A.V.V.M. Sri Pushpam College (Autonomous), Poondi – 613 503.

PG & Research Department of Computer Science

B.C.A. Programme

OUTCOME BASED EDUCATION - CHOICE BASED CREDIT SYSTEM

SCHEME OF PROGRAMME AND SYLLABUS

(For the candidates admitted from 2023-2024 onwards)

Vision and Mission of the college

Vision

To provide quality academic programmes and value oriented higher education to the rural community, equip them to encounter current regional, national and global demands upholding moral standards and intellectual competency.

Mission

- To provide conducive environment for quality teaching-learning process and innovative research.
- To bestow substantial educational experience that is intellectually, socially, and personally transformative.
- To strive to bring out the latent potentiality and core competency of the learners
- To foster the culture of research-based learning, independent academic inquiry by encouraging the students to involve in research activities ranging from hands on training, student projects, publications etc.,
- To nurture essential skills, competent minds and compassionate hearts.
- To impart a practical, demanding and overall development of the personality generated by love, consideration and care for the society.
- To serve the society by extending needful outreach programmes to the rural populace.

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

- Make the learners realize the transformative power of education.
- Acquire profound disciplinary, applied, integrative knowledge and intellectual competency and domain specific and generic skills.
- Pursue lifelong learning and generate innovative solutions for the problems at individual and social level.
- Create a collaborative and inclusive environment, and serve the betterment of the society with moral integrity.
- Motivate to become a committed professional with necessary ethics as a leader as well as a team player.

PROGRAMME OUTCOMES for B.C.A Programme:

On the completion of the programme, the learners will be able to

PO1: Well equipped with analytical and logical skills which will accomplish with a sound knowledge of the core and the allied papers.

PO2: Communicate effectively from professional life to personal life and interpret information more accurately and quickly.

PO3: Attain knowledge to figure out scientific data critically and systematically and ability to draw objective conclusions thereof.

PO4: Develop scientific temper, which beneficial for the society, as the scientific developments can grow a nation or a society at a rapid pace through research.

PO5: Enrich skill to understand social, ethical, global and environmental responsibility for the benefit of the society.
PO6: Function effectively as a member or a leader of a team engaged in activities relevant to the program's discipline.
PO7: Enroll in self-sufficient and lifelong learning in the extensive context of socio technological changes.

PROGRAMME SPECIFIC OUTCOMES for B.C.A Programme

PSO-1: Globally expertise the technological planning and development of software applications in the usage of the modern era.
PSO-2: Expertise to communicate in both oral and written forms, demonstrating the practice of professional ethics and the concerns for social welfare.
PSO-3: Ability to enhance and develop techniques for independent and lifelong learning in computer application.
PSO-4: Acquiring In-depth knowledge & sustained learning leading to innovation, permutation, modernization and research to fulfill global interest.
PSO-5: Understand, formulate, develop programming model with logical approaches to a address issues arising in social science, business and other contexts.
PSO-6: Our graduates will demonstrate strong communication skills and the ability to function effectively in multi-disciplinary teams.
PSO-7: Equip with Computer science technical ability, problem solving skills, creative talent and power of communication necessary for various forms of employment.

Mapping of Programme Outcomes and Programme Specifics Outcomes

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
PO1	3	3	2	2	3	3	3
PO2	2	3	3	3	2	2	1
PO3	3	3	3	2	3	3	3
PO4	3	2	3	3	3	2	1
PO5	3	3	2	3	3	3	3
PO6	2	3	2	2	2	3	3
PO7	3	3	2	3	1	3	3

3 - Strongly Correlated; 2 - Moderately Correlated; 1 - Weakly Correlated; 0 - No correlation

Curriculum Structure for B.C.A Programmes (OBE-CBCS) – 2023

	Nature of Course	Total No. of Courses	Total marks	Total credits	Total credits for the Programme
Part – I	Language (Tamil / Hindi)	04	400	12	123 (CGPA)
Part – II	English	04	400	12	
Part – III	Core Courses	14	1400	63	
	Core Industry Module (CIM)	01	100	06	
	Elective Courses(Generic) - Allied	06	600	18	
	Elective Courses (Discipline Centric)	04	400	12	
Part – IV	Skill Enhancement Course - Non Major Elective (NME)	01	100	02	17 (Non CGPA)
	Skill Enhancement Course – Discipline Specific (SEC)	02	200	04	
	Professional Competency Skill Enhancement Course(PCSE)	01	100	02	
	Gender Studies(GS)	01	100	02	
	Environmental Studies (EVS)	01	100	02	
	Value Education (VE)	01	100	02	
	Internship / Industrial Activity	--	--	02	
Part – V	Extension Activity (EA)	--	--	01	
	Total	**40**	**4000**	**140**	**140**
Value Added Course (VAC)		01	100	--	--

B.C.A (Bachelor of Computer Applications) onwards – 2023 – 2024

S. No.	Semester	Category	Course Code	Title of the Course	Maximum Marks			Minimum Marks			Hours/ Week	Credits
					CIA	EE	Total	CIA	EE	Total		
1	I	Language	23U1CAT1/H1	Tamil – I / Hindi – I	25	75	100	10	30	40	6	3
2		Language	23U1CAE1	English – I	25	75	100	10	30	40	6	3
3		Core	23U1CAC1	Object Oriented Programming concepts using C++	25	75	100	10	30	40	6	5
4		Core	23U1CACP1	C++ Programming Lab	25	75	100	10	30	40	4	5
5		Allied	23U1CAMAA1	Numerical Analysis and Statistical methods	25	75	100	10	30	40	5	3
		Allied	23U2CAMAA2	Discrete Mathematics (Non-Semester)	-	-	-	-	-	-	3	-
6		ES	23U1CAES	Environmental Studies	-	-	100	-	-	40	SS	2
7	II	Language	23U2CAT2/H2	Tamil – II / Hindi – II	25	75	100	10	30	40	6	3
8		Language	23U2CAE2	English – II	25	75	100	10	30	40	6	3
9		Core	23U2CAC2	Data structures and Algorithms	25	75	100	10	30	40	6	5
10		Core	23U2CACP2	Data structures and Algorithms Lab	25	75	100	10	30	40	4	4
11		Allied	23U2CAMAA2	Discrete Mathematics (Non-Semester)	25	75	100	10	30	40	3	3
12		Allied	23U2CAMAA3	Operation Research	25	75	100	10	30	40	5	3
13		VE	23U2CAVE	Value Education	25	75	100	10	30	40	SS	2
		Extra Credit		MOOC(Massive open online course)	-	-	-	-	-	-	-	-
14	III	Language	23U3CAT3/H3	Tamil – III / Hindi – III	25	75	100	10	30	40	6	3
15		Language	23U3CAE3	English – III	25	75	100	10	30	40	6	3
16		Core	23U3CAC3	Python Programming	25	75	100	10	30	40	6	4
17		Core	23U3CACP3	Python Programming Lab	25	75	100	10	30	40	4	4
18		Allied	23U3CABAA1	Organizational Behavior	25	75	100	10	30	40	5	3
		Allied	23U4CABAAPL	Organizational Dynamics Training Lab (Non-Semester)	-	-	-	-	-	-	3	-
		Extra Credit		MOOC / Field visit / Hands on Training	-	-	-	-	-	-		

S. No	Semester	Category	Course Code	Title of the Course	Maximum Marks			Minimum Marks			Hours/ Week	Credits
					CIA	EE	Total	CIA	EE	Total		
19	IV	Language	23U4CAT4/H4	Tamil – IV / Hindi – IV	25	75	100	10	30	40	6	3
20		Language	23U4CAE4	English – IV	25	75	100	10	30	40	6	3
21		Core- CIM	23U4CACIM	Industry Module: Database Management System	25	75	100	10	30	40	5	6
22		Core-Lab	23U4CACP4	Database Management System lab	25	75	100	10	30	40	4	4
23		Allied	23U4CABAAPL	Organizational Dynamics Training Lab (Non-Semester)	25	75	100	10	30	40	3	3
24		Allied	23U4CACMA1	Allied - Financial Accounting	25	75	100	10	30	40	5	3
25		SEC	23U4CASEC1	Artificial Neural Networks	25	75	100	10	30	40	2	2
26		GS	23U4CAGS	Gender Studies	-	-	100	-	-	40	SS	2
		Extra Credit	Field visit / Hands on Training			-	-	-	-	-	-	-
27	V	Core	23U5CAC4	Operating Systems	25	75	100	10	30	40	6	5
28		Core	23U5CAC5	Java Programming	25	75	100	10	30	40	6	5
29		Core-Lab	23U5CACP5	Java Programming Lab	25	75	100	10	30	40	3	4
30		Elective	23U5CAEL1A/ 23U5CAEL1B	Introduction to Data Science / Software Engineering	25	75	100	10	30	40	4	3
31		Elective	23U5CAEL2A/ 23U5CAEL2B	Cloud computing/ Agile Project Management	25	75	100	10	30	40	4	3
32		NME	23U5CANME	NME-Content Writer	25	75	100	10	30	40	2	2
33		Core	23U5CAC6PR	Project with Viva Voce	25	75	100	10	30	40	5	4
		Internship / Industrial Training (Carried out in II Year summer vacation – 30 hours)									-	2
34	VI	Core	23U6CAC7	R-Programming	25	75	100	10	30	40	6	5
35		Core	23U6CAC8	Computer Networks	25	75	100	10	30	40	5	5
36		Core/Lab	23U6CACP6	R-Programming Lab	25	75	100	10	30	40	5	4
37		Elective	23U6CAEL3A/ 23U6CAEL3B	Robotics/ Data mining and Warehousing	25	75	100	10	30	40	5	3
38		Elective	23U6CAEL4A/ 23U6CAEL4B	Computational Intelligence/ Grid Computing	25	75	100	10	30	40	5	3
39		SEC	23U6CASEC2	DOT Net Programming	25	75	100	10	30	40	2	2
40		PCSE	23U6CAPCSE	Comprehensive Knowledge	-	100	100	-	40	40	2	2
		EA	Extension Activities (Outside College hours)		-	-	-	-	-	-	-	1
			Total				**4000**					**140**
		Value Add Course		Multimedia using ICT tools	-	100	100	-	40	40	SS	-

Internship/ Industrial Activity:

Students must complete in-plant training in any industry or organization where a programme-related procedure is being used, and this training must be done during the summer vacation at the end of II Year. A minimum of 30 hours should be spent on training. Students must submit a report on their training together with a certificate from the relevant industry or organization authority.

MOOC:

Massive Open Online Course (MOOC) is offered in the II and III Semester as an Extra Credit Course. Students can avail any one or more of the courses available in MOOC to equip their skill and knowledge themselves. To receive the extra credit, students must provide their MOOC course completion certificate at the end of the second year.

Field visit / Hands on Training:

In order to achieve experiential learning, these programmes with a minimum of 15 hours of contact time are offered as Extra Credit Courses in the III & IV Semester.

Evaluation of visit report will be held at the end of IV Semester.

Components of Evaluation:

Internal Marks : 25
External Marks : 75
Total : 100

Skill Enhancement course (SEC) offered by the Computer Science Department

1. Artificial Neural Network
2. NET Programming

Non – Major Elective (NME) Course offered by the Computer Science Department

Content Writer

Value Added Course offered by the Computer Science Department

"Multimedia Using ICT tools" will be conducted for III UG students as a certificate Course.

B.C.A.

Semester	Subject Code	Title Of The Paper	Hours Of Teaching/ Week	No. of Credits
I	**23U1CAT1**	**பொதுத் தமிழ் – 1**	**6**	**3**

Nature of the Course

1.Employablity Oriented வேலை வாய்ப்புச் சார்ந்தது	✓	7. Addresses Professional Ethics தொழில் நெறிமுறைகளை நிறைவு செய்தல்	
2. Entrepreneurship Oriented தொழில் முனைவு சார்ந்தது		8.Relevent To Local Need உள்ளூர் தேவைகளோடு தொடர்புடையது	✓
3. Skill Development Oriented திறன்மேம்பாடு சார்ந்தது	✓	9. Relevent To Regional Need மண்டல அளவிலான தேவைகளோடு தொடர்புடையது	
4. Addresses Gender Sensitization பாலின உணர்திறன் பூர்த்தி செய்தல்		10. Relevent To National Need தேசிய அளவிலான தேவைகளோடு தொடர்புடையது	
5. Addresses Environment and Sustainablity சுற்றுச் சூழல் மற்றும் நிலைத் தன்மை நிறைவு செய்தல்		11. Relevent To Global Development Need உலக அளவிலான தேவைகளோடு தொடர்புடையது	
6. Addresses Human Values மனித மதிப்புகளை நிறைவு செய்தல்	✓		

Course Objectives

1. முதலாமாண்டுப் பட்ட வகுப்பு மாணவர்களுக்குத் தமிழ் மொழி இலக்கியங்களை அறிமுகம் செய்தல்
2. தற்கால இலக்கியப் போக்குகளையும் இலக்கணங்களையும் மாணவர் அறியுமாறு செய்தல்.
3. மாணவர்களுக்குத் தமிழ் படைப்பாற்றலைத் தூண்டுதல்.
4. தமிழ் இலக்கியம் சார்ந்த போட்டித் தேர்வுகளுக்கு ஏற்ப கற்பித்தல் நடைமுறைகளை மேற்கொள்ளுதல்.

