRAPHICS

1. DDA line algorithm
2. Bresenham line algorithm
3. Bresenham circle algorithm
4. Mid-point circle algorithm
5. Ellipse Algorithm
6. Boundary fill Algorithm
7. Flood fill algorithm
8. Animating an object
9. Text Display
10. Translation Algorithm
11. Scaling of Triangle
12. Rotation of Triangle
13. Line Clipping Algorithm

VISUALIZATION:

- 1.Create a simple **bar chart using D3.js** with sample data.
- 2.Bind the data and generate bars using **div elements**.
- 3.Create an **SVG canvas** and draw basic shapes such as **circle, rectangle, and line**.
- 4.Apply **styling, transparency, and layering** to the shapes.
- 5.Bind a dataset to SVG elements using **D3 data() function**.
- 6.Generate **rectangles dynamically** and style them based on the data values.

DATA COMMUNICATIONS AND COMPUTER NETWORK

(26UCSE61)

SEMESTER:VI	EC –T7	HOURS:4	CREDITS:3	TOTAL HOURS:60
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Course Outcomes:

Upon completion of the course, the students will be able to

CO1	Identify the basic concepts of Computer Network architecture and the OSI and TCP/IP reference models	K1
CO2	Describe the functions and importance of protocols used in each layer of the OSI and TCP/IP models	K2
CO3	Apply different types of transmission media and digital transmission techniques in data communication	K3
CO4	Analyze the services provided by each OSI layer and examine their relevance in network communication	K4
CO5	Evaluate Wireless LAN technologies and routing mechanisms used in computer networks	K5
CO6	Design network management strategies and integrate key management functions of cryptography to enhance network security	K6

UNIT I

(12 Hours)

Data communications- Networks - Network Types- Protocols and Standard-The OSI Model – TCP/IP Protocol suite-Addressing-**Physical Layer:** Data and Signals- Transmission Impairment-**Digital Transmission:** Digital-To-Digital conversion – Analog-To-Digital conversion. **Analog Transmission-** Digital-to-Analog Conversion -Analog-to-Analog Conversion- **Multiplexing** - Frequency-Division Multiplexing -Time-Division Multiplexing-**Transmission media:** Guided Media - Unguided Media: Wireless.

UNIT II

(12 Hours)

Data Link Layer: - Introduction-Block Coding- **Data link Control:** Framing- Flow and Error Control- Noiseless and Noisy Channel– **Media Access Protocols:** Random Access- Controlled Access- **Link Layer Addressing:** Three Types of Addresses-Address Resolution Protocol – **Local Area Networks (LANS):** Ethernet- Standard Ethernet- Fast Ethernet- Gigabit Ethernet- 10 Gigabit Ethernet.

UNIT III

(12 Hours)

WIFI-IEEE 802.11 Project: Architecture – MAC Sub layer- Addressing Mechanism – **Bluetooth:** Architecture – Bluetooth Layers- **Wide Area Networks(WANS):** Cellular Telephony- Operation- First Generation (1G) - Second Generation (2G) - Third Generation (3G)-Fourth Generation (4G) - **Connecting Devices and Virtual LANs:** Connecting Devices –Hubs- Link Layer Switches – Routers.

UNIT IV

(12 Hours)

Virtual LANs: Membership – Configuration- Communication among Switches – Cellular Technology- **Network Layer:** IPv4 - IPv6– Transition from IPv4 to IPv6- **Delivery, Forwarding and Routing:** Delivery- Forwarding- Unicast Routing Protocols- Multicast Routing Protocols– **Transport Layer Services-** Transport Layer Protocols.

UNIT V

(12 Hours)

Application Layer: Introduction – Client server Paradigm – **Standard Applications:** World Wide Web and HTTP – FTP – Electronic Mail – Domain Name System – **Network Management:** Introduction- SNMP- **Cryptography and Network Security:** Introduction – Confidentiality: Symmetric key Ciphers – Asymmetric key Ciphers.

Text Book

1. Behrouz A Forouzan, “Data Communications and Networking: With TCP/IP Protocol Suite”, Sixth Edition, McGrawHill Education (India), 2022.

Reference Books

1. A. S. Tanenbaum, “Computer Networks”, 4th Edition, Prentice-Hall of India, 2008.
2. F. Halsall, “Data Communications, Computer Networks and Open Systems”, Pearson Education, 2008.
3. D. Bertsekas and R. Gallager, “Data Networks”, 2nd Edition, PHI, 2008.
4. Lamarca, “Communication Networks”, Tata McGraw- Hill, 2002

Web resources:

1. E-Content : <http://www.vbspu.ac.in/wp-content/uploads/2020/05/CN-Notes.pdf>
2. E-Content: <https://mu.ac.in/wp-content/uploads/2021/08/USIT303-Computer-Networks.pdf>

NETWORK SECURITY

(26UCSE61)

SEMESTER:VI	EC –T7	HOURS:4	CREDITS:3	TOTAL HOURS:60
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Course Outcomes:

Upon completion of the course, the students will be able to

CO1	Describe computer security concepts, security attacks, services, and mechanisms.	K2
CO2	Apply symmetric encryption, stream ciphers, and block cipher modes for confidentiality	K3
CO3	Analyze public-key cryptography, hash functions, and digital signature mechanisms	K4
CO4	Evaluate key distribution, authentication, and transport-level security standards.	K5
CO5	Evaluate network security applications including wireless, e-mail, and IP security.	K5
CO6	Design secure systems to defend against intruders, malware, and firewall threats.	K6

UNIT I

(12 Hours)

Computer Security Concepts – OSI Security Architecture – Security Attacks – Security Services – Security Mechanisms – Model for Network Security – Standards – Symmetric Encryption Principles – Symmetric Block Encryption Algorithms – Random and Pseudorandom Numbers – Stream Ciphers and RC4 – Cipher Block Modes of Operation.

UNIT II

(12 Hours)

Approaches to Message Authentication – Secure Hash Functions – Message Authentication Codes – Public-Key Cryptography Principles – Public-Key Cryptography Algorithms – Digital Signatures.

UNIT III

(12 Hours)

Symmetric Key Distribution Using Symmetric Encryption – Kerberos – Key Distribution Using Asymmetric Encryption – X.509 Certificates – Public-Key Infrastructure – Federated Identity Management – Web Security Considerations – Secure Socket Layer and Transport Layer Security – Transport Layer Security – HTTPS – Secure Shell (SSH).

UNIT IV

(12 Hours)

IEEE 802.11 Wireless LAN Overview – IEEE 802.11i Wireless LAN Security – Wireless Application Protocol Overview – Wireless Transport Layer Security – WAP End-to-End Security – Pretty Good Privacy – S/MIME – DomainKeys Identified Mail – IP Security Overview – IP Security Policy – Encapsulating Security Payload – Combining Security Associations – Internet Key Exchange – Cryptographic Suites.

UNIT V**(12 Hours)**

Network Forensic – Security Audit - Other Security Mechanism: Introduction to: Stenography – Quantum Cryptography – Water Marking - DNA Cryptography Intruders – Intrusion Detection – Password Management –Types of Malicious Software – Viruses – Virus Countermeasures – Worms – Distributed Denial of Service Attacks –The Need for Firewalls – Firewall Characteristics – Types of Firewalls – Firewall Basing – Firewall Location and Configurations.

TEXT BOOKS:

1. William Stallings, Network Security Essentials: Applications and Standards, Fourth Edition, Pearson Education.

REFERENCE BOOKS:

1. Bruce Schneier, Applied Cryptography, CRC Press.
2. Menezes et al., Handbook of Applied Cryptography, CRC Press.
3. Charlie Kaufman, Radia Perlman, and Mike Speciner, Network Security: Private Communication in a Public World, Pearson.

PROFESSIONAL COMPETENCY SKILL

(26UCSS61)

SEMESTER:VI	SEC:6	HOURS:2	CREDITS:2	TOTAL HOURS:30
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Course Outcomes:

Upon completion of the course, the students will be able to

CO1	Explain the meaning and importance of professional competency, self-awareness, and employability skills required for Computer Science graduates.	K2
CO2	Apply goal-setting techniques and SWOT analysis for personal effectiveness and career planning.	K3
CO3	Describe the process, types, and barriers of communication, including verbal, non-verbal, written, and listening skills.	K2
CO4	Demonstrate effective communication and problem-solving skills using logical reasoning, critical thinking, and decision-making models.	K3
CO5	Explain the concepts of teamwork, leadership styles, professional ethics, and workplace values in organizational settings.	K2
CO6	Prepare a resume and portfolio and practice interview, group discussion, and professional etiquette skills for career readiness.	K3

Unit I: Professional Competency and Self-Development (6 Hours)

Meaning and importance of professional competency - Core employability skills for Computer Science graduates - Self-awareness, self-esteem, and self-motivation - Goal setting and personal effectiveness - SWOT analysis for career planning

Unit II: Communication Skills (6 Hours)

Process and types of communication - Verbal communication: clarity, tone, and articulation - Non-verbal communication: body language and etiquette - body language (Angika), facial expressions (Mukha Bhava), and gestures (Mudras) - Written communication: emails, reports, and documentation - Listening skills and barriers to communication

Unit III: Thinking and Problem-Solving Skills (6 Hours)

Critical and analytical thinking - Logical reasoning and decision-making models - Creative thinking and innovation - Problem-solving techniques in professional scenarios - Time management and stress management

Unit IV: Teamwork, Leadership, and Ethics (6 Hours)

Team dynamics and collaborative work culture - Leadership styles and qualities of effective leaders (Rāja Dharma, Servant leadership, Guna-based leadership) - Conflict management and negotiation skills - Professional ethics and workplace values - Social responsibility and digital professionalism

Unit V: Career Readiness and Professional Growth**(6 Hours)**

Resume writing and portfolio development - profile optimization techniques - Interview skills and group discussion techniques - Professional grooming and workplace etiquette - professional networking strategies - Career planning and lifelong learning - Introduction to corporate culture and organizational behavior.

Text Books:

1. Barun K. Mitra, *Personality Development and Soft Skills*, Oxford University Press, 2024.
2. Meenakshi Raman & Sangeeta Sharma, *Technical Communication: Principles and Practice*, Oxford University Press, 2022.

Reference Books:

1. Dale Carnegie, *How to Win Friends and Influence People*, Simon & Schuster, 1981.
2. Stephen P. Robbins & Timothy A. Judge, *Organizational Behavior*, Pearson Education, 2024.
3. R. S. Aggarwal, *A Modern Approach to Verbal & Non-Verbal Reasoning*, S. Chand, 2023.
4. Covey, Stephen R., *The 7 Habits of Highly Effective People*, Free Press, 1989.