Unit	Details	Hours
Unit-I	***மரபுக் கவிதை*** *1. பெ. சுந்தரனார் - தமிழ்த் தெய்வ வணக்கம்* *2. பாரதிதாசன் - சிறுத்தையே வெளியில் வா* *3. கவிமணி - புத்தரும் சிறுவனும்* *4. முடியரசன் - மொழி உணர்ச்சி* *5. கண்ணதாசன் - ஆட்டனத்தி ஆதிமந்தி — ஆதிமந்தி புலம்பல்* *6. சுரதா - துறைமுகம் தொகுப்பிலிருந்து ஏதேனும் ஒரு கவிதை* *7. தமிழ் ஒளி - கடல்*	18 Hrs

Unit-II	***புதுக்கவிதை*** *1. அப்துல் ரகுமான் - வீட்டுக்கொரு மரம் வளர்ப்போம்* *2. ஈரோடு தமிழன்பன் - சென்ரியூ கவிதைகள் (ஏதேனும் ஐந்து கவிதைகள்)* *3. வைரமுத்து - பிற்சேர்க்கை* *4. மு.மேத்தா- வாழைமரம்* *5. அறிவுமதி -வள்ளுவம் பத்து* *6. நா முத்துக்குமார் - ஆனந்த யாழை மீட்டுகிறாய்* *7. சுகிர்தராணி - சபிக்கப்பட்ட முத்தம்* *8. இளம்பிறை -நீ எழுத மறுக்கும் எனது அழகு*	18 Hrs
Unit-III	***சிறுகதைகள்*** *1. வாய்ச் சொற்கள் - ஜெயகாந்தன் (மாலை மயக்கம் தொகுப்பு)* *2. கடிதம் - புதுமைப்பித்தன்* *3. முள்முடி - தி ஜானகிராமன்* *4. சிதறல்கள் - விழி.பா.இதயவேந்தன்* *5. காகித உறவு - சு.சமுத்திரம்* *6. வீட்டின் மூலையில் சமையல் அறை - அம்பை* *7. (மொழிபெயர்ப்புக் கதை) ஆண்டன் செக்காவ் - நாய்க்காரச் சீமாட்டி, சந்தியா*	18 Hrs
Unit-IV	*1. பாடம் சார்ந்த இலக்கிய வரலாறு* *2. இராகபாவம் — கேட்டிவி*	18 Hrs
Unit-V	***மொழித்திறன் போட்டி தேர்வு*** *1.பொருள் பொதிந்த சொற்றொடர் அமைத்தல்* *2. ஓர் எழுத்து ஒரு மொழி* *3. வேற்றுமை உருபுகள்* *4. திணை, பால், எண், இடம்* *5. கலைச்சொல்லாக்கம், மொழிபெயர்ப்பு.* *(குறிப்பு: அலகு 4, 5 ஆகியன போட்டித் தேர்வு நோக்கில் நடத்தப்பட வேண்டும்).*	18 Hrs

CO Number	CO Statement	Cognitive Level
CO1	*பாரதியார் காலந்தொட்டு தற்காலப் புதுக்கவிதைகள் வரை கவிதை இலக்கியம் அறிமுகப்படுத்தப்படுவதால் படைப்பாற்றல் திறன் பெறுதல்.*	**K2**
CO2	*புதுக்கவிதை வரலாற்றினை அறிந்து கொள்வர்.*	**K3**
CO3	*இக்கால இலக்கிய வகையினைக் கற்பதன் மூலம் படைப்பாக்கத் திறனைப் பெறுவர்.*	**K4**
CO4	*மொழியறிவோடு சிந்தனைத்திறன் அதிகரித்தல்.*	**K3**
CO5	*தமிழ்மொழியைப் பிழையின்றி எழுதவும், புதிய கலைச் சொற்களை உருவாக்கவும் அறிந்து கொள்ளுதல்.*	**K5**

Text Books

1. தமிழ் இலக்கிய வரலாறு -செம்பதிப்பு- பெ.சுபாஷ் சந்திரபோஸ்

பார்வை நூல்கள்.

1. தமிழ் இலக்கிய வரலாறு - சிற்பி.பாலசுப்பிரமணியன்
2. புதிய நோக்கில் தமிழ் இலக்கிய வரலாறு - தமிழண்ணல்
3. வகைமை நோக்கில் தமிழ் இலக்கிய வரலாறு - எஃப்.பாக்கியமேரி

Web Resource

Related Online Contents (MOOC, SWAYAM, NPTEL, Websites etc.)

1. Tamil Heritage Foundation- www.tamilheritage.org <http://www.tamilheritage.org> Tamil virtual University Library-
2. www.tamilvu.org/ library
3. http://www.virtualvu.org/library Project Madurai - www.projectmadurai.org.
4. Chennai Library- www.chennailibrary.com <http://www.chennailibrary.com>.
5. Tamil Universal Digital Library- www.ulib.prg <http://www.ulib.prg>.
6. Tamil E-Books Downloads- tamale books downloads. blogspot.com
7. Tamil Books on line- books. tamil cube.com
8. Catalogue of the Tamil books in the Library of British Congress archive.org
9. Tamil novels on line - books.tamilcube.com

பொதுத்தமிழ் —1												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CLO1	3	2	3	3	3	2	2	2	3	2	3	2
CLO2	3	3	2	2	2	3	2	3	3	2	2	2
CLO3	3	2	3	3	2	2	2	3	2	3	3	2
CLO4	2	3	3	2	2	2	3	2	3	2	3	3
CLO5	3	3	2	2	2	3	3	2	2	2	3	3

Semester	Course Code	Course Title	Hours of Teaching / Cycle	No. of Credits
I	**23U1CAE1**	**PART - II GENERAL ENGLISH**	**6**	**3**

Learning Objectives		
LO1	To enable earners to acquire self awareness and positive thinking required in Various life situations.	
LO2	To help the macquire the attribute of empathy	
LO3	To assist them in acquiring creative and critical thinking abilities	
LO4	To enable them to learn the basic grammar	
LO5	To assist the min developing LSRW skills	
Unit No.	**Unit Title &Text**	**No.of Periods for the Unit**
I	**SELF-AWARENESS (WHO) & POSITIVE THINKING (UNICEF)** **Life Story** Chapter 1 from Malala Yousafzai, I am Malala An Autobiography or The Story of My Experiments with Truth (Chapters 1, 2 & 3) M.K.Gandhi **Poem** Where the Mind is Without Fear–Gitanjali 35– Rabindranath Tagore Love Cycle– Chinua Achebe	**20**
II	**EMPATHY** **Poem** Nine Gold Medals– David Roth Alice Fellor poverty–William Words worth **Short Story** The School for Sympathy– E.V. Lucas Barn Burning – William Faulkner	**20**
III	**CRITICAL & CREATIVE THINKING** **Poem** The Things That Haven't Been Done Before– Edgar Guest Stopping by the Woods on a Snowy Evening– Robert Frost **Readers Theatre** The Magic Brocade – A Tale of China Stories on Stage–Aaron Shepard (Three Sideway Stories from Wayside School" by Louis Sachar)	**20**
IV	**Reflective Thinking** The Running Rivulets of man The Lady in the Silver Coat Mr.Applebaum at Play The Feigning Brawl of an Imposter Thy Life is my Lesson	**15**
V	**Communication Skill Part of Speech** Articles Noun Pronoun Verb Adverb Adjective Preposition	**15**

Course Outcomes		
Course Outcomes	On completion of this course, students will:	
CO1	Acquire self awareness and positive thinking required in various life situations	PO1,PO7
CO2	Acquire the attribute of empathy.	PO1,PO2,PO10
CO3	Acquire creative and critical thinking abilities.	PO4,PO6,PO9
CO4	Learn basic grammar	PO4,PO5,PO6
CO5	Development and integrate the use of four language skills i.e., listening, speaking, reading and writing.	PO3,PO8

	Textbooks (Latest Editions)
1.	Malala Yousafzai. Iam Malala, Little, Brown and Company, 2013.
2.	M.K.Gandhi. An Autobiography or The Story of My Experiments with Truth (Chapter – I), Rupa Publications, 2011.
3.	Rabindranath Tagore. "Gitanjali 35" from Gitanjali (Song Offerings): A CollectionofProseTranslationsMadebytheAuthorfromtheOriginalBengali. MacMillan, 1913.
4.	N.Krishnasamy. Modern English: A Book of Grammar, Usage and Composition Macmillan, 1975.
5.	Aaron Shepard. Storieson Stage, Shepard Publications, 2017.
6.	J.C.Nesfield. English Grammar Composition and Usage, Macmillan, 2019.
7.	Sri.KTV. Melodious Harmony, New Century Book House. 2022

Web Resources	
1	MalalaYousafzai.Iam Malala(Chapter1)https://archive.org/details/i-am-malala
2	M.KGandhi.An Auto biographyor The Story of My Experiments with Truth(Chapter-1)-RupaPublication,2011https://www.indiastudychannel.com/resources/146521-Book-Review-An-Autobiography-or-The-story-of-my-experiments-with-Truth.aspx
3	Rabindranath Tagore. "Gitanjali 35" from Gitanjali (Song Offerings)https://www.poetryfoundation.org/poems/45668/gitanjali-35
4	AaronShepard.StoriesonStage,ShepardPublications,2017 https://amzn.eu/d/9rVzlNv
5	JCNesfield. Manual of English Grammar and Composition. https://archive.org/details/in.ernet.dli.2015.44179

Mapping with Programme Outcomes:-

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

Mapping with Programme Specific Outcomes:-

CO /PO	PSO1	PSO2	PSO3	PSO4
CO1	3	3	3	3
CO2	3	3	3	3
CO3	3	3	3	3
CO4	3	3	3	3
CO5	3	3	3	3
Weight age	15	15	15	15
Weighted percentage of Course Contribution to POS	3.0	3.0	3.0	3.0

3– Strong, 2 –Medium, 1-Low

Semester	Course Code	Course Title	Hours of Teaching / Cycle	No. of Credits
I	**23U1CAC1**	**Object Oriented Programming Concepts Using C++**	**6**	**5**

Nature of the course

Employability Oriented	√	To introduce various techniques for representation of the data in the real world	√	Addresses Gender Sensitization	
Entrepreneurship Oriented		Relevant to regional need		Addresses Environment and Sustainability	
Skill development Oriented	√	Relevant to national need		Addresses Human Values	
		Relevant to Global development need	√	Addresses Professional Ethics	√

Course Objectives

The main objectives of this course are to:

1.Describe the procedural and object oriented paradigm with concepts of streams, classes, functions, data and objects
2.Understand dynamic memory management techniques using pointers, constructors, destructors, etc.
3.Describe the concept of function overloading, operator overloading, virtual functions and polymorphism
4.Classify inheritance with the understanding of early and late binding, usage of exception handling, generic programming
5.Demonstrate the use of various OOPs concepts with the help of programs

UNIT	SYLLABUS Content	No. of Hours
I	Introduction to C++ - key concepts of Object-Oriented Programming – Advantages – Object Oriented Languages – I/O in C++ - C++ Declarations. Control Structures : - Decision Making and Statements : If ..else, jump, go to, break, continue, Switch case statements – Loops in C++ :for, while, do – functions in C++ - inline functions – Function Overloading.	21
II	Classes and Objects: Declaring Objects – Defining Member Functions – Static Member variables and functions – array of objects –friend functions – Overloading member functions – Bit fields and classes – Constructor and destructor with static members.	21
III	Operator Overloading: Overloading unary, binary operators – Overloading Friend functions –type conversion – Inheritance: Types of Inheritance – Single, Multilevel, Multiple, Hierarchical, Hybrid, Multi path inheritance – Virtual base Classes – Abstract Classes.	21

IV	Pointers – Declaration – Pointer to Class , Object – this pointer – Pointers to derived classes and Base classes – Arrays – Characteristics – array of classes – Memory models – new and delete operators – dynamic object – Binding, Polymorphism and Virtual Functions.	21
V	Files – File stream classes – file modes – Sequential Read / Write operations – Binary and ASCII Files – Random Access Operation – Templates – Exception Handling – String – Declaring and Initializing string objects – String Attributes – Miscellaneous functions .	21

Self Study :

Introduction to Program : Defined types – scoped enumerations – unscoped enumerations – passing – returing structs – Fried non member functions.

Text Book:

1.E. Balagurusamy, "Object-Oriented Programming with C++", TMH 2013, 7th Edition.

Reference Books:

1. Ashok N Kamthane, "Object-Oriented Programming with ANSI and Turbo C++", Pearson Education 2003.

2. Maria Litvin& Gray Litvin, "C++ for you", Vikas publication 2002.

3. Object-Oriented Programming Using C++ by Alok Kumar Jagadev , Amiya Kumar Rath , Satchidananda Dehuri , PHI Learning, 2017.

Web Resources:

1. https://alison.com/course/introduction-to-c-plus-plus-programming.

2. https://www.geeksforgeeks.org/object-oriented-programming-in-cpp/

3 https://www.w3schools.com/cpp/cpp_oop.asp

Pedagogy: Teaching/Learning Methods

1. Lecture 2. Tutorial 3. Assignment 4. PPT presentation
5. Seminar & Quizzes.

Course Outcome

On the successful completion of the course, students will be able to

CO Number	CO Statement	Cognitive Level
CO1	Remember the program structure of C with its syntax and semantics	K1,K2,K3,K4
CO2	Understand the programming principles in C (data types, operators, branching and looping, arrays, functions, structures, pointers and files)	K2,K3,K4,K5
CO3	Apply the programming principles learnt in real-time problems	K1,K3,K4,K6
CO4	Analyze the various methods of solving a problem and choose the best method	K2,K5,K6
CO5	Code, debug and test the programs with appropriate test cases	K3,K4,K5

Cognitive Level :K1 – Remember **; K2** –Understanding **; K3 –**Apply; **K4**- Analyze; **K5** –Evaluate **; K6** – Create ;

Mapping with Programme Outcomes:

PO / CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1	3	2	3	3	3	2	3
CO 2	3	2	2	2	3	3	2
CO 3	2	2	3	3	2	3	3
CO 4	2	2	2	2	2	3	3
CO 5	3	3	3	3	3	3	2

3 - Strongly Correlated; 2 - Moderately Correlated; 1 - Weakly Correlated;
0 - No correlation.

Semester	Course Code	Course Title	Hours of Teaching / Cycle	No. of Credits
I	**23U1CACP1**	**C++ Programming Lab**	**4**	**5**

Nature of the course

Employability Oriented	√	To introduce various techniques for representation of the data in the real world	√	Addresses Gender Sensitization	
Entrepreneurship Oriented		Relevant to regional need		Addresses Environment and Sustainability	
Skill development Oriented	√	Relevant to national need		Addresses Human Values	
		Relevant to Global development need	√	Addresses Professional Ethics	√

Course Objectives

The main objectives of this course are:

- Describe the procedural and object oriented paradigm with concepts of streams, classes, functions, data and objects
- Understand dynamic memory management techniques using pointers, constructors, destructors, etc
- Describe the concept of function overloading, operator overloading, virtual functions and polymorphism
- Classify inheritance with the understanding of early and late binding, usage of exception handling, generic programming
- Demonstrate the use of various OOPs concepts with the help of programs

SYLLABUS		
S. No	**Content**	**No. of Hours**
1.	Write a C++ program to demonstrate function overloading, Default\ Arguments and Inline function.	3
2.	Write a C++ program to demonstrate Class and Objects	3
3.	Write a C++ program to demonstrate the concept of Passing Objects to Functions	3
4.	Write a C++ program to demonstrate the Friend Functions.	3
5.	Write a C++ program to demonstrate the concept of Passing Objects to Functions	3
6.	Write a C++ program to demonstrate Constructor and Destructor	3

7.	Write a C++ program to demonstrate Unary Operator Overloading	3
8.	Write a C++ program to demonstrate Binary Operator Overloading	3
9.	Write a C++ program to demonstrate: ● Single Inheritance ● Multilevel Inheritance ● Multiple Inheritance ● Hierarchical Inheritance ● Hybrid Inheritance	3
10.	Write a C++ program to demonstrate Virtual Functions.	3
11.	Write a C++ program to manipulate a Text File.	3
12.	Write a C++ program to perform Sequential I/O Operations on a file.	3
13.	Write a C++ program to find the Biggest Number using Command Line Arguments	3
14.	Write a C++ program to demonstrate Class Template	3
15.	Write a C++ program to demonstrate Function Template.	3
16.	Write a C++ program to demonstrate Exception Handling.	3

Text Book:

1.E. Balagurusamy, "Object-Oriented Programming with C++", TMH 2013, 7th Edition.