Web Resources:

1. <https://www.coursera.org/search?query=professional%20skills>
2. <https://hbr.org/2026/02/to-lead-through-uncertainty-unlearn-your-assumptions?ab=HP-hero-featured-1>

ADD ON COURSE

ADVANCED MS EXCEL (26UCSAO1)

SEMESTER:I	AOC	HOURS:2	CREDITS:2	TOTAL HOURS:30
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Course Outcomes:

Upon completion of the course, the students will be able to

CO1	Recall and define fundamental Excel concepts and features, including cell referencing and functions.	K1
CO2	Summarize the use of lookup functions like VLOOKUP for organizing and consolidating data.	K2
CO3	Apply conditional formatting, data filters, and formula-based tasks to real-world datasets.	K3
CO4	Analyze PivotTables and chart functionalities to compare and interpret business data.	K4
CO5	Evaluate forecasting and scenario tools (Goal Seek, Data Tables) to support decision making.	K5
CO6	Create dynamic reports using advanced Excel features and integrate charts with PowerPoint/Word.	K6

UNIT I (6 Hours)

Basics of Excel- Customizing common options- Absolute and relative cells- Protecting and un-protecting worksheets and cells- Working with Functions - Writing conditional expressions - logical functions - lookup and reference functions- Vlookup with Exact Match, Approximate Match- Nested Vlookup with Exact Match- Vlookup with Tables, Dynamic Ranges- Using Vlookup to consolidate Data from Multiple Sheets.

UNIT II (6 Hours)

Creating Pivot tables Formatting and customizing Pivot tables- advanced options of Pivot tables- Pivot charts- Consolidating data from multiple sheets and files using Pivot tables- external data sources- Running Total, Compare with Specific Field- Viewing Subtotal under Pivot- Creating Slicers.

UNIT III (6 Hours)

More Functions Date and time functions- Text functions- Database functions- Power Functions - Formatting Using auto formatting option for worksheets- Using conditional formatting option for rows, columns and cells- What If Analysis - Goal Seek- Data Tables- Scenario Manager.

UNIT IV (6 Hours)

Data Structuring and Table Management – Creating and managing Excel Tables; defining structured references; data validation techniques; removing duplicates; maintaining data integrity; using named ranges; dynamic named ranges

UNIT V (6 Hours)

Charts - Formatting Charts- 3D Graphs- Bar and Line Chart together- Secondary Axis in Graphs- Sharing Charts with PowerPoint / MS Word, Dynamically- New Features Of Excel Sparklines, Inline

Charts, Data Charts- Overview of all the new features.

Text Books

1. Dalgleish, Debra, and Bill Jelen. *Microsoft Excel 2019 Pivot Table Data Crunching*. Microsoft Press, 2019.

Reference Book

1. Walkenbach, John. *Excel 2019 All-in-One For Dummies*. John Wiley & Sons, 2018.

Web Resources

1. <https://support.microsoft.com/excel>
2. <https://www.w3schools.com/excel/index.php>

List of Practical

1. **Basic Operations in Excel** : To work with basic arithmetic operations and fundamental Excel functions (Addition, subtraction, multiplication, division, SUM, AVERAGE, MIN, and MAX on a sample sales dataset.)
2. **Cell Referencing and Formula Application** :To implement relative, absolute, and mixed cell referencing in Excel formulas. (Calculate profit margins and tax computations using different referencing techniques.)
3. **Logical Functions Implementation: To develop formula-based decision-making using IF, AND, OR, and nested IF functions. (classify student grades or employee bonuses based on conditions)**
4. **Lookup Functions:** To implement lookup functions such as VLOOKUP for data consolidation.(Retrieve employee or product details from structured tables)
5. **Working with Filters and Sorting:**To work with data filters and sorting tools to organize large datasets.(Filter sales data based on region, date, or revenue thresholds.)
6. **Working with Date Functions:** To develop date-based calculations using functions such as TODAY(), NOW(), DATEDIF(), YEAR(), MONTH(), and DAY().(compute age, project deadlines, and financial quarter summaries.)
7. **Conditional Formatting:** To implement conditional formatting rules for highlighting trends and anomalies. (Highlight top performers, overdue payments, and low inventory levels.)
8. **Descriptive Statistics and Histogram:** To analyze datasets using descriptive statistics and generate histograms. (Students will compute mean, median, standard deviation, and create frequency distributions.)
9. **Graphs and Charts Creation:** To develop graphical representations using column charts, line charts, pie charts, and bar graphs. (Compare quarterly sales performance using visual analytics).
10. **PivotTables and Scenario Analysis:** To create PivotTables and implement Goal Seek/Data Tables for business forecasting. (Students will analyze regional sales trends and perform break-even analysis.)

VISUAL DESIGNING USING CANVA

(23UCSAO2)

SEMESTER:I	AOC	HOURS:2	CREDITS:2	TOTAL HOURS:30
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Course Outcomes:

Upon completion of the course, the students will be able to

CO1	Learn the fundamentals of Design	K1
CO2	Manipulate the elements such as text, shapes, and images	K2
CO3	Creating layout with design tools	K4
CO4	Develop dashboard with layout	K3
CO5	Apply filters for animation	K3
CO6	Develop Design skills.	K4

Unit I

(Hours 6)

Introduction to Canva: Overview of Canva features, Setting up a Canva account, Navigating the Canva dashboard, Creating a new design, Basic design elements: text, shapes, lines, images, icons, Saving and sharing designs.

Unit II

(Hours 6)

Working with Design Elements: Text manipulation: fonts, text effects, Using shapes and lines, Incorporating icons, Utilizing photos and illustrations, Uploading personal images, Combining design elements.

Unit III

(Hours 6)

Utilizing Canva Templates and Layouts: Exploring Canva templates, Customizing templates: colors, fonts, images, Using grids for layout consistency, Applying frames to images and text, Creating structured designs.

Unit IV

(Hours 6)

Advanced Tools and Techniques: Working with layers, Applying filters and effects to images, Advanced text effects: shadows, outlines, Using Canva's animation features, Creating custom templates, Integrating advanced techniques in projects.

Unit V

(Hours 6)

Collaboration and Project Management: Sharing designs with team members, Real-time collaboration, Feedback and revisions, Organizing projects with folders and design libraries, Presenting designs within Canva, Exporting designs for various uses.

Text Book

James Bernstein, Graphic Design with Canva, Packet Publications, 2022.

References

1. Kelby Carr, Canva for Dummies, John Wiley Publications, 2020.
2. Robin Williams, The Non-Designer's Design Book", Peachpit Press, Fourth edition, 2014.

Web References:

1. www.imagine.jhu.edu
2. www.cpd.emory.edu
3. www.canva.com

**INTRODUCTION TO DATA SCIENCE
(23UCSAO3)**

SEMESTER:I	AOC	HOURS:2	CREDITS:2	TOTAL HOURS:30
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Course Outcomes:

Upon completion of the course, the students will be able to

CO1	Identify fundamentals of Data Science.	K1
CO2	Explain the process of Data analytics.	K2
CO3	Implement Algorithmic solutions for Data Science	K3
CO4	Analyze NOSQL and other Domains for Data Science	K4
CO5	Evaluate Data visualization tools	K5
CO6	Develop Data analytical skills.	K6

UNIT I (6 Hours)

Data science in a big data world– Benefits and Uses of Data Science and big Data – Facets of Data- Big data ecosystem and data science - **Data science process:** Overview of THE DTA Science Process (Six Steps).

UNIT II (6 Hours)

Machine Learning: Introduction- The Modeling Process – Types of Machine Learning – Semi supervised Learning- **Handling large data on a single computer** – The Problems You Face Handling Large Data – General Techniques for handling large volumes of Data – General Programming tips for Dealing with Large Data Sets.

UNIT III (6 Hours)

Join the NoSQL Movement –Introduction to NoSQL – Introducing Connected Data and Graph Databases - Text mining and Text Analytics – Text Mining in the Real World –Text Mining Techniques.

UNIT IV (6 Hours)

Data visualization to the End user: Data Visualization Options-Cross filter, The Javascript Map reduce Library - Dashboard Development Tools.

UNIT V (6 Hours)

Decision Trees and ensemble Methods – Introduction - Top down Construction of Decision Trees –Additional considerations- Controlling the Tree Shape.

Text Books

1. Davy Cielen, Arno D. B. Meysman, Mohamed Ali, “Introducing Data Science”, manning publications 2016. (UNIT I, II, III, IV)
2. Dirk P. Kroese, Zdravko I. Botev, Thomas Taimre, Radislav Vaisman, ”Data Science and Machine Learning-Mathematical and Statistical Methods”, CRC Press, MISC CBS Publishers, 2023. (UNIT V)

Reference Books

1. Roger Peng, “The Art of Data Science”, lulu.com 2016.
2. MurtazaHaider, “Getting Started with Data Science – Making Sense of Data with Analytics”, IBM press, E-book.
3. Davy Cielen, Arno D.B. Meysman, Mohamed Ali, “Introducing Data Science: Big Data, Machine Learning, and More, Using Python Tools”, Dreamtech Press 2016.

Web resources:

1. <https://www.simplilearn.com/resources-to-learn-data-science-online-article>
2. <https://learn.microsoft.com/en-us/training/paths/understand-machine-learning/>
3. https://www.w3schools.com/datascience/ds_introduction.asp

VALUE ADDED COURSE
MOBILE APPLICATION DEVELOPMENT
(26UCSVA1)

SEMESTER:III	VAC	HOURS:2	CREDITS:2	TOTAL HOURS:30
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Course Outcomes:

Upon completion of the course, the students will be able to

CO1	Explain the fundamentals of React and React Native, including architecture, working principles, strengths, and limitations of React Native.	K2
CO2	Use basic React Native components by managing component data through state and props effectively.	K3
CO3	Analyze React component specifications and lifecycle methods and construct a basic React Native application using these concepts.	K4
CO4	Implement user interface layouts using React Native styling techniques, including Flexbox, transformations, and platform-specific styles.	K3
CO5	Implement cross-platform APIs such as Alert, App State, Async Storage, and Clipboard to enhance application functionality.	K3
CO6	Evaluate and integrate device and user-interaction APIs including Dimensions, Geolocation, Keyboard, NetInfo, and PanResponder to build responsive and interactive mobile applications.	K5

UNIT I

Getting started with React Native - Introducing React and React Native - Understanding how React Native works - React Native's strengths - React Native's drawbacks - Creating and using basic components - Understanding React: Managing component data using state - Managing component data using props.

UNIT II

React component specifications - React lifecycle methods - Building first React Native app.

UNIT II

Developing applications in React Native: Introduction to styling - Applying and organizing styles in React Native - Styling view components - Styling Text components - Styling in depth - Platform-specific sizes and styles - Using transformations to move, rotate, scale, and skew components - Using flexbox to lay out components.

UNIT IV

Implementing cross - platform APIs - Using the Alert API to create cross-platform notifications - Using the App State API to detect the current application state - Using the Async Storage API to persist data - Using the Clipboard API to copy text into the user's clipboard.

UNIT V

Using the Dimensions API to get the user's screen information - Using the Geo location API

to get the user's current location information - Using the Keyboard API to control the location and functionality of the native keyboard - Using Net Info to get the user's current online/offline status - Getting information about touch and gesture events with PanResponder.