Reference Books:

1. Ashok N Kamthane, "Object-Oriented Programming with ANSI and Turbo C++", Pearson Education 2003.
2. Maria Litvin& Gray Litvin, "C++ for you", Vikas publication 2002.
3. Object-Oriented Programming Using C++ by Alok Kumar Jagadev , Amiya Kumar Rath , SatchidanandaDehuri , PHI Learning, 2017.

Web Resources:

1. https://alison.com/course/introduction-to-c-plus-plus-programming.
2. https://www.geeksforgeeks.org/object-oriented-programming-in-cpp/
3 https://www.w3schools.com/cpp/cpp_oop.asp

Pedagogy: Teaching/Learning Methods

1. Lecture 2. Tutorial 3. PPT presentation 5. Seminar & Quizzes.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Cognitive Level
CO1	Remember the program structure of C++ with its syntax and semantics	**K1, K2, K3, K4**
CO2	Understand the programming principles in C++ (data types, operators, branching and looping, arrays, functions, structures, pointers and files)	**K2, K3, K4,K5**
CO3	Apply the programming principles learnt in real-time problems	**K1,K3, K4, K6**
CO4	Analyze the various methods of solving a problem and choose the best method	**K2,K5,K6**
CO5	Code, debug and test the programs with appropriate test cases	**K3, K4, K5**

Cognitive Level: K1 - Remember; **K2 -** Understanding; **K3 -** Apply; **K4 -** Analyze; **K5 –** Evaluate; **K6 –** Create

Mapping of Course Outcomes with Programme Outcomes

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	3	3	3	3	2	2	2
CO2	3	3	3	3	2	3	3
CO3	2	2	3	3	2	3	1
CO4	2	2	3	3	2	2	2
CO5	3	3	2	3	2	3	3

3 - Strongly Correlated; 2 - Moderately Correlated; 1 - Weakly Correlated;
0 – No correlation

Semester	Course Code	Course Title	Hours of Teaching / Cycle	No. of Credits
I	23U1CAMAA1	Allied - NUMERICAL ANALYSIS AND STATISTICAL METHODS	5	3

Nature of the course

Employability Oriented	√	Relevant to Local need		Addresses Gender Sensitization	
Entrepreneurship Oriented		Relevant to regional need		Addresses Environment and Sustainability	
Skill development Oriented	√	Relevant to national need		Addresses Human Values	
		Relevant to Global development need	√	Addresses Professional Ethics	

Course Objectives

The main objectives of this course are to:

1. Teach various methods to find the roots of the equations.
2. Impart the knowledge of predictor and corrector methods.
3. Introduce the concepts of correlation & regression.

SYLLABUS		
Unit	**Content**	**No. of Hours**
I	**Algebraic & Transcendental equations:** Bisection Method – Iteration method – RegulaFalsi Method – Newton Raphson Method.	15
II	**Solutions to simultaneous linear algebraic equations:** Gauss Elimination Method – Gauss Jacobi & Gauss Seidal iterative methods – Simple problems only. ***Self-Study: Numerical differentiation: Newton's forward & backward difference formulae for derivatives.***	15
III	**Numerical solution of ODE:** Solution by Taylor Series Method – Euler's Method, Runge–Kutta method (4^{th} order only) – Milne's Predictor Corrector Method – Adam's Predictor Corrector Method.	15
IV	**Measures of Central Tendency:** Arithmetic Mean – Median – Mode. **Measures of Dispersion:** Standard Deviation.	15
V	**Correlation and Regression Analysis:** Simple linear correlation – Karl Pearson's coefficient of correlation – Spearman's rank correlation – Simple linear regression – two regression lines - forming regression equations.	15

Note:** Questions may be asked from the ***Self-study content for only CIA test (Mid and End semesters) and **NOT** for the external (Semester Examinations)

Textbook:

1. ***Numerical Methods,*** *P. Kandasamy, K. Thilagavathy, K. Gunavathi, S. Chand, 2007.*
2. ***Business Mathematics and Statistics (Part- II),*** *PA. Navanitham, Jai Publishers, Trichy,2014.*

Unit	Text Book	Chapter	Sections
I	1	3	3.1 to 3.4. Pg.no. (69-97)
II	1	4	4.2, 4.8, 4.9. Pg.no. (112-121, 146-158)
III	1	11	11.5, 11.9, 11.13, 11.17, 11.18. Pg.no. (352-357, 369- 372-373, 380-389, 395-408)
IV	2	7 8	Pg.no. (162-176, 196-206, 212-224) Pg.no. (325-340)
V	2	12 13	Pg.no. (503-521) Pg.no. (540-553)

References:

1. *M.K.Jain., S.R.K.Iyengarand R.K. Jain.* ***Numerical Methods for Scientific and Engineering Computation.*** *New Age International Private Limited, 1999.*
2. *C.E. Froberg.* ***Introduction to Numerical Analysis,*** *II Edn., Addison Wesley. 1979.*
3. ***Statistical Methods*** *– S.P.Gupta.*

Web resources:

1. https://archive.nptel.ac.in/courses/111/106/111106101/
2. https://archive.nptel.ac.in/courses/111/107/111107062/
3. https://open.umn.edu/opentextbooks/textbooks/459

Pedagogy: Teaching / Learning methods:

Chalk and Board, Virtual Class room, LCD projector, Video Conference, Guest Lectures, Tutorial, Assignment, Seminar. Library, Net Surfing, NPTEL Course Materials, Use of Mathematical software.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Cognitive Level
CO1	find the roots of algebraic and transcendental equations.	**K5**
CO2	use standard numerical and statistical methods to solve complex engineering problems.	**K3, K5**
CO3	solve the ordinary differential equations by using various methods.	**K4, K5**
CO4	calculate measures of central tendency and measures of dispersion.	**K3, K5**
CO5	correlate the relations between the variables.	**K4**

Cognitive Level :K1 - Remember; **K2 -** Understanding; **K3 -** Apply; **K4 -** Analyze; **K5 –** Evaluate; **K6 –** Create

Mapping of Course Outcomes with Programme Outcomes

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	2	3	2	2	2	3	3
CO2	3	3	3	3	3	3	3	3
CO3	2	3	3	2	2	3	3	2
CO4	3	1	3	2	3	3	3	2
CO5	3	3	3	1	3	3	3	1

3 - Strongly Correlated; 2 - Moderately Correlated;
1 - Weakly Correlated; 0 – No correlation

Mapping of Course Outcomes with Programme Specific Outcomes

PSO / CO	PSO 1	P SO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	3	3	2	3	3	3	3	3
CO2	2	3	2	3	3	3	3	3
CO3	3	2	2	3	2	3	3	2
CO4	3	2	3	3	3	3	1	2
CO5	1	3	2	1	3	2	3	1

3 - Strongly Correlated; 2 - Moderately Correlated;
1 - Weakly Correlated; 0 – No correlation

Semester	Course Code	Course Title	Hours of Teaching / Cycle	No. of Credits
I & II	**23U2CAMAA2**	**Allied - DISCRETE MATHEMATICS (NS)**	**3+3**	**-**

Nature of the course

Employability Oriented	√	Relevant to Local need		Addresses Gender Sensitization	
Entrepreneurship Oriented		Relevant to regional need		Addresses Environment and Sustainability	
Skill development Oriented	√	Relevant to national need		Addresses Human Values	
		Relevant to Global development need	√	Addresses Professional Ethics	

Course Objectives

The main objectives of this course are to:

1. Throughout the course, students will be expected to demonstrate their understand of Discrete mathematics.
2. To impart the basic knowledge use mathematics correct terminology and notation. Construct correct direct and indirect proofs.
3. 3. To provide a use division into cases in a Proof. Use counter examples. Apply logical reasoning to solve a variety of problems

SYLLABUS		
Unit	**Content**	**No. of Hours**
I	**Mathematical Logic:** statements and notation – connectives – negation conjunction - disjunction – Statement formulas and truth tables - conditional and bi - conditional – well-formed formulae - Tautologies – equivalence of formulae – duality law – disjunctive normal forms – conjunctive Normal forms	**18**
II	**Set Theory:** Basic concepts – Notation – Inclusion and equality – Power set – some operations on sets – Venn diagrams – Some basic set identities – principle of specification – ordered pairs and n-tuples – Cartesian products.	**18**
III	**Relations and ordering**: relations – properties of binary relations – relation matrix – partition and covering of a set – equivalence relations – compatibility relations composition of binary relations – partial ordering – partially ordered set . ***Self-Study :Functions: Definition and introduction - composition – inverse function - binary and n-array operation.***	**18**
IV	**Graph:** Graph - Sub-graphs – Walks, paths and Circuits – Connected graphs –Euler graphs – operations on graphs – Hamiltonian paths and circuits – Traveling salesman problem.	**18**

V	**Trees**: Trees – properties of trees – pendant vertices – distance and centers in a Tree- Rooted and Binary Trees – on counting trees – Spanning Trees –Fundamental circuits – Spanning Trees in a weighted graph – Shortest spanning tree: kruskal algorithm.	**18**

Note:** Questions may be asked from the ***Self-study content for only CIA test (Mid and End semesters) and **NOT** for the external (Semester Examinations)

Text Book:

*1. J.P.Tremblay, R.Manohar, **"Discrete Mathematical structures with Applications to Computer Science"** Tata McGraw Hill International, 2004.*

*2. NarsingDeo**"Graph Theory with Applications to Engineering and Computer Science".**PHI. Private Ltd., 2014.*

Unit	Text Book	Chapter	Section	Page
I	1	**1**	**Sec(1.1-1.2.10)& Sec(1.3.1-1.3.2)**	Page:2-32,50-53
II	1	2	**Sec(2.1.1-2.1.9)**	Page:105-125
III	1	2	**Sec(2.3&2.4.1-2.4.4)**	Page:148-192
IV	2	1,2	**Sec(1.1-1.6)&Sec(2.1-2.10)**	Page:1-38
V	2	3	**Sec(3.1-3.10)**	Page:39-65

References:

1. Bernard Kolman& Robert C.Busby "Discrete Mathematical Structure for Computer Science" (Revised) PHI.

2.Hamary "Graph Theory" Addison Wesley Publishing Company

Web resources:

1.https://explorecourses.stanford.edu/search?q=CS157[Stanford]

2.https://www.cst.cam.ac.uk/teaching/2021/DiscMath[University of Cambridge]

Pedagogy: Teaching / Learning methods:

Chalk and Board, Virtual Class room, LCD projector, Video Conference, Guest Lectures, Tutorial, Assignment, Seminar.Library, Net Surfing, NPTEL Course Materials, Use of Mathematical software.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Cognitive Level
CO1	apply mathematical logic to solve problems.understand sets, relations, functions and discrete structures.	**K5**
CO2	use logical notations to define and reas.son about fundamental mathematical concept such as set relations and function.	**K3, K5**
CO3	formulate truth table for expressions involving the logical connectives :negation, conjunction, disconjunction, conditional and biconditional.	**K4, K5**
CO4	model and solve real world problems using graphs and trees.	**K3, K5**
CO5	extend their knowledge to pursue research using this field	**K4**

Cognitive Level :K1 - Remember; **K2 -** Understanding; **K3 -** Apply; **K4 -** Analyze; **K5 –** Evaluate; **K6 –** Create

Mapping of Course Outcomes with Programme Outcomes

PO / CO	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	2	3	2	2	2	3	3
CO2	3	3	3	3	3	3	3	3
CO3	2	3	1	2	2	3	3	2
CO4	3	2	3	2	3	1	1	1
CO5	1	3	3	2	2	3	3	2

3 - Strongly Correlated; 2 - Moderately Correlated;
1 - Weakly Correlated; 0 – No correlation

Mapping of Course Outcomes with Programme Specific Outcomes

PSO / CO	PSO 1	P SO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	3	3	2	3	3	3	3	3
CO2	2	3	2	3	3	3	3	3
CO3	2	2	1	3	2	3	3	2
CO4	3	1	3	2	3	2	2	2
CO5	3	3	3	2	2	1	2	3

3 - Strongly Correlated; 2 - Moderately Correlated;
1 - Weakly Correlated; 0 – No correlation

Semester	Subject Code	Title Of The Paper	Hours Of Teaching/ Week	No. of Credits
II	**23U2CAT2**	**பொதுத் தமிழ் – 2**	**6**	**3**

Nature of the Course

1.Employablity Oriented வேலை வாய்ப்புச் சார்ந்தது	✓	7. Addresses Professional Ethics தொழில் நெறிமுறைகளை நிறைவு	
2. Entrepreneurship Oriented தொழில் முனைவு சார்ந்தது		8.Relevent To Local Need உள்ளூர் தேவைகளோடு தொடர்புடையது	✓
3. Skill Development Oriented திறன்மேம்பாடு சார்ந்தது	✓	9. Relevent To Regional Need மண்டல அளவிலான தேவைகளோடு தொடர்புடையது	
4. Addresses Gender Sensitization பாலின உணர்திறன் பூர்த்தி செய்தல்		10. Relevent To National Need தேசிய அளவிலான தேவைகளோடு தொடர்புடையது	
5. Addresses Environment and Sustainablity சுற்றுச் சூழல் மற்றும் நிலைத் தன்மை நிறைவு செய்தல்		11. Relevent To Global Development Need உலக அளவிலான தேவைகளோடு தொடர்புடையது	
6. Addresses Human Values மனித மதிப்புகளை நிறைவு செய்தல்	✓		

Course Objectives

1. சமய இலக்கியங்களையும் சிற்றிலக்கியங்களையும் மாணவர்களுக்கு அறிமுகப்படுத்துதல்.
2. மாணவர்களுக்கு மொழித்திறனை வளர்க்கப் பயிற்சி அளித்தல்.
3. மாணவர்களுக்குச் சிறுகதை இலக்கிய வடிவத்தை உணர்த்துதல்.

Unit	Details	Hours
Unit-I	*1.திருநாவுக்கரசர் தேவாரம் - நாமார்க்கும் குடியல்லோம் எனத் தொடங்கும் பதிகம் (10 பாடல்கள்)* *2.ஆண்டாள் - திருப்பாவை (முதல் 10 பாசுரம்)*	**18 Hrs**
Unit-II	*1.வள்ளலார் -அருள் விளக்க மாலை (முதல் 10 பாடல்)* *2.எச்.ஏ.கிருட்டிணப்பிள்ளை - இரட்சணிய மனோகரம் - பால்ய பிரார்த்தனை* *3.குணங்குடி மஸ்தான் சாகிபு - பராபரக்கண்ணி (முதல் 10 கண்ணி)*	**18 Hrs**
Unit-III	*சிற்றிலக்கியங்கள்* *1.தமிழ்விடு தூது (முதல் 20 கண்ணி)* *2.திருக்குற்றாலக் குறவஞ்சி - குறத்தி மலைவளம் கூறுதல்* *3.முக்கூடல் பள்ளு - நாட்டு வளம்*	**18 Hrs**
Unit-IV	*1.பாடம் தழுவிய இலக்கிய வரலாறு* *2.மனோரஞ்சிதம் -கேட்டிவி*	**18 Hrs**
Unit-V	*மொழித்திறன்/போட்டித் தேர்வுத் திறன்* *1. தொடர் வகைகள்* *2. மரபுத்தொடர், பழமொழிகள்* *3. பிறமொழிச் சொற்களைக் களைதல்* *4. வழுச்சொற்கள் நீக்குதல்* *5. இலக்கணக் குறிப்பு அறிதல்*	**18 Hrs**

CO Number	CO Statement	Cognitive Level
CO1	பக்தி இலக்கியங்களைக் கற்பதன் மூலம் பக்தி நெறியினையும்,சமய நல்லிணக்கத்தையும் தெரிந்து பின்பற்றுவர்.	**K1, K2**
CO2	சிற்றிலக்கியங்களின்வழி இலக்கியச் சுவையினையும் பண்பாட்டு அறிவினையும் பெறுவர்.	**K2**
CO3	பட்டப் படிப்பினைப் படிக்கும் போதே பெரும்பான்மையான தமிழ் இலக்கியங்கள் குறித்த அறிவினைப் பெறுவர்.	**K4**
CO4	தமிழ்ச் சமூகப் பண்பாட்டு வரலாற்றினை இலக்கியங்கள் வாயிலாக அறிவர்.	**K3**
CO5	போட்டித் தேர்வுகளில் வெற்றி பெறுவதற்குத் தமிழ்ப் பாடத்தினைப் பயன்கொள்ளும் வகையில் ஏற்ற பயிற்சி பெறுவர்.	**K4**

Text Books

1. தமிழ் இலக்கிய வரலாறு -செம்பதிப்பு- பெ.சுபாஷ் சந்திரபோஸ்

பார்வை நூல்கள்

1. தமிழ் இலக்கிய வரலாறு - சிற்பி.பாலசுப்பிரமணியன்
2. புதிய நோக்கில் தமிழ் இலக்கிய வரலாறு - தமிழண்ணல்
3. வகைமை நோக்கில் தமிழ் இலக்கிய வரலாறு - எஃப்.பாக்கியமேரி

Web Resource:-

Related Online Contents (MOOC,SWAYAM,NPTEL,Websites etc.)

1. Tamil Heritage Foundation- www.tamilheritage.org <http://www.tamilheritage.org>
   Tamil virtual University Library-
2. www.tamilvu.org/ library
3. http://www.virtualvu.org/library Project Madurai - www.projectmadurai.org.
4. Chennai Library- www.chennailibrary.com <http://www.chennailibrary.com>.
5. Tamil Universal Digital Library- www.ulib.prg <http://www.ulib.prg>.
6. Tamil E-Books Downloads- tamilebooksdownloads. blogspot.com
7. Tamil Books on line- books.tamil cube.com
8. Catalogue of the Tamil books in the Library of British Congress archive.org
9. Tamil novels on line - books.tamilcube.com

பொதுத்தமிழ் —2												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CLO1	3	2	3	3	3	2	2	2	3	2	3	2
CLO2	3	3	2	2	2	3	2	3	3	2	2	2
CLO3	3	2	3	3	2	2	2	3	2	3	3	2
CLO4	2	3	3	2	2	2	3	2	3	2	3	3
CLO5	3	3	2	2	2	3	3	2	2	2	3	3

Semester	Course Code	Course Title	Hours of Teaching / Cycle	No. of Credits
II	**23U2CAE2**	**PART - II GENERAL ENGLISH**	**6**	**3**

Learning Objectives		
LO1	To make students realize the importance of resilience	
LO2	To enable them to become good decision makers	
LO3	To enable them to imbibe problem-solving skills	
LO4	To enable them to usetenses appropriately	
LO5	To help the muse English effectively at the work place.	
Unit No.	**Unit Title &Text**	**No.of Periods for the Unit**
I	**RESILIENCE** **Poem** Don't Quit – Edgar A. Guest Still Here–Langston Hughes **Short Story** Engine Trouble – R.K.Narayan RipVan Winkle– Washington Irving	**20**
II	**DECISION MAKING** **Short Story** The Scribe– Kristin Hunter The Lady or the Tiger- Frank Stockton **Poem** The Road not Taken–Robert Frost Snake – D. H Lawrence	**20**
III	**PROBLEM SOLVING** **Prose life Story** How I taught My Grandmother to Read– Sudha Murthy **Autobiography** How frog Went to Heaven–ATale of Angolo Wings of Fire(Chapters1, 2, 3) by A.P.J Abdul Kalam	**20**
IV	**Moral Values** The Stoic Penalty Nobility in Reasoning Malu, the Frivolous Freak Honesty is the Cream of Chastity A Boy in Boy's Town	**15**
V	**Tenses** Present Past Future Concord	**15**

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Realize the importance of resilience	PO1,PO7
CO2	Become good decision-makers	PO1,PO2,PO10
CO3	Imbibe problem-solving skills	PO4,PO6,PO9
CO4	Use tenses appropriately	PO4, PO5,PO6
CO5	Use English effectively at the work place.	PO3,PO8

Text Books (Latest Editions)	
References Books	
1	Martin Hewings. Advanced English Grammar. Cambridge University Press, 2000
2	SP Bakshi, Richa Sharma. Descriptive English. Arihant Publications (India) Ltd., 2019.
3.	Sheena Cameron, Louise Dempsey. The Reading Book: A Complete Guide to Teaching Reading. S & L. Publishing, 2019.
4	Barbara Sherman. Skimming and Scanning Techniques, Liberty University Press, 2014.
5.	Phil Chambers. Brilliant Speed Reading: What every ouneed to read, however. Pearson, 2013.
6.	Communication Skills: Practical Approach Ed.Shaikh Moula Ramendra Kumar. Stories of Resilience, Blue Rose Publications, 2020.
7.	Sri.KTV.Melodious Harmony, New Century Book House. 2022

Web Sources

1	LangstonHughes.StillHere https://poetryace.com/im-still-here
2	R.K. Narayan.Engine Trouble http://www.sbioaschooltrichy.org/work/Work/images/new/8e.pdf
3	Washington Irving. Rip Van Winkle https://www.gutenberg.org/files/60976/60976-h/60976-h.htm
4	FrankStockton. TheLadyor the Tigerhttps://www.gutenberg.org/ebooks/396

Mapping with Programme Outcomes:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3–Strong,2–Medium,1-Low Mapping with Programme Specific Outcomes:

CO /PO	PSO1	PSO2	PSO3	PSO4
CO1	3	3	3	3
CO2	3	3	3	3
CO3	3	3	3	3
CO4	3	3	3	3
CO5	3	3	3	3
Weight age	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0

3– Strong, 2 –Medium, 1-Low

Semester	Course Code	Course Title	Hours of Teaching / Cycle	No. of Credits
II	**23U2CAC2**	**Data Structures and Algorithms**	**6**	**5**

Nature of the course

Employability Oriented	√	To introduce various techniques for representation of the data in the real world	√	Addresses Gender Sensitization	
Entrepreneurship Oriented	√	Relevant to regional need		Addresses Environment and Sustainability	
Skill development Oriented		Relevant to national need	√	Addresses Human Values	
		Relevant to Global development need		Addresses Professional Ethics	√

Course Objectives

The main objectives of this course are to:

- To understand the concepts of ADTs
- To learn linear data structures-lists, stacks, queues
- To learn Tree structures and application of trees
- To learn graph structures and application of graphs
- To understand various sorting and searching

SYLLABUS

UNIT	Content	No. of Hours
I	Abstract Data Types (ADTs)- List ADT-array – based implementation-linked list implementation singly linked lists-circular linked lists-doubly-linked lists-applications of lists-Polynomial Manipulation- All operations-Insertion-Deletion-Merge-Traversal.	21
II	Stack ADT-Operations- Applications- Evaluating arithmetic expressions – Conversion of infix to postfix expression-Queue ADT-Operations-Circular Queue- Priority Queue- de deque applications of queues.	21
III	Tree ADT-tree traversals-Binary Tree ADT-expression trees-applications of trees-binary search tree ADT- Threaded Binary Trees-AVL Trees- B-Tree- B+ Tree – Heap-Applications of heap.	21
IV	Definition- Representation of Graph- Types of graph-Breadth first traversal – Depth first traversal-Topological sort- Bi-connectivity – Cut vertex-Euler circuits-Applications of graphs.	21
V	Searching- Linear search-Binary search-Sorting-Bubble sort-Selection sort-Insertion sort-Shell sort-Radix sort-Hashing-Hash functions-Separate chaining- Open Addressing-Rehashing Extendible Hashing	21

Self Study:

Red black tree, skew heap, travelling salesman problem, towers of Hanoi.

Text Book:

1. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C++", Pearson Education 2014, 4th Edition.
2.Reema Thareja, "Data Structures Using C", Oxford Universities Press 2014, 2nd Edition.

Reference Book:

1. Thomas H.Cormen, Chales E.Leiserson, Ronald L.Rivest, Clifford Stein, "Introduction to Algorithms", McGraw Hill 2009, 3rd Edition.
2. Aho, Hopcroft and Ullman, "Data Structures and Algorithms", Pearson Education 2003.

Web Resources:

1.NPTEL & MOOC courses titled Data Structures
2.https://nptel.ac.in/courses/106106127/

Pedagogy: Teaching/Learning Methods

1. Lecture 2. Tutorial 3. Assignment 4. PPT presentation
5. Seminar & Quizzes.

Course Outcome

On the successful completion of the course ,students will be able to

CO Number	CO Statement	Cognitive Level
CO1	Understand the concept of Dynamic memory management, data types, algorithms, Big O notation	K1,K2,K3,
CO2	Understand basic data structures such as arrays, linked lists, stacks and queues	K3,K4,K5
CO3	Describe the hash function and concepts of collision and its resolution methods	K3,K4,K6
CO4	Solve problem involving graphs, trees and heaps	K1,K2,K5,K6
CO5	Apply Algorithm for solving problems like sorting, searching, insertion and deletion of data	K3,K4,K5

Cognitive Level :K1 – Remember **; K2** –Understanding **; K3 –**Apply; **K4**- Analyze; **K5** –Evaluate **; K6** – Create ;

Mapping with Programme Outcomes:

PO / CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1	3	3	2	2	3	2	3
CO 2	2	3	2	3	3	3	2
CO 3	3	3	3	2	2	3	3
CO 4	3	2	3	3	2	3	3
CO 5	3	2	2	3	3	3	2

3 - Strongly Correlated; 2 - Moderately Correlated; 1 - Weakly Correlated;
0 - No correlation.

Semester	Course Code	Course Title	Hours of Teaching / Cycle	No. of Credits
II	**23U2CACP2**	**Data structures and algorithms Lab**	**4**	**4**

Nature of the course

Employability Oriented	√	To introduce various techniques for representation of the data in the real world	√	Addresses Gender Sensitization	
Entrepreneurship Oriented		Relevant to regional need		Addresses Environment and Sustainability	√
Skill development Oriented	√	Relevant to national need	√	Addresses Human Values	
		Relevant to Global development need		Addresses Professional Ethics	√

Course Objectives

The main objectives of this course are :

- To understand the concepts of ADTs
- To learn linear data structures-lists, stacks, queues
- To learn Tree structures and application of trees
- To learn graph structures and application of graphs
- To understand various sorting and searching

SYLLABUS		
Sl.No	**Content**	**No. of Hours**
1.	Write a C++ program to implement the List ADT using arrays and linked lists.	**3**
2.	Write a C++ program to implement the following using a singly linked list. ● Stack ADT ● Queue ADT	**3**
3.	Write a C++ program that reads an infix expression, converts the expression to postfix form and then evaluates the postfix expression (use stack ADT).	**3**
4.	Write a C++ program to implement priority queue ADT.	**3**
5.	Write a C++ program to perform the following operations: ● Insert an element into a binary search tree. ● Delete an element from a binary search tree. ● Search for a key element in a binary search tree.	**3**
6.	Write a C++ program to perform the following operations	**3**

	● Insertion into an AVL-tree ● Deletion from an AVL-tree	
7.	Write a C++ program for the implementation of BFS and DFS for a given graph.	**3**
8.	Write a C++ program for implementing the following searching methods: ● Linear search ● Binary search.	**3**
9.	Write a C++ program for implementing the following sorting methods: ● Bubble sort ● Selection sort ● Insertion sort ● Radix sort.	**3**

Text Book:

1. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C++", Pearson Education 2014, 4th Edition.
2. Reema Thareja, "Data Structures Using C", Oxford Universities Press 2014, 2nd Edition.

Reference Book:

1. Thomas H.Cormen, Chales E.Leiserson, Ronald L.Rivest, Clifford Stein, "Introduction to Algorithms", McGraw Hill 2009, 3rd Edition.
2. Aho, Hopcroft and Ullman, "Data Structures and Algorithms", Pearson Education 2003.