PRACTICAL LIST

1. Layout with Flexbox
2. Breaking down a UI into Components
3. Dealing with the Keyboard
4. Listing Data with the FlatList
5. Persistent Storage
6. Dealing with Remote Images on Slow Networks
7. Playing with Animations
8. Making a Declarative API for an Imperative API
9. API Calling Using GET & POST method

Text Book:

1. Nader Dabit, "React Native in Action", Manning Publications Co., 2019.

Reference Books:

1. Bonnie Eisenman, "Learning React Native - Building Native Mobile Apps with JavaScript", Second Edition, O'Reilly Media, Inc., 2018.
2. Jonathan Lebensold, "React Native Cookbook", O'Reilly Media, Inc., 2018.

Web References:

1. <https://www.netguru.com/glossary/react-native>
2. <https://www.oreilly.com/library/view/learning-react-/9781491929049/ch01.html>
3. https://www.tutorialspoint.com/react_native/index.htm

ROBOTICS AND ITS APPLICATIONS
(26UCSVA2)

SEMESTER:III	VAC	HOURS:2	CREDITS:2	TOTAL HOURS:30
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Course Outcomes:

Upon completion of the course, the students will be able to

CO1	Describe basic concepts, history and types of robots	K1
CO2	Explain components of robotic systems and their functions	K2
CO3	Apply basic programming concepts to control simple robots	K3
CO4	Analyse working of sensors and actuators in robotic applications	K4
CO5	Evaluate the suitability of robots for different real-world applications	K5
CO6	Design simple robotic solutions for given problem statements	K6

UNIT I

(7 Hours)

Definition of Robotics – History and Evolution of Robots – Classification of Robots – Industrial and Service Robots – Robot Anatomy – Degrees of Freedom – Coordinate Systems – Basic Terminologies.

UNIT II

(7 Hours)

Controllers – Microcontrollers and Embedded Boards – Power Supply – Actuators (Motors, Servos, Stepper Motors) – End Effectors – Mechanical Structures – Safety in Robotics.

UNIT III

(7 Hours)

Types of Sensors – Proximity Sensors – Light and IR Sensors – Ultrasonic Sensors – Temperature Sensors – Encoders – Sensor Interfacing Basics – Signal Conditioning – Sensor Applications.

UNIT IV

(7 Hours)

Introduction to Robot Programming – Flowcharts and Algorithms – Basics of Embedded C / Python / Block-based Programming – Control Structures – Interfacing Sensors and Actuators – Simple Robot Programs.

UNIT V

(7 Hours)

Robots in Manufacturing – Healthcare Robotics – Agricultural Robots – Educational Robots – Home Automation – Mobile Robots – Humanoid Robots – Future Trends in Robotics – Ethical and Social Issues

Text Books:

1. Saeed B. Niku, Introduction to Robotics: Analysis, Control, Applications, Wiley,2010.
2. John J. Craig, Introduction to Robotics: Mechanics and Control, Pearson,2022.
3. Timothy J. Ross, Applied Robotics for Engineers and Technicians, Wiley,2010.

Reference Books:

1. Mikell P. Groover, Industrial Robotics: Technology, Programming and Applications, McGraw-Hill,1986.
2. Gordon McComb, Robot Builder's Bonanza, McGraw-Hill,2006.
3. Jonathan W. Valvano, Embedded Systems: Introduction to ARM Cortex-M Microcontrollers, Pearson,2014.

Web References:

1. Arduino Official Documentation – <https://www.arduino.cc>

VAC – 3 UI/UX DESIGN

(23UCSVA3)

SEMESTER:III	VAC	HOURS:2	CREDITS:2	TOTAL HOURS:30
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Course Outcomes

Upon completion of the course, the students will be able to

CO1:	Describe UI, UX, CX, and usability principles used in user-centered design.	K2
CO2:	Apply design thinking, information architecture, and task analysis techniques for user interface design.	K3
CO3:	Analyze ideation methods and creative thinking techniques used in UX design processes.	K4
CO4:	Evaluate product design methods such as wireframes, prototypes, and usability heuristics.	K5
CO5:	Evaluate UI/UX implementation techniques including typography, grid systems, and mobile-first design.	K5
CO6:	Design and test user interfaces using UX testing techniques and evaluation methods	K6

UNIT I

UI/UX Fundamentals: User Interface (UI) – User Interface (UI) Benefits – User Experience (UX) – User Experience (UX) Benefits – Customer Experience (CX) – Customer Experience (CX) Benefits – Developer Experience (DX) – Developer Experience (DX) Benefits – User-centered Design (UCD) – Usability – Accessibility – Information Architecture (IA) – Design Thinking – Focus Group – Personas – Journeys – Voice of the Customer (VoC) – Subject Matter Expert (SME).

UNIT II

Design Methods and Analysis: Design Charrette – Mind Map – Decision Tree – Gamification – Design Management – Design System – Style Guide – Pattern Library – UK Government Design Principles – Apple Human Interface Guidelines – Google Material Design – Task Analysis – Cognitive Task Analysis (CTA) – Hierarchical Task Analysis (HTA) – Workflow Analysis – Critical Incident Technique (CIT) – Diary Study – Anticipatory Design.

UNIT III

Ideation and Creative Techniques: Ideation – Creative Thinking Techniques – Brainstorming – Active Listening – Thinking Hats – SCAMPER – Futurespective – Storyboard – Storyboard Steps – Mental Model – Dendrogram – The Map Is Not the Territory – Vision Board – Oblique Strategies.