Web Resources:

1.NPTEL & MOOC courses titled Data Structures
2.https://nptel.ac.in/courses/106106127/

Pedagogy:Teaching/Learning Methods

1. Lecture
2. Tutorial
3 PPT presentation
5. Seminar & Quizzes.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Cognitive Level
CO1	Understand the concept of Dynamic memory management, data types, algorithms, Big O notation	**K1, K3**
CO2	Understand basic data structures such as arrays, linked lists, stacks and queues	**K3, K5**
CO3	Describe the hash function and concepts of collision and its resolution methods	**K1, K6**
CO4	Solve problem involving graphs, trees and heaps	**K2,K6**
CO5	Apply Algorithm for solving problems like sorting, searching, insertion and deletion of data	**K3, K4,**

Cognitive Level: K1 - Remember; **K2 -** Understanding; **K3 -** Apply; **K4 -** Analyze; **K5 –** Evaluate; **K6 –** Create

Mapping of Course Outcomes with Programme Outcomes

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	2	3	3	3	3	2	3
CO2	3	2	3	3	2	2	3
CO3	2	2	2	3	2	3	1
CO4	2	2	3	2	2	3	3
CO5	3	3	2	3	3	2	3

3 - Strongly Correlated; 2 - Moderately Correlated; 1 - Weakly Correlated;
0 – No correlation

Semester	Course Code	Course Title	Hours of Teaching / Cycle	No. of Credits
I & II	**23U2CAMAA2**	**Allied- DISCRETE MATHEMATICS (NS)**	**3+3**	**3**

Nature of the course

Employability Oriented	√	Relevant to Local need		Addresses Gender Sensitization	
Entrepreneurship Oriented		Relevant to regional need		Addresses Environment and Sustainability	
Skill development Oriented	√	Relevant to national need		Addresses Human Values	
		Relevant to Global development need	√	Addresses Professional Ethics	

Course Objectives

The main objectives of this course are :

1. Throughout the course, students will be expected to demonstrate their understand of Discrete mathematics.
2. To impart the basic knowledge use mathematics correct terminology and notation. Construct correct direct and indirect proofs.
3. 3. To provide a use division into cases in a Proof. Use counter examples. Apply logical reasoning to solve a variety of problems

SYLLABUS		
Unit	**Content**	**No. of Hours**
I	**Mathematical Logic:** statements and notation – connectives – negation conjunction - disjunction – Statement formulas and truth tables - conditional and bi - conditional – well-formed formulae - Tautologies – equivalence of formulae – duality law – disjunctive normal forms – conjunctive Normal forms	**18**
II	**Set Theory:** Basic concepts – Notation – Inclusion and equality – Power set – some operations on sets – Venn diagrams – Some basic set identities – principle of specification – ordered pairs and n-tuples – Cartesian products.	**18**
III	**Relations and ordering**: relations – properties of binary relations – relation matrix – partition and covering of a set – equivalence relations – compatibility relations composition of binary relations – partial ordering – partially ordered set . ***Self-Study :Functions: Definition and introduction - composition – inverse function - binary and n-array operation.***	**18**
IV	**Graph:** Graph - Sub-graphs – Walks, paths and Circuits – Connected graphs –Euler graphs – operations on graphs – Hamiltonian paths and circuits – Traveling salesman problem.	**18**

V	**Trees**: Trees – properties of trees – pendant vertices – distance and centers in a Tree- Rooted and Binary Trees – on counting trees – Spanning Trees –Fundamental circuits – Spanning Trees in a weighted graph – Shortest spanning tree: kruskal algorithm.	**18**

Note:** Questions may be asked from the ***Self-study content for only CIA test (Mid and End semesters) and **NOT** for the external (Semester Examinations)

Text Book:

*1. J.P.Tremblay, R.Manohar, **"Discrete Mathematical structures with Applications to Computer Science"** Tata McGraw Hill International, 2004.*

*2. NarsingDeo**"Graph Theory with Applications to Engineering and Computer Science".**PHI. Private Ltd., 2014.*

Unit	Text Book	Chapter	Section	Page
I	1	**1**	**Sec(1.1-1.2.10)& Sec(1.3.1-1.3.2)**	Page:2-32,50-53
II	1	2	**Sec(2.1.1-2.1.9)**	Page:105-125
III	1	2	**Sec(2.3&2.4.1-2.4.4)**	Page:148-192
IV	2	1,2	**Sec(1.1-1.6)&Sec(2.1-2.10)**	Page:1-38
V	2	3	**Sec(3.1-3.10)**	Page:39-65

References:

1. Bernard Kolman& Robert C.Busby "Discrete Mathematical Structure for Computer Science" (Revised) PHI.

2.Hamary "Graph Theory" Addison Wesley Publishing Company

Web resources:

1.https://explorecourses.stanford.edu/search?q=CS157[Stanford]

2.https://www.cst.cam.ac.uk/teaching/2021/DiscMath[University of Cambridge]

Pedagogy: Teaching / Learning methods:

Chalk and Board, Virtual Class room, LCD projector, Video Conference, Guest Lectures, Tutorial, Assignment, Seminar.Library, Net Surfing, NPTEL Course Materials, Use of Mathematical software.

CourseOutcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Cognitive Level
CO1	apply mathematical logic to solve problems.understand sets, relations, functions and discrete structures.	**K5**
CO2	use logical notations to define and reas.son about fundamental mathematical concept such as set relations and function.	**K3, K5**
CO3	formulate truth table for expressions involving the logical connectives :negation, conjunction, disconjunction, conditional and biconditional.	**K4, K5**
CO4	model and solve real world problems using graphs and trees.	**K3, K5**
CO5	extend their knowledge to pursue research using this field	**K4**

Cognitive Level :K1 - Remember; **K2 -** Understanding; **K3 -** Apply; **K4 -** Analyze; **K5 –** Evaluate; **K6 –** Create

Mapping of Course Outcomeswith Programme Outcomes

PO / CO	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	2	3	2	2	2	3	3
CO2	3	3	3	3	3	3	3	3
CO3	2	3	1	2	2	3	3	2
CO4	3	2	3	2	3	1	1	1
CO5	1	3	3	2	2	3	3	2

3 - Strongly Correlated; 2 - Moderately Correlated;
1 - Weakly Correlated; 0 – No correlation

Mapping of Course Outcomeswith Programme Specific Outcomes

PSO / CO	PSO 1	P SO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	3	3	2	3	3	3	3	3
CO2	2	3	2	3	3	3	3	3
CO3	2	2	1	3	2	3	3	2
CO4	3	1	3	2	3	2	2	2
CO5	3	3	3	2	2	1	2	3

3 - Strongly Correlated; 2 - Moderately Correlated;
1 - Weakly Correlated; 0 – No correlation

Semester	Course Code	Course Title	Hours of Teaching / Cycle	No. of Credits
II	**23U2CAMAA3**	**Allied – OPERATION RESEARCH**	**5**	**3**

Nature of the course

Employability Oriented	√	Relevant to Local need		Addresses Gender Sensitization	
Entrepreneurship Oriented	√	Relevant to regional need		Addresses Environment and Sustainability	
Skill development Oriented	√	Relevant to national need		Addresses Human Values	
		Relevant to Global development need	√	Addresses Professional Ethics	

Course Objectives

The main objectives of this course are:

1. To introduce the concept of binomial, exponential and logarithmic series.
2. To teach the relation between circular and hyperbolic function.
3. To impart the knowledge of the methods to find radius of curvature and centre of curvature.

SYLLABUS

Unit	Content	No. of Hours
I	**Operation Research**: Linear programming formulations & graphical solution of two Variables . ***Self study : Canonical and standard forms of LPP***	**15**
II	**Simplex Method:** Simplex Method for <, =, > constraints – BigM method of penalties.	**15**
III	**Transportation problem:** Transportation algorithm – Degeneracy algorithm – Degeneracy in Transportation Problem, Unbalanced transportation problem – **Assignment Problem:** assignment algorithm – unbalanced Assignment problem.	**15**
IV	**Sequencing problem**: Processing of n jobs through two machines – processing of n jobs through 3 machines – processing of two jobs through m machines.	**15**
V	**Networks:** Network– PERT computation – CPM computation.	**15**

Note:** Questions may be asked from the ***Self-study content for only CIA test (Mid and End semesters) and **NOT** for the external (Semester Examinations)

Textbook:

P.K. Gupta and Manmohan, ***Problems in Operations Research,*** *Sultan Chandpublishers, New Delhi, 2014.*

Unit	Chapter	Sections
I	Chapter 1,2	Pages :11 to 62
II	Chapter 4,5	Pages :75 to 120
III	Chapter 15,16	Pages :293 to 382
IV	Chapter 17	Pages :383 to 407
V	Chapter 27	Pages : 691 to 720

References:

1. Premkumar Gupta and D.S.Hira**. Operations Research: An introduction:** S.Chand and Co., Ltd., New Delhi.
2. HamdyA.Taha, **Operations Research** (7^{th}Edn.), McMillan Publishing Company, New Delhi. 1982.

Web resources:

1. https://archive.nptel.ac.in/courses/112/106/112106134/
2. https://www.youtube.com/watch?v=a2QgdDk4Xjw
3. https://www.youtube.com/watch?v=6wEOWvcU2k0

Pedagogy: Teaching / Learning methods:

Chalk and Board, Virtual Class room, LCD projector, Video Conference, Guest Lectures, Tutorial, Assignment, Seminar.Library, Net Surfing, NPTEL Course Materials, Use of Mathematical software.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Cognitive Level
CO1	Know the linear programming problem and its types	**K1,K2**
CO2	Solve the problems of simplex methods	**K2,K3**
CO3	Classify the method of transportation problem and assignment problem	**K3,K4**
CO4	Find the problems of n jobs through two machines	**K2,K4**
CO5	Solve the problems of PERT and CPM	**K2,K3**

Cognitive Level: **K1 -** Remember; **K2 -** Understanding; **K3 -** Apply; **K4 -** Analyze; **K5 –** Evaluate; **K6 –** Create

Mapping of Course Outcomes with Programme Outcomes

PO / CO	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	2	3	2	2	2	3	3
CO2	3	3	3	3	3	3	3	3
CO3	2	3	3	2	2	3	3	1
CO4	3	2	1	2	3	2	2	2
CO5	1	3	3	2	1	3	3	2

3 - Strongly Correlated; 2 - Moderately Correlated;
1 - Weakly Correlated; 0 – No correlation

Mapping of Course Outcomes with Programme Specific Outcomes

PSO / CO	PSO 1	P SO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	3	3	2	3	3	3	3	3
CO2	2	3	2	3	3	3	3	3
CO3	3	2	2	1	2	3	3	2
CO4	1	3	1	3	3	1	2	1
CO5	2	3	2	2	3	2	3	3

3 - Strongly Correlated; 2 - Moderately Correlated;
1 - Weakly Correlated; 0 – No correlation

Semester	Subject Code	Title Of The Paper	Hours Of Teaching/ Week	No. of Credits
III	**23U3CAT3**	**பொதுத் தமிழ் – 3**	**6**	**3**

Nature of the Course

1.Employablity Oriented வேலை வாய்ப்புச் சார்ந்தது		7. Addresses Professional Ethics தொழில் நெறிமுறைகளை நிறைவு செய்தல்	✓
2. Entrepreneurship Oriented தொழில் முனைவு சார்ந்தது		8.Relevent To Local Need உள்ளூர் தேவைகளோடு தொடர்புடையது	✓
3. Skill Development Oriented திறன்மேம்பாடு சார்ந்தது	✓	9. Relevent To Regional Need மண்டல அளவிலான தேவைகளோடு தொடர்புடையது	
4. Addresses Gender Sensitization பாலின உணர்திறன் பூர்த்தி செய்தல்		10. Relevent To National Need தேசிய அளவிலான தேவைகளோடு தொடர்புடையது	
5. Addresses Environment and Sustainablity சுற்றுச் சூழல் மற்றும் நிலைத் தன்மை நிறைவு செய்தல்		11. Relevent To Global Development Need உலக அளவிலான தேவைகளோடு தொடர்புடையது	
6. Addresses Human Values மனித மதிப்புகளை நிறைவு செய்தல்	✓		

Course Objectives

1.இலக்கியங்களின் சிறப்பினை உணர்த்துதல்.
2.காலந்தோறும் எழுந்த காப்பியங்களின் போக்கையும், புதினத்தின் இலக்கிய வடிவத்தை மாணவர்கள் உணருமாறு செய்தல்.
3.யாப்பு, அணி போன்ற இலக்கிய வகைகளையும் மொழி பெயர்ப்புத் திறனையும் மாணவர்கள் உணருமாறு செய்தல்.
4.தமிழ் இலக்கியம் சார்ந்த போட்டித் தேர்வுகளுக்கு ஏற்பக் கற்பித்தல் நடைமுறைகளை மேற்கொள்ளுதல்.

Unit	Details	Hours
Unit-I	பெருங்காப்பியங்கள் *1.சிலப்பதிகாரம் - வழக்குரைகாதை-இளங்கோவடிகள்* *2.மணிமேகலை ஆதிரை பிச்சையிட்ட காதை சீத்தலைச்சாத்தனார்* *3.சீவகசிந்தாமணி - பூமகள் இலம்பகம் திருத்தக்கதேவர்* *4.வளையாபதி—நாதகுத்தனார்*	**18 Hrs**
Unit-II	சமயக் காப்பியங்கள் *1.பெரியபுராணம் - பூசலார் நாயனார்புராணம்-சேக்கிழார்* *2.கம்பராமாயணம்- மந்தரை சூழ்ச்சிப் படலம்-கம்பர்* *3.வில்லிபாரதம் - மற்போர் சருக்கம்-வில்லிப்புத்தூராழ்வார்* *4.சீறாப்புராணம் - புலி வசனித்த படலம்-உமறுப்புலவர்*	**18 Hrs**

Unit-III	புதினம் 1.வஞ்சிமாநகரம் (வரலாற்றுப் புதினம்) -நா. பார்த்தசாரதி	**18 Hrs**
Unit-IV	1.பாடம் தழுவிய இலக்கிய வரலாறு 2.குரல் கொடுக்கும் வானம்பாடி - கேட்டிவி	**18 Hrs**
Unit-V	மொழித்திறன்/போட்டித் தேர்வுத் திறன் 1. நூல் மதிப்புரை 2. திறனாய்வு செய்தல் 3. கடிதம் வரைதல் 4. விண்ணப்பம் எழுதுதல்	**18 Hrs**

CO Number	CO Statement	Cognitive Level
CO1	காப்பியங்கள் அறிமுகப்படுத்தப்படுவதால் தமிழ் மொழியின் உயர்வையும் சிறப்பையும் உணர்தல்.	**K1, K2**
CO2	தமிழ்ப் புதினங்களின்வழி சமகாலப் படைப்புகளின் வாழ்வியல் சிந்தனைகளை அறிந்து கொள்வர்.	**K2**
CO3	நாவல் இலக்கியம் அறிமுகப்படுத்தப்படுவதால் சிந்தனை ஆற்றல், படைப்பாற்றல், கற்பனைத்திறன் வளர்தல்.	**K4**
CO4	யாப்பு, அணி இலக்கணங்கள், மொழிபெயர்ப்புத்திறன் ஆகியவற்றைக் கற்பதன் மூலம் போட்டித் தேர்வுகளை எதிர் கொள்ளுதல்.	**K3**
CO5	காப்பியங்கள் அறிமுகப்படுத்தப்படுவதால் தமிழ் மொழியின் உயர்வையும் சிறப்பையும் உணர்தல்.	**K4**

Text Books

1. தமிழ் இலக்கிய வரலாறு -செம்பதிப்பு- பெ.சுபாஷ் சந்திரபோஸ்

பார்வை நூல்கள்

1. தமிழ் இலக்கிய வரலாறு - சிற்பி.பாலசுப்பிரமணியன்
2. புதிய நோக்கில் தமிழ் இலக்கிய வரலாறு - தமிழண்ணல்
3. வகைமை நோக்கில் தமிழ் இலக்கிய வரலாறு - எஃப்.பாக்கியமேரி

Web Resources

Related Online Contents (MOOC, SWAYAM, NPTEL, Websites etc.)

1. Tamil Heritage Foundation- www.tamilheritage.org <http://www.tamilheritage.org> Tamil virtual University Library-
2. www.tamilvu.org/ library
3. http://www.virtualvu.org/library Project Madurai - www.projectmadurai.org.
4. Chennai Library- www.chennailibrary.com <http://www.chennailibrary.com>.
5. Tamil Universal Digital Library- www.ulib.prg <http://www.ulib.prg>.
6. Tamil E-Books Downloads- tamale books downloads. blogspot.com
7. Tamil Books on line- books. tamil cube.com
8. Catalogue of the Tamil books in the Library of British Congress archive.org
9. Tamil novels on line - books.tamilcube.com

பொதுத்தமிழ் —3												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	3	2	3	3	3	2	2	2	3	2	3	2
CO2	3	3	2	2	2	3	2	3	2	3	2	2
CO3	2	2	2	3	2	3	3	2	2	2	2	3
CO4	3	2	2	2	3	2	3	3	2	3	3	3
CO5	2	2	2	3	2	3	2	3	3	2	3	3

Semester	Course Code	Course Title	Hours of Teaching / Cycle	No. of Credits
III	**23U3CAE3**	**PART - II GENERAL ENGLISH**	**6**	**3**

Learning Objectives	
LO1	To make students realize the importance of resilience
LO2	To enable them to become good decision makers
LO3	To enable them to imbibe problem-solving skills
LO4	To enable them to usetenses appropriately
LO5	To help the muse English effectively at the work place.

Unit No.	**Unit Title &Text**	**No.of Periods for the Unit**
I	**ACTIVE LISTENING** **Short Story** Ina Grove–Akutagawa Ryunosuke Translated from Japanese by TakashiKojima The Gift of the Magi – O' Henry **Prose** Listening – Robin Sharma Nobel Prize Acceptance Speech –Wangari Maathai	**20**
II	**INTERPERSONAL RELATIONSHIPS** **Prose** Telephone Conversation–Wole Soyinka Of Friendship – Francis Bacon **Songon (Motivational/ Narrative)** Ulysses–Alfred Lord Tennyson And Still IRise– MayaAngelou	**20**
III	**COPING WITH STRESS** **Poem** Leisure– W.H. Davies Anxiety Monster– RhonaMcFerran **Readers Theatre** The Forty Fortunes: A Tale of Iran Where there is a Will–Mahesh Dattani	**20**
IV	**Grammar** Phrasal Verb & Idioms Modals and Auxiliaries Verb Phrases–Gerund, Participle, Infinitive	**15**
V	**Composition/Writing Skills** Official Correspondence–Leave Letter, Letter of Application, Permission Letter Drafting Invitations Brochures for Programmes and Events	**15**

Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Listen actively	PO1,PO7
CO2	Develop interpersonal relationship skills	PO1,PO2,PO10
CO3	Acquire self-confidence to cope with stress	PO4,PO6,PO9
CO4	Master grammar skills	PO4,PO5,PO6
CO5	Carryout business communication effectively	PO3,PO8

Text Books (Latest Editions)

1	Wangari Maathai–Nobel Lecture. Nobel Prize Outreach AB 2023.Jul 2023.
2	Mahesh Dattani,Where there is W ill. Penguin, 2013.
3	Martin Hewings, Advanced English Grammar, Cambridge University Press,2000
4	EssentialEnglishGrammarbyRaymondMurphy

WebResources

1	WangariMaathai–NobelLecture.NobelPrizeOutreachAB2023.Mon.17Jul 2023. https://www.nobelprize.org/prizes/peace/2004/maathai/lecture/
2	TelephoneConversation-Wole Soyinka https://www.k-state.edu/english/westmank/spring_00/SOYINKA.html
3	AnxietyMonster- RhonaMcFerran- www.poetrysoup.com

Mapping with Programme Outcomes:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3– Strong, 2– Medium, 1 -Low

Mapping with Programme Specific Outcomes:

CO /PO	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	3	3	3	3
CO2	3	3	3	3
CO3	3	3	3	3
CO4	3	3	3	3
CO5	3	3	3	3
Weight age	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0

Semester	Course Code	Course Title	Hours of Teaching / Cycle	No. of Credits
III	**23U3CAC3**	**Python Programming**	**6**	**4**

Nature of the course

Employability Oriented	√	Relevant to Local need		Addresses Gender Sensitization	
Entrepreneurship Oriented		Relevant to regional need		Addresses Environment and Sustainability	
Skill development Oriented	√	Relevant to national need		Addresses Human Values	
		Relevant to Global development need	√	Addresses Professional Ethics	

Course Objectives

The main objectives of course are:

- Describe the core syntax and semantics of Python programming language.
- Describe the control structures of Python
- Discover the need for working with the strings and functions.
- Illustrate the process of structuring the data using lists, dictionaries, tuples and sets
- Understand the usage of packages and Dictionaries.

SYLLABUS		
Unit	**Content**	**No. of Hours**
I	**Introduction:** The essence of computational problem solving – Limits of computational problem solving-Computer algorithms-Computer Hardware-Computer Software-The process of computational problem solving-Python programming language - Literals - Variables and Identifiers - Operators - Expressions and Data types, Input / output.	**12**
II	**Control Structures:** Boolean Expressions - Selection Control - If Statement- Indentation in Python- Multi-Way Selection -- Iterative Control- While Statement- Infinite loops- Definite vs. Indefinite Loops- Boolean Flag. String, List and Dictionary, Manipulations Building blocks of python programs, Understanding and using ranges.	**12**
III	**Functions:** Program Routines- Defining Functions- More on Functions: Calling Value-Returning Functions- Calling Non-Value-Returning Functions- Parameter Passing - Keyword Arguments in Python - Default Arguments in Python-Variable Scope. Recursion: Recursive Functions.	**12**
IV	**Objects and their use:** Software Objects - Turtle Graphics – Turtle attributes-Modular Design: Modules - Top-Down Design - Python Modules - Text Files: Opening, reading and writing text files – Database Programming: Connecting to a database, Creating Tables, INSERT, UPDATE, DELETE and READ operations, Transaction Control, Disconnecting from a database, String Processing - Exception Handling	**12**

V	**Dictionaries and Sets:** Dictionary type in Python - Set Data type. Object Oriented Programming using Python: Encapsulation - Inheritance – Polymorphism. Python packages: Simple programs using the built-in functions of packages matplotlib, numpy, pandas etc	**12**

Self Study :

GUI Programming Tkinter – Lambda expressions – concept of modularization – Appending to files & challenge – Rank & Sort – Forking threads.

Text Books:

1. Charles Dierbach, "Introduction to Computer Science using Python - A computational Problem solving Focus", Wiley India Edition, 2015.
2. Wesley J. Chun, "Core Python Applications Programming", 3rd Edition , Pearson Education, 2016

References:

1. Mark Lutz, "Learning Python Powerful Object Oriented Programming", O'reilly Media 2018, 5th Edition.
2. Timothy A. Budd, "Exploring Python", Tata MCGraw Hill Education Private Limited 2011, 1 st Edition.
3. John Zelle, "Python Programming: An Introduction to Computer Science", Second edition, Course Technology Cengage Learning Publications, 2013, ISBN 978- 1590282410
4. Michel Dawson, "Python Programming for Absolute Beginers", Third Edition, Course Technology Cengage Learning Publications, 2013, ISBN 978-1435455009

Web Resources

http://interactivepython.org/courselib/static/pythonds2
http://www.ibiblio.org/g2swap/byteofpython/read/
http://www.diveintopython3.net/http://greenteapress.com/wp/think-python-2e/

Pedagogy: Teaching / Learning methods

1. Lecture **2.** Tutorial **3.** Assignment **4.** PPT **5.** Seminar presentation

Course Outcomes

On the successful completion of the course students will be able to

CO Number	CO Statement	Cognitive Level
CO1	Develop and execute simple Python programs	**K3**
CO2	.Write simple Python programs using conditionals and looping for solving problems	**K4**
CO3	ecompose a Python program into functions.	**K6**
CO4	Represent compound data using Python lists, tuples, dictionaries etc.	**K5**
CO5	Read and write data from/to files in Python programs.	**K3**

Cognitive Level:K1 - Remember; **K2 -** Understanding; **K3 -** Apply; **K4 -** Analyze; **K5 –** Evaluate; **K6 –** Create

Mapping of Course Outcomes with Programme Specific Outcomes

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	3	3	3	2	3	2	3
CO2	3	2	3	2	2	3	2
CO3	3	3	2	2	3	3	3
CO4	2	3	2	3	2	3	2
CO5	3	3	3	3	3	2	3

3 - Strongly Correlated; 2 - Moderately Correlated;
1 - Weakly Correlated; 0 – No correlation

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No.of Credits
III	**23U3CACP3**	**Python Programming Lab**	**4**	**4**

Nature of the course

Employability Oriented	√	Relevant to Local need		Addresses Gender Sensitization	
Entrepreneurship Oriented		Relevant to regional need		Addresses Environment and Sustainability	
Skill development Oriented	√	Relevant to national need		Addresses Human Values	
		Relevant to Global development need	√	Addresses Professional Ethics	

Course Objectives

- To implement the python programming features in practical applications.
- To write, test, and debug simple Python programs.
- To implement Python programs with conditionals and loops.
- Use functions for structuring Python programs.
- Represent compound data using Python lists, tuples, dictionaries, turtles, Files and modules.

S.NO.	Details	No. of Hours
1	Program to convert the given temperature from Fahrenheit to Celsius and vice versa depending upon user's choice	3
2	Program to calculate total marks, percentage and grade of a student. Marks obtained in each of the five subjects are to be input by user. Assign grades according to the following criteria: ● Grade A: Percentage >=80 Grade B: Percentage >=70 and <80 ● Grade C: Percentage >=60 and <70 Grade D: Percentage >=40 and <60 ● Grade E: Percentage <40	3
3	Program, to find the area of rectangle, square, circle and triangle by accepting suitable input parameters from user.	3
4	Program to display the first n terms of Fibonacci series.	3
5	Program to find factorial of the given number using recursive function.	3
6	Write a Python program to count the number of even and odd numbers from array of N numbers.	3
7	Python function that accepts a string and calculate the number of upper case letters and lower case letters.	3
8	Python program to reverse a given string and check whether the give string is palindrome or not.	3
9	Write a program to find sum of all items in a dictionary.	3

10	Write a Python program to construct the following pattern, using a nested loop 1 22 333 4444 55555 666666 7777777 88888888 999999999	3
11	Read a file content and copy only the contents at odd lines into a new file.	3
12	Create a Turtle graphics window with specific size.	3
13	Write a Python program for Towers of Hanoi using recursion	3
14	Create a menu driven Python program with a dictionary for words and their meanings.	3
15	Devise a Python program to implement the Hangman Game**.**	3
	Total	**45**

On the successful completion of the course students will be able to

CO Number	Course Outcomes	Program Outcomes
1	To understand the problem solving approaches	**CognitiveLevel**
2	To learn the basic programming constructs in Python	**K3**
3	To practice various computing strategies for Python-based solutions to real world problems	**K4**
4	To use Python data structures - lists, tuples, dictionaries.	**K6**
5	To do input/output with files in Python.	**K5**

Cognitive Level:K1 - Remember; **K2 -** Understanding; **K3 -** Apply; **K4 -** Analyze; **K5 –** Evaluate; **K6 –** Create

Text Book:

1. Charles Dierbach, "Introduction to Computer Science using Python - A computational Problem solving Focus", Wiley India Edition, 2015.

Reference Books:

1. Mark Lutz, "Learning Python Powerful Object Oriented Programming", O'reilly Media 2018, 5th Edition.
2. Timothy A. Budd, "Exploring Python", Tata MCGraw Hill Education Private Limited 2011, 1st Edition.
3. John Zelle, "Python Programming: An Introduction to Computer Science", Second edition, Course Technology Cengage Learning Publications, 2013, ISBN 978- 1590282410.
4. Michel Dawson, "Python Programming for Absolute Beginers" , Third Edition, Course Technology Cengage Learning Publications, 2013, ISBN 978-1435455009.

Web Resources:

1. http://interactivepython.org/courselib/static/pythonds2
2. http://www.ibiblio.org/g2swap/byteofpython/read/
3. http://www.diveintopython3.net/http://greenteapress.com/wp/think-python-2e/
4. NPTEL & MOOC courses titled Python programming
5. http://spoken-tutorial.org/tutorial-search/? search_ foss= Python&search _language = English
6. http://docs.python.org/3/tutorial/index.html

Mapping with Programme Outcomes:

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	3	3	3	2	3	2	3
CO2	3	2	3	2	2	3	2
CO3	3	3	2	2	3	3	3
CO4	2	3	2	3	2	3	2
CO5	3	3	3	3	3	2	3

3 - Strongly Correlated; 2 - Moderately Correlated;
1 - Weakly Correlated; 0 – No correlation

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No.of Credits
III	**23U3CABAA1**	**Allied - ORGANIZIONAL BEHAVIOUR**	**5**	**3**

Nature of the course

Relevant to Local need		Employability Oriented	√	Addresses Professional Ethics	√
Relevant to national need		Entrepreneurship Oriented	√	Addresses Gender Sensitization	
Relevant to regional need		Skill development Oriented		Addresses Environment and Sustainability	
Relevant to Global need	√			Addresses Human Values	√

Course Objectives

The main objectives of this course are to:

To gain extensive knowledge of OB.
To create awareness of job satisfaction.
To enhance the importance of human behavior
To analyze the importance of learning.
To interpret a critical evaluation of organizational practices

SYLLABUS		
Unit	**Content**	**No. of Hours**
I	**INTRODUCTION :** Concept of Organization-concept of (OB): Nature, Scope, need, important and Role of OB: Disciplines that contribute to OB-challenges and opportunities of OB-Applying OB knowledge to management practices-approaches to OB-Models of OB	12
II	**INDIVIDUAL BEHAVIOUR:** concept of behavior-process of behavior-models of man-Personality-determinants, types, theories. Perception-concept of perception-developing perceptional skills. Learning-learning theories- Reinforcement, Attitudee: Definition, components, charcterstics, types, changing employee attitude	12
III	**GROUP BEHAVIOUR :** 1. Groups meaning, Need, definition, formation, types of groups-Group behavior-group norms, group cohesion, group decision making) Leadership : Concept; Trait theories; Behavioral theories (Ohio and Michigan studies); Contingency theories (Fiedler, Hersey and Blanchard, Path-Goal);	12
IV	**ORGANISATIONAL CULTURE AND STRUCTURE:** Concept of culture; Impact (functions and liability); Creating and sustaining culture: Concept of structure, types and importance of organization structure-difference between line and staff organization structure	12
V	**ORGANISATIONAL CHANGE, CONFLICT AND POWER:** Forces of change; Planned change; Resistance; Approaches (Levin's model,	12

	Organizational development); Concept of conflict, Conflict process; Types, Power-types of power.	