UNIT IV

Product Design and Modeling: Product Design – Design Canvas – Mockups – Wireframes – Use Cases – User Stories – Use Cases and User Stories – MoSCoW Method – Low-Fidelity Prototype – High-Fidelity Prototype – WYSIWYG – Kaizen (Continuous Improvement) – Cognitive Load – Cognitive Load Recommendations – Usability Friction – Usability Friction Recommendations – Jakob's Ten Usability Heuristics – Modeling Diagrams – Activity Diagram – Sequence Diagram –

Use Case Diagram – State Diagram – Timing Diagram – Cause-and-Effect Diagram – Unified Modeling Language (UML) – PlantUML – Mermaid.js.

UNIT V

UI/UX Implementation and Testing: Typography – Copywriting – Microcopy – Iconography – Grid System – Mobile-First Design – Reactive UI – Low-Code / No-Code – Text-To-Speech (TTS) – Speech-To-Text (STT) – Progressive Enhancement – Graceful Degradation – Data Schema – Object-Relational Mapper (ORM) – Split Testing – End-to-End Testing – Acceptance Testing – Localization Testing – Accessibility Testing – Screen Reader Testing – Benchmark Testing – Shift-Left Testing – Heatmap.

TEXT BOOK

Joel Parker Henderson, UI/UX Design Guide: Concepts • Terminology • Tactics, 2024.

REFERENCE BOOKS

1. Jeff Gothelf and Josh Seiden, *Lean UX: Designing Great Products with Agile Teams*, O'Reilly Media, 2016.
2. Louis Rosenfeld, Peter Morville, and Jorge Arango, *Information Architecture: For the Web and Beyond*, O'Reilly Media, 2015

WEB REFERENCES:

1. Nielsen Norman Group (NN/g)
Official UX research and usability resource covering UX principles, usability, accessibility, personas, and user-centered design.
2. Interaction Design Foundation
Official learning platform for UI/UX design, design thinking, information architecture, and usability.
3. World Wide Web Consortium (W3C) Accessibility Guidelines
Official accessibility standards and web accessibility guidelines.

EXTRA CREDIT COURSES
PROBLEM SOLVING TECHNIQUES
(26UCSEC1)

Course Outcomes:

Upon completion of the course, the students will be able to

CO1	Recall fundamental concepts of algorithms, programs, and structured problem-solving approaches.	K1
CO2	Explain systematic problem-solving strategies, including top-down design and recursion.	K2
CO3	Apply fundamental algorithms for numerical and mathematical problem-solving tasks.	K2
CO4	Analyse and implement efficient factoring and number-related algorithms.	K4
CO5	Apply array-based and text-processing techniques to solve structured computational problems.	K4
CO6	Design and develop algorithmic solutions using recursion and structured programming principles.	K6

UNIT I

Foundations of Problem Solving: Introduction to Algorithms and Programs -Characteristics of Good Algorithms- Problem Definition and Analysis- Top-Down Design Strategy- General Problem-Solving Strategies- Implementation of Algorithms- Introduction to Recursion.

UNIT II

Fundamental Algorithms: Variable Exchange Techniques- Counting and Summation- Factorial Computation- Fibonacci Series- Base Conversion- Reversing Digits of an Integer- Sine Function Computation

UNIT III

Number Theory & Factoring Methods: Square Root Computation- Smallest Divisor of an Integer- Greatest Common Divisor (GCD)- Prime Number Generation- Prime Factorization- Raising a Number to Large Powers- n^{th} Fibonacci Computation.

UNIT IV

Array Techniques: Array Reversal- Histogram (Array Counting)- Maximum and Minimum in Arrays- Removal of Duplicates- Partitioning Techniques- Finding the k-th Smallest Element- Longest Monotone Subsequence

UNIT V

Text Processing & Recursive Algorithms: Text Formatting (Left & Right Justification)- Keyword Searching- Linear Pattern Search- Text Editing Techniques- Towers of Hanoi- * Permutation Generation

Text Book

1. Dromey, R. G. , *How to Solve It by Computer*, Pearson India, 2007.

Reference Books

1. George Polya, Jeremy Kilpatrick, *The Stanford Mathematics Problem Book: With Hints and Solutions*, Dover Publications, 2009 (Kindle Edition 2013).
2. Greg W. Scragg, *Problem Solving with Computers*, Jones & Bartlett 1st edition, 1996.

Web Resources:

3. <https://www.hackerrank.com/domains/tutorials/10-days-of-algorithms>
4. <https://www.geeksforgeeks.org/data-structures/>

DIGITAL MARKETING

(26UCSEC2)

Course Outcomes:

Upon completion of the course, the students will be able to

CO1	Remember the basic concepts, terminology and importance of digital marketing	K1
CO2	Understand digital marketing channels and strategies for business growth	K2
CO3	Apply SEO, SEM and social media tools to optimize online presence	K3
CO4	Analyze and interpret digital marketing data using analytics tools	K4
CO5	Evaluate the effectiveness of digital campaigns and measure ROI	K5
CO6	Design integrated digital marketing campaigns using best practices	K6

UNIT I

Introduction to Digital Marketing:

Meaning and scope of digital marketing–Evolution from traditional marketing–Digital marketing ecosystem–Online consumer behaviour–Digital marketing channels–Digital marketing trends and opportunities.

UNIT II

Website and Content Marketing:

Website planning and development–UX/UI basics–Landing page optimization–CMS overview (WordPress)–Content marketing strategy–Content types (blogs, videos, infographics)–Content distribution and promotion–Content calendar planning.