Reference books

1.	L.M.Prasad "Organisational Behaviour" Sultan chand and & sons educational publisher, New Delhi, Fifth edition 2020
2.	Fed Luthans "organizational behavior" Mcgraw hill publishers. 2015
3.	S.S. Khanka, Organizational Behaviour, S. Chand & Co, New Delhi. 2000
4.	J. Jayasankar, Organizational Behaviour, Margham Publications, Chennai, 2017.
5.	John Newstrom, *Organizational Behaviour: Huma Behaviour at Work*, McGraw Hill Education; 12th edition 2017

WEB SOURCE:	
1	https://www.iedunote.com/organizational-behavior
2	https://www.london.edu/faculty-and-research/organisational-behaviour
3	Journal of Organizational Behavior on JSTOR
4	International Journal of Organization Theory & Behavior | Emerald Publishing
5	https://2012books.lardbucket.org/pdfs/an-introduction-to-organizational-behavior-v1.1.pdf

Pedagogy: Teaching / Learning methods, Lecture, Assignment, PPT presentation, Quiz, Group Discussion.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Cognitive Level
CO1	To define Human behaviour at work place.	**K1, K3**
CO2	To apply leadership and learning theories at work place.	**K2**
CO3	To analyze the complexities and solutions of human behaviour.	**K3,K2 -**
CO4	To explain issues relating to individual and group behaviour.	**K4**
CO5	To create a congenial climate in the organization.	**K5**

Cognitive Level : K1 - Remember; **K2 -** Understanding; **K3 -** Apply; **K4 -** Analyze; **K5 –** Evaluate; **K6 –** Create

Mapping of Course Outcomes with Programme Specific Outcomes

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	3	3	3	3	3	3	3
CO2	3	3	3	3	3	3	3
CO3	3	3	3	3	3	3	3
CO4	3	3	3	3	3	3	3
CO5	3	3	3	3	3	3	3

3 - Strongly Correlated; 2 - Moderately Correlated;
1 - Weakly Correlated; 0 – No correlation

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No.of Credits
III & IV	**23U4CABAAPL**	**Allied Practical – Organizational Dynamics Training Lab (NS)**	**3+3**	**-**

Nature of the course

Employability Oriented	√	Relevant to Local need		Addresses Gender Sensitization	
Entrepreneurship Oriented		Relevant to regional need		Addresses Environment and Sustainability	
Skill development Oriented	√	Relevant to national need		Addresses Human Values	
		Relevant to Global development need	√	Addresses Professional Ethics	

Course Objectives:

The main objectives of this course are to:

- To have extensive piratical knowledge of OB.
- To create practical awareness of job satisfaction.
- To enhance the3 importance of workplace counseling.
- To analyze the importance of coordination.
- To measure the organizational development.

S. No	Details	No. of Hours
1	Developing interpersonal behavior to know themselves – Goal setting, Time management.	15
2	Understanding group discussions.	15
3	Developing leadership attributes.	15
4	Improving communication.	15
5	Practicing controls.	15
6	Adopting to change management.	15
7	Develop EQ skills regarding.	15

References:

1. Uma Sekaran, Organizational Behaviour Text & Cases, 2nd e4dition, Tata McGraw Hill publishing CO. Ltd.
2. Gangadhar Rao, Narayana, V.S.P. Rao, Organizational Behavioiur 1987, Reprint 2000. Konark Publishers Pvt. Ltd., 1st edition.
3. S.S.Khanka, Organizational Behavioiur, S Chand & Co, New Delhi.
4. J.Jayasankar, Organizational Behaviour, Margham Publication, Chennai, 2017.
5. John Newstrom, Organizational Behaviour: Huma Behaviour at Woprk, McGraw Hill Education, 12th edition (1 July 2017).

Pedagogy: Teaching / Learning methods

1. Lecture 2. Tutorial 3.Assignment 4. PPT presentation
5. Seminar

After completion of the course, students will be able to

CO Number	Course Outcomes	Program Outcomes
1	To define Human behavior at work place.	**Cognitive Level**
2	To apply motivation, leadership and learning theories at work	**K3**
3	To analyze the complexities and solution of human behaviour.	**K4**
4	To explain issues relating to individual and group behavior.	**K6**
5	To create a congenial climate in the organization.	**K5**

Cognitive Level:K1 - Remember; **K2 -** Understanding; **K3 -** Apply; **K4 -** Analyze; **K5 –** Evaluate; **K6 –** Create

Mapping of Course Outcomes with Programme Specific Outcomes

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	3	3	3	3	3	3	3
CO2	3	2	3	3	2	3	2
CO3	3	3	3	3	3	3	3
CO4	2	3	3	3	2	3	2
CO5	3	3	3	3	3	3	3

3 - Strongly Correlated; 2 - Moderately Correlated;
1 - Weakly Correlated; 0 – No correlation

Semester	Subject Code	Title Of The Paper	Hours Of Teaching/ Week	No. of Credits
IV	**23U4CAT4**	**பொதுத் தமிழ் – 4**	**6**	**3**

Nature of the Course

1.Employablity Oriented வேலை வாய்ப்புச் சார்ந்தது		7. Addresses Professional Ethics தொழில் நெறிமுறைகளை நிறைவு செய்தல்	
2. Entrepreneurship Oriented தொழில் முனைவு சார்ந்தது		8.Relevent To Local Need உள்ளூர் தேவைகளோடு தொடர்புடையது	✓
3. Skill Development Oriented திறன்மேம்பாடு சார்ந்தது	✓	9. Relevent To Regional Need மண்டல அளவிலான தேவைகளோடு தொடர்புடையது	
4. Addresses Gender Sensitization பாலின உணர்திறன் பூர்த்தி செய்தல்		10. Relevent To National Need தேசிய அளவிலான தேவைகளோடு தொடர்புடையது	
5. Addresses Environment and Sustainablity சுற்றுச் சூழல் மற்றும் நிலைத் தன்மை நிறைவு செய்தல்	✓	11. Relevent To Global Development Need உலக அளவிலான தேவைகளோடு தொடர்புடையது	
6. Addresses Human Values மனித மதிப்புகளை நிறைவு செய்தல்	✓		

Course Objectives

1. சங்க இலக்கியத்தின் சிறப்பையும், நாடகம் என்னும் இலக்கிய வகையின் தன்மையையும் அகத்திணை, புறத்திணை இலக்கணங்களையும் மாணவர்களுக்கு அறிமுகப்படுத்துதல்.
2. தமிழ் இலக்கியம் சார்ந்த போட்டித் தேர்வுகளுக்கு ஏற்பக் கற்பித்தல் நடைமுறைகளை மேற்கொள்ளுதல்.
3.சங்க இலக்கியத்தில் காணப்பெறும் வாழ்வியல் சிந்தனைகளை அறிந்து கொள்வர்.
4.தமிழின் தொன்மையையும், செம்மொழித் தகுதியையும் அறிந்து கொள்ளுதல்.

Unit	Details	Hours
Unit-I	*எட்டுத்தொகை 1* *நற்றிணைஎ (10, 14, 16), குறுந்தொகை (16, 17, 19, 20, 25, 29, 38, 440 கலித்தொகை (38, 51),அகநானூறு(15, 33, 55,) புறநானூறு (37, 86, 112,) பரிபாடல் —55*	**18 Hrs**
Unit-II	*எட்டுத்தொகை 2* *நெடுநல்வாடை-நக்கீரர்*	**18 Hrs**
Unit-III	*நாடகம் - சபாபதி-பம்மல் சம்பந்த முதலியார்*	**18 Hrs**
Unit-IV	*1.பாடம் தழுவிய இலக்கிய வரலாறு* *2.பயணங்கள் தொடரும் - கேட்டிவி*	**18 Hrs**

Unit-V	*1.* மொழிபெயர்ப்பு / கலைச்சொற்கள் *2.* கொடுக்கப்பட்டுள்ள ஆங்கிலப்பகுதியைத் தமிழில் மொழிபெயர்த்தல் *3.* அலுவலகத் கடிதம் - தமிழில் மொழிபெயர்த்தல்	**18 Hrs**

CO Number	CO Statement	Cognitive Level
CO1	சங்க இலக்கியத்தில் காணப்பெறும் வாழ்வியல் சிந்தனைகளை அறிந்து கொள்வர்.	**K1, K2**
CO2	தமிழின் தொன்மையையும், செம்மொழித் தகுதியையும் அறிந்து கொள்ளுதல்.	**K2**
CO3	நாடக இலக்கியம் மூலம் நடிப்பாற்றலையும். கலைத்தன்மையையும், படைப்பாற்றலையும் வளர்த்தல்.	**K4**
CO4	தமிழிலிருந்து அலுவலகக் கடிதங்களை மொழிபெயர்க்கும் அறிவைப் பெறுவர்.	**K3**
CO5	மொழியறிவோடு வேலை வாய்ப்பினைப் பெறுதல்.	**K4**

Text Books

1. தமிழ் இலக்கிய வரலாறு -செம்பதிப்பு- பெ.சுபாஷ் சந்திரபோஸ்

பார்வை நூல்கள்.

2. தமிழ் இலக்கிய வரலாறு - சிற்பி.பாலசுப்பிரமணியன்.
3. புதிய நோக்கில் தமிழ் இலக்கிய வரலாறு - தமிழண்ணல்
4. வகைமை நோக்கில் தமிழ் இலக்கிய வரலாறு - எஃப்.பாக்கியமேரி

Web Resources

Related Online Contents (MOOC, SWAYAM, NPTEL, Websites etc.)

1. Tamil Heritage Foundation- www.tamilheritage.org <http://www.tamilheritage.org> Tamil virtual University Library-
2. www.tamilvu.org/ library
3. http://www.virtualvu.org/library Project Madurai - www.projectmadurai.org.
4. Chennai Library- www.chennailibrary.com <http://www.chennailibrary.com>.
5. Tamil Universal Digital Library- www.ulib.prg <http://www.ulib.prg>.
6. Tamil E-Books Downloads- tamilebooks downloads. blogspot.com
7. Tamil Books on line- books.tamil cube.com
8. Catalogue of the Tamil books in the Library of British Congress archive.org
9. Tamil novels on line - books.tamilcube.com

பொதுத்தமிழ் —4												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CLO1	3	2	3	3	3	2	2	2	3	2	3	2
CLO2	3	3	2	2	2	3	2	3	3	2	2	2
CLO3	3	2	3	3	2	2	2	3	2	3	3	2
CLO4	2	3	3	2	2	2	3	2	3	2	3	3
CLO5	3	3	2	2	2	3	3	2	2	2	3	3

Semester	Course Code	Course Title	Hours of Teaching / Cycle	No. of Credits
IV	**23U4CAE4**	**PART - II GENERAL ENGLISH**	**6**	**3**

Learning Objectives		
LO1	To make students realize the importance of resilience	
LO2	To enable them to become good decision makers	
LO3	To enable them to imbibe problem-solving skills	
LO4	To enable them to usetenses appropriately	
LO5	To help the muse English effectively at the work place.	
Unit No.	**Unit Title &Text**	**No.of Periods for the Unit**
I	**GOALSETTING (UNICEF)** **Life Story** From Chinese Cinderella–Adeline Yen Mah Why I Write- George Orwell **Short Essay** On Personal Mastery–Robin Sharma On the Love of Life – William Hazlitt	**20**
II	**INTEGRITY** **Short Story** The Taxi Driver – K.S. Duggal Kabuliwala -Rabindranath Tagore A Retrieved Reformation –O Henry **Extract from a play** The Quality of Mercy (Trial Scene from the Merchant of Venice - Shakespeare)	**20**
III	**COPING WITH EMOTIONS** **Poem** Pride – Dahlia Ravikovitch Phenomenal Woman – Maya Angelou **Reader's Theatre** The Giant's Wife A Tall Tale of Irel and–William Carleton The Princess and the God :A Tale of Ancient India	**20**
IV	**Language Competency Sentences** Simple Sentences Compound Sentences Complex Sentences **Direct and Indirect Speech**	**15**
V	**Report Writing** Narrative Report Newspaper Report **Drafting Speeches** Welcome Address Vote of Thanks	**15**

Course Outcomes

Course Outcomes	On completion of this course, students will;	
CO1	Determine their goals	PO1,PO7
CO2	Identify the value of integrity.	PO1,PO2,PO10
CO3	Deal with emotions.	PO4,PO6,PO9
CO4	Frame grammatically correct sentences	PO4,PO5,PO6
CO5	Write cohesive reports.	PO3,PO8

Text Books (Latest Editions)

1	Oxford Practice Grammar, John Eastwood, Oxford University Press
2	Cambridge Grammar of English, Ronald Carter and Michael McCarthy
3.	George Orwell Essays, Penguin Classics

Web Resources

1	http:/www.gradesaver.com/George-orwell-essays/study/summary
2	O' Henry. A Retrieved Reformation. https://americanenglish.state.gov/files/ae/resource_files/a-retrieved-reformation.pdf
	Maya Angelou. Phenomenal Woman. https://www.poetryfoundation.org/poems/48985/phenomenal-woman
3	TheQuality ofMercy, https://poemana1ysis.com
4	https://www'.oxfordscho1ar1yeditions.coin/disp1ay/10.1093/actrade/9780199235742.book.1/actrade-9780199235742-div1-106-WilliamHazilitt

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3–Strong, 2–Medium, 1–Low

Mapping with Programme Specific Outcomes:

CO /PO	PSO1	PSO2	PSO3	PSO4
CO1	3	3	3	3
CO2	3	3	3	3
CO3	3	3	3	3
CO4	3	3	3	3
CO5	3	3	3	3
Weight age	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0

3– Strong, 2 –Medium, 1-Low

Semester	Course Code	Course Title	Hours of Teaching / Cycle	No. of Credits
IV	23U4CACIM	**Industry Module – Database Management System**	6	4

Nature of the course

Employability Oriented	√	Relevant to Local need	√	Addresses Gender Sensitization	
Entrepreneurship Oriented		Relevant to regional Need		Addresses Environment and Sustainability	
Skill development Oriented	√	Relevant to national need		Addresses Human Values	
		Relevant to Global development need	√	Addresses Professional Ethics	

Course Objectives

The main objectives of this course are:

- Discuss Database management systems, databases and its applications
- Familiarize the students with a good formal foundation on the relational model.
- Outline the various systematic database design approaches
- Describe the concepts of transactions and transaction processing and the issues,
- Techniques related to concurrency and recovery manager.
- Explore the File organizations, indexing and hashing mechanisms.