UNIT III

Search Engine Optimization (SEO) and Search Engine Marketing (SEM):

Search engine basics–SEO fundamentals–On-page SEO (meta tags, URLs, headings, internal linking)–Off-page SEO (link building, social signals)–Technical SEO (sitemap, robots.txt, speed optimization)–Keyword research–Introduction to SEM and Google Ads–PPC campaign basics.

UNIT IV

Social Media and Influencer Marketing:

Social media platforms overview (Facebook, Instagram, LinkedIn, YouTube, X)–Social media marketing strategy–Content creation for social media–Community building–Social media advertising–Influencer marketing–Social media analytics and reporting.

UNIT V

Digital Marketing Tools, Analytics and Ethics:

Email marketing fundamentals–Mobile marketing–Online advertising models–Web analytics (Google Analytics)–Marketing automation tools–Campaign planning and budgeting–Measuring ROI–Online reputation management–Ethical issues and data privacy (GDPR basics).

Text Book:

Seema Gupta, *Digital Marketing*, McGraw Hill Education.

Reference Books:

1. Philip Kotler et al., *Marketing 4.0*, Pearson
2. Dave Chaffey, *Digital Marketing Strategy*, Pearson
3. Charlesworth, *Digital Marketing: A Practical Approach*, Routledge

Web Resources:

Web content from NDL / SWAYAM or open source web resources.

INTERNET OF THINGS

(26UCSEC3)

Course Outcomes:

Upon completion of the course, the students will be able to

CO 1	Learn the Basics of Internet of Things	K1
CO 2	Compare and contrast the deployment of smart objects and the technologies to connect them to network	K3
CO 3	Classify the IoT design Concepts and supporting technologies	K2
CO 4	Analyze the role of IoT protocols for efficient network communication	K4
CO 5	Evaluate the building blocks of Internet of Things Network	K5
CO 6	Illustrate different sensor technologies for sensing real world entities and identify the applications of IoT in Industry	K3
K1-Remember; K2-Understand; K3-Apply; K4-Analyze; K5-Evaluate; K6-Create		

Unit I

Introduction to Internet of Things – Physical design of IoT – Logical Design of IOT – IoT enabling technologies – IoT levels and deployment templates

Unit II

IoT and M2M – Introduction – M2M – Difference between IoT and M2M – SDN and NFV for IoT – IoT System management with NETCONF-YANG – Need for IoT systems Management – Simple Network Management Protocol – Network Operator Requirements – NETCONF – YANG.

Unit III

IoT Platforms design methodology – IoT Design Methodology – IoT systems – Logical Design using Python – Python Data Types and Data Structures – Control Flow – Functions – Modules – Packages – File Handling – Classes – Python Packages for IoT.

Unit IV

IoT Physical Devices and Endpoints – Raspberry Pi – Raspberry Pi Interfaces – Programming Raspberry Pi with Python – Other IoT Devices - IoT Physical Servers and Cloud Offerings – WAMP AutoBrain for IoT – Xively Cloud for IoT – Python Web Application Framework – Django.

Unit V

Case Studies Illustrating IoT Design – Home Automation – Cities – Environment – Agriculture – Productivity Applications.

Text Book

1. Vijay Madiseti and Arshdeep Bahga, “Internet of Things (A Hands-on-Approach)”, First Edition, VPT, 2014.

Reference Books

1. Raj Kamal, “Internet of Things: Architecture and Design Principles”, 1st Edition, McGraw Hill Education, 2017.
2. Honbo zhou “The Internet of Things in the Cloud”,CRC Press, London, 2018.

Web Resources:

1. <https://www.techtarget.com/iotagenda/definition/Internet-of-Things-IoT>
2. <https://www.ibm.com/topics/internet-of-things>

QUANTUM COMPUTING

(26UCSEC4)

UNIT I

Basic quantum mechanics:, linear algebra for quantum mechanics, Quantum states in Hilbert space, The Bloch sphere, Density operators, generalized measurements, no-cloning theorem.

UNIT II

Bell inequalities and entanglement, Schmidt decomposition, superdense coding, teleportation. Classical vs Quantum Correlations – Quantum Entanglement and Nonlocality – Bell’s Theorem and Bell Inequalities – Measures of Entanglement (Entropy, Concurrence) – Quantum Discord – Applications of Quantum Correlations in Quantum Computing, Communication, and Cryptography – Experimental Demonstrations and Practical Considerations.

UNIT III

Introduction to Quantum Cryptography – Need for QKD – Basic Principles: No-Cloning Theorem and Uncertainty Principle – Quantum States and Polarization – BB84 Protocol: Concept, Working and Security – E91 and B92 Protocols (Overview) – Quantum and Classical Channels – Eavesdropping and Error Detection – Key Reconciliation and Privacy Amplification – Fiber and Free-space QKD.

UNIT IV

Universal set of gates, quantum circuits, Solovay-Kitaev theorem, Deutsch-Jozsa algorithm, factoring - Applications, Challenges and Future Trends

UNIT V

The IBMQ, coding a quantum computer using a simulator to carry out basic quantum measurement and state analysis.

Text Books:

1. Phillip Kaye, Raymond Laflamme et. al., An introduction to Quantum Computing, Oxford University press, 2007.
2. Chris Bernhardt, Quantum Computing for Everyone, The MIT Press, Cambridge, 2020.
3. David McMahon-Quantum Computing Explained-Wiley-Interscience , IEEE Computer Society (2008).

Reference Books:

1. Quantum Computation and Quantum Information, M. A. Nielsen & I. Chuang, Cambridge University Press (2013).
2. Quantum Computing, A Gentle Introduction , Eleanor G. Rieffel and Wolfgang H. Polak MIT press (2014).

Web References:

1. <https://skillsbuild.org/students/course-catalog/quantum-computing>

DATA VISUALIZATION

(26UCSEC5)

Course Outcomes:

Upon completion of the course, the students will be able to

Course Outcome		K Level
CO1	Recall Python libraries used for data visualization	K1
CO2	Explain exploratory data analysis using Python	K2
CO3	Compile results of exploratory data analysis	K3
CO4	Analyze the results for documentation	K4
CO5	Evaluate Dash Board & Visual Perception and Cognition	K5
CO6	Create Visualization Designs.	K6

UNIT I:

Basic Plotting-Line plot - Bar plot - Pie Chart - Scatter Plot - Histogram - Stacked Bar Charts - Sub Plots - Matplotlib, Searborn, Plotly - Seaborn Styles

UNIT II:

Applied Visualizations-Box plot - Density Plot - Area Chart - Heat map - Tree map - Graph Networks

UNIT III:

Interactive Visualizations and Animations - dynamic charts - Dynamic maps - Animation types - 2D, 3D, Motion Animation - Animation Principles - Altair Package - Statistical Visualizations

UNIT IV:

Principles of Information Visualization-Visual Perception and Cognition - Gestalt's Principles

UNIT V:

Tufte's Principles - Applications of Principles of Information Visualization - Dashboard Design.

TEXT BOOK:

1. Andy Kirk ,Data Visualization: A Handbook for Data Driven Design, SAGE Publications Ltd; First Edition,2016

REFERENCE BOOK:

1. Alex Campbell, Data Visualization-Proper Guide for Data Scientist, 2016, B08JHGFHM1

WEB REFERENCES:

1. <https://www.tableau.com/learn/articles/data-visualization>
2. <https://www.techtarget.com/searchbusinessanalytics/definition/data-visualization>
3. <https://www.javatpoint.com/what-is-data-visualization>

BIG DATA ANALYTICS

(26UCSEC6)

Course Outcomes:

Upon completion of the course, the students will be able to

CO1	Explain the classification of digital data, Big Data characteristics, evolution, challenges, and the importance of Big Data Analytics.	K2
CO2	Analyze NoSQL databases and Hadoop architecture, comparing SQL vs NoSQL and RDBMS vs Hadoop, and explaining distributed computing challenges.	K4
CO3	Apply MongoDB concepts including data types, query language, MapReduce components, and data operations such as searching, sorting, and compression.	K3
CO4	Execute Hive queries using HQL features such as partitions, bucketing, joins, aggregations, subqueries, and user-defined functions.	K3
CO5	Implement Pig Latin scripts to process large datasets using relational operators, functions, complex data types, and user-defined functions.	K3
CO6	Evaluate the suitability of Big Data tools such as Hadoop, MongoDB, Hive, and Pig for different data storage and processing requirements.	K5

Unit I

Classification of Digital Data, Structured and Unstructured Data - Introduction to Big Data: Characteristics - Evolution - Definition - Challenges with Big Data - Other Characteristics of Data - Why Big Data - Big Data Analytics: Classification of Analytics - Challenges - Big Data Analytics importance.

Unit II

NoSQL, Comparison of SQL and NoSQL, Hadoop -RDBMS Versus Hadoop - Distributed Computing Challenges - Hadoop Overview - Hadoop Distributed File System - Processing Data with Hadoop - Managing Resources and Applications with Hadoop YARN - Interacting with Hadoop Ecosystem.

Unit III

Why Mongo DB - Terms used in RDBMS and Mongo DB - Data Types - MongoDB Query Language MapReduce: Mapper - Reducer - Combiner - Partitioner - Searching - Sorting - Compression.

Unit IV

Hive: Introduction - Architecture - Data Types - File Formats - Hive Query Language Statements - Partitions - Bucketing - Views - Sub- Query - Joins - Aggregations - Group by and Having - RCFile Implementation - Hive User Defined Function.

Unit V

Pig: Introduction - Anatomy - Features - Philosophy - Use Case for Pig - Pig Latin Overview - Pig Primitive Data Types - Running Pig - Execution Modes of Pig - HDFS Commands - Relational

Operators - Eval Function - Complex Data Types - User-Defined Functions - Parameter Substitution
- Diagnostic Operator.

Text Book:

1. Seema Acharya, Subhashini Chellappan, “Big Data and Analytics”, Wiley Publications, First Edition, 2015.

References books:

1. Judith Huruwitz, Alan Nugent, Fern Halper, Marcia Kaufman, “Big data for dummies”, John Wiley & Sons, Inc. (2013).
2. Tom White, “Hadoop The Definitive Guide”, O’Reilly Publications, Fourth Edition, 2015.
3. Dirk Deroos, Paul C. Zikopoulos, Roman B. Melnky, Bruce Brown, Rafael Coss, “Hadoop For Dummies”, Wiley Publications, 2014
4. Robert D. Schneider, “Hadoop For Dummies”, John Wiley & Sons, Inc. (2012)
5. Paul Zikopoulos, “Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data, McGraw Hill, 2012 Chuck Lam, “Hadoop In Action”, Dreamtech Publications, 2010

Web References:

1. SQL vs NoSQL: A Comparison of Database Technologies for Data Engineers | Airbyte
2. Introduction to Apache Hive
3. Why Use MongoDB And When To Use It? | MongoDB