SYLLABUS		
Unit	**Content**	**No. of Hours**
I	**Introduction:** Purpose of data base systems- View levels of data-Data models - Database Users - Database Languages - Database Architecture - E-R Model: Basic concepts-Design isssues-Constraints- Keys-ER-Diagrams-weak Entity set-Extented E-R features- Relational Algebra: Fundamental, Additional & Extended operations Modification of the database – View - Other Relational Database - Tuple Relational Calculus -Domain Relational Calculus.	**12**
II	**SQL**: Basic Structure-Set operation-aggregate Functions- null values-nested sub queries-Derived Relations-view-modification of database-join relations-Advanced SQL-Embedded SQL-Advanced SQL Features.	**12**
III	**Advanced SQL:** Domain Constraints-Referential integrity-assertion-Application Design and Development-triggers-RDB design-Decomposition using Functional Dependency-Normalization types.	**12**
IV	**Indexing & Hashing**: Basic concepts -Ordered indices-B++ tree index files-B tree index files-Static Hashing-Multiple Key Access-Comparison of ordered indexing and hashing-index Dynamic hashing definition in SQL.	**12**

V	**PL/SQL fundamentals:** PL/SQL overview-PL/Sql syntax-data types-variables-constants and literals-operators-conditions-loops-strings-arrays-functions-cursors-records-triggers-exceptions-pl/sql date and time.	**12**

Self Study :

PLSQL sample programs / output, NOSQL dat abase Oracle Forms and related concepts

Text Books:

1. "Database System concepts", Abraham Silber Schatz, Henk F.Korth, S.Sudarsan, Fifth Edition, 2006, McGraw Hill.

References:

1. Fred Mc Fadden, Jeffery A Hoffer, Mary B.prescott, "Modern Database Management", 5 Edition, Addison Wesley, 2000.
2. Elmasri, Navathe, "Fundamentals of Database System", Third Edition, Addison wesley, 2000.
3. Jefrey D.Ulman, Jenifer widomj, "A First Course in Database System", pearson Education Asia, 2001
4. Bipin c Desai, "An Introduction to Database System", Galgotia publications Pvt Limited, 2001.
5. Database System Concepts, C.J. Date. Seventh Edition, 1993.

Web Resources

1. https://www.codingninjas.com/codestudio/library/fundamentals-of-database-systems-dbms-tutorial
2. https://www.javatpoint.com/dbms-tutorial
3. https://www.javatpoint.com/pL/SQL.tutorial

Pedagogy: Teaching / Learning methods

2. Lecture 2. Tutorial 3.Assignment 4. PPT presentation
5. Seminar

Course Outcomes

On the successful completion of the course students will be able to

CO Number	CO Statement	Cognitive Level
CO1	Summarize the concepts of database objects; enforce integrity constraints on a database using RDBMS.	**K3**
CO2	Use Structured Query Language (SQL) for database manipulation	**K4**
CO3	Design simple database systems for some application to interact with databases	**K6**
CO4	Implement normalization algorithms using database design theory for different applications	**K5**
CO5	Implement normalization algorithms using database design theory for different applications .	**K3**

Cognitive Level: K1 - Remember; **K2 -** Understanding; **K3 -** Apply; **K4 -** Analyze; **K5 –** Evaluate; **K6 –** Create

Mapping of Course Outcomes with Programme Specific Outcomes

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	3	3	3	2	3	2	3
CO2	3	2	3	2	2	3	2
CO3	3	3	2	2	3	3	3
CO4	2	3	2	3	2	3	2
CO5	3	3	3	3	3	2	3

3 - Strongly Correlated; 2 - Moderately Correlated;
1 - Weakly Correlated; 0 – No correlation

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
IV	**23U4CACP4**	**Database Management System Lab**	**4**	**4**

Course Objectives

- This lab enables the students to practice the concepts learnt in the subject DBMS by developing a database.
- practice the designing, developing and querying a database.
- Students are expected to use "Oracle" database
- To solve different industry level problems & to learn its applications
- To understand how a real world problem can be mapped to schemas

S. No	Details	No. of Hours
1	Table creations, sorting, setting relations between tables.	3
2	Students mark sheet processing.	3
3	Electricity bill processing.	3
4	Bank transaction	3
5	Pay roll processing.	3
6	Inventory.	3
7	Library information processing.	3
8	Exception Handling.	3
9	Queries using single and multiple tables	3
10	Functions	3
	TOTAL	**30**

Text Book:

1. "Database System concepts", Abraham Silber Schatz, Henk F.Korth, S.Sudarsan, Fifth Edition, 2006, McGraw Hill.

Reference Books:

1. Fred Mc Fadden, Jeffery A Hoffer, Mary B.prescott, "Modern Database Management", 5th Edition, Addison Wesley, 2000.
2. Maria Litvin& Gray Litvin, "C++ for you", Vikas publication 2002. Jefrey D.Ulman, Jenifer
widomj, "A First Course in Database System", pearson Education Asia, 2001

Web Resources:

https://www.codingninjas.com/codestudio/library/fundamentals-of-database-systems-dbms-tutorial
https://www.javatpoint.com/dbms-tutorial

On the successful completion of the course students will be able to

CO Number	Course Outcomes	Cognitive Level
1	Ability to design and implement a database schema for given problem.	**K3**
2	Apply the normalization techniques for development of application software to realistic problems.	**K4**
3	Ability to formulate queries using SQL DML/DDL/DCL /TCL commands.	**K6**
4	Analyze the various methods of solving a problem	**K5**
5	Construct the Queries using PL/ SQL.	**K3**

Cognitive Level: K1 - Remember; **K2 -** Understanding; **K3 -** Apply; **K4 -** Analyze; **K5 –** Evaluate; **K6 –** Create

Mapping of Course Outcomes with Programme Specific Outcomes

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	3	3	3	2	3	2	3
CO2	3	2	3	2	2	3	2
CO3	3	3	2	2	3	3	3
CO4	2	3	2	3	2	3	2
CO5	3	3	3	3	3	2	3

3 - Strongly Correlated; 2 - Moderately Correlated;
1 - Weakly Correlated; 0 – No correlation

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No.of Credits
III & IV	**23U4CABAAPL**	**Allied Practical – Organizational Dynamics Training Lab (NS)**	**3+3**	**3**

Nature of the course

Employability Oriented	√	Relevant to Local need		Addresses Gender Sensitization	
Entrepreneurship Oriented		Relevant to regional need		Addresses Environment and Sustainability	
Skill development Oriented	√	Relevant to national need		Addresses Human Values	
		Relevant to Global development need	√	Addresses Professional Ethics	

Course Objectives:

The main objectives of this course are to:

- To have extensive piratical knowledge of OB.
- To create practical awareness of job satisfaction.
- To enhance the3 importance of workplace counseling.
- To analyze the importance of coordination.
- To measure the organizational development.

S. No	Details	No. of Hours
1	Developing interpersonal behavior to know themselves – Goal setting, Time management.	15
2	Understanding group discussions.	15
3	Developing leadership attributes.	15
4	Improving communication.	15
5	Practicing controls.	15
6	Adopting to change management.	15
7	Develop EQ skills regarding.	15

References:

1. Uma Sekaran, Organizational Behaviour Text & Cases, 2nd e4dition, Tata McGraw Hill publishing CO. Ltd.
2. Gangadhar Rao, Narayana, V.S.P. Rao, Organizational Behavioiur 1987, Reprint 2000. Konark Publishers Pvt. Ltd., 1st edition.
3. S.S.Khanka, Organizational Behavioiur, S Chand & Co, New Delhi.
4. J.Jayasankar, Organizational Behaviour, Margham Publication, Chennai, 2017.
5. John Newstrom, Organizational Behaviour: Huma Behaviour at Woprk, McGraw Hill Education, 12th edition (1 July 2017).

Pedagogy: Teaching / Learning methods

3. Lecture 2. Tutorial 3.Assignment 4. PPT presentation
5. Seminar

After completion of the course, students will be able to

CO Number	Course Outcomes	Program Outcomes
1	To define Humabn behavior at work place.	**Cognitive Level**
2	To apply motivation, leadership and learning theories at work	**K3**
3	To analyze the complexities and solution of human beyhaviour.	**K4**
4	To explain issues relating to individual and group behavior.	**K6**
5	To create a congenial climate in the organization.	**K5**

Cognitive Level:K1 - Remember; **K2 -** Understanding; **K3 -** Apply; **K4 -** Analyze; **K5 –** Evaluate; **K6 –** Create

Mapping of Course Outcomes with Programme Specific Outcomes

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	3	3	3	3	3	3	3
CO2	3	2	3	3	2	3	2
CO3	3	3	3	3	3	3	3
CO4	2	3	3	3	2	3	2
CO5	3	3	3	3	3	3	3

3 - Strongly Correlated; 2 - Moderately Correlated;
1 - Weakly Correlated; 0 – No correlation

Semester	Course Code	Course Title	Hours of Teaching / Cycle	No. of Credits
IV	**23U4CACMA1**	**Allied- Financial Accounting**	**5**	**3**

Nature of the course

Relevant to Local need	√	Employability Oriented	√	Addresses Professional Ethics	
Relevant to national need	√	Entrepreneurship Oriented		Addresses Gender Sensitization	
Relevant to regional need	√	Skill development Oriented	√	Addresses Environment and Sustainability	
Relevant to Global need				Addresses Human Values	

Course Objectives

The main objectives of this course are:

1. To understand the basic accounting concepts and standards.
2. To know the basis for calculating business profits.
3. To familiarize with the accounting treatment of depreciation.
4. To learn the methods of calculating profit for single entry system.
5. To gain knowledge on the accounting treatment of insurance claims.

SYLLABUS

Unit	Content	Hours
I	**Fundamentals of Financial Accounting** Financial Accounting – Meaning, Definition, Objectives, Basic Accounting Concepts and Conventions - Journal, Ledger Accounts– Subsidiary Books — Trial Balance.	**15**
II	**Final Accounts** Final Accounts of Sole Trading Concern- Capital and Revenue Expenditure and Receipts – Preparation of Trading, Profit and Loss Account and Balance Sheet with Adjustments.	**15**
III	**Depreciation** Depreciation - Meaning – Objectives – Accounting Treatments - Types - Straight Line Method – Diminishing Balance method – Annuity Method.	**15**

IV	**Accounting from Incomplete Records** Incomplete Records -Meaning and Features - Limitations - Difference between Incomplete Records and Double Entry System - Methods of Calculation of Profit - Statement of Affairs Method – Preparation of final statements by Conversion method.	**15**
V	**Royalty and Insurance of Claims** Meaning – Minimum Rent – Short Working – Recoupment of Short Working – Lessor and Lessee – Accounting Treatment. (Excluding Sub-Lease) **Insurance Claims** –Calculation of Claim Amount-Average clause (Loss of Stock only)	**15**
TOTAL		**75**
THEORY 20% & PROBLEM 80%		

Textbooks:

1.	S. P. Jain and K. L. Narang Financial Accounting- I, Kalyani Publishers, New Delhi.
2.	S.N. Maheshwari, Financial Accounting, Vikas Publications, Noida.
3.	Shukla Grewal and Gupta, "Advanced Accounts", volume 1, S.Chand and Sons, New Delhi.
4.	Radhaswamy and R.L. Gupta: Advanced Accounting, Sultan Chand, New Delhi.
5.	R.L. Gupta and V.K. Gupta, "Financial Accounting", Sultan Chand, New Delhi.

Reference Books:

1.	Dr. Arulanandan and Raman: Advanced Accountancy, Himalaya Publications, Mumbai.
2.	Tulsian , Advanced Accounting, Tata McGraw Hills, Noida.
3.	T.S. Reddy & A. Murthy, Financial Accounting, Margham Publications, Chennai.

Web Resources

1.	https://www.slideshare.net/mcsharma1/accounting-for-depreciation-1
2.	https://www.slideshare.net/ramusakha/basics-of-financial-accounting

Pedagogy: Teaching / Learning methods

Chalk and Talk, Lecture, Tutorial, Assignment, Quiz, Group Discussion, Seminar.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Cognitive Level
CO1	Remember the concept of accounting fundamentals	K1,K2
CO2	Apply the knowledge in preparing detailed accounts of sole trading concerns	K1, K3,K4
CO3	Analyse the various methods of providing depreciation	K1,K2
CO4	Evaluate the methods of calculation of profit	K5, K6
CO5	Determine the royalty accounting treatment and claims from insurance companies in case of loss of stock.	K1,K2,K6

Cognitive Level: K1 - Remember; **K2 -** Understanding; **K3 -** Apply; **K4 -** Analyze; **K5 –** Evaluate; **K6 –** Create

Mapping of Course Outcomes with Programme Outcomes and Programme Specific Outcomes.

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3
CO1	3	2	3	3	2	3	2	2	3	2	2
CO2	3	2	3	3	3	2	2	2	3	2	2
CO3	3	2	3	3	3	2	2	2	3	2	2
CO4	3	2	3	3	2	2	2	2	3	2	2
CO5	3	2	3	3	3	2	2	2	3	2	2

3 - Strongly Correlated; 2 - Moderately Correlated;
1 - Weakly Correlated; 0 – No correlation

Semester	Course Code	Course Title	Hours of Teaching / Cycle	No. of Credits
IV	**23U4CASEC1**	**Skill Enhancement Course - Artificial Neural Networks**	**2**	**2**

Nature of the course

Employability Oriented	√	Relevant to Local need		Addresses Gender Sensitization	
Entrepreneurship Oriented		Relevant to regional Need	√	Addresses Environment and Sustainability	
Skill development Oriented	√	Relevant to national need		Addresses Human Values	
		Relevant to Global development need	√	Addresses Professional Ethics	

Course Objectives

The main objectives of this course are:

- Understand the basics of artificial neural networks, learning process, single layer and multi-layer perception networks.
- Understand the Error Correction and various learning algorithms and tasks.
- Identify the various Single Layer Perception Learning Algorithm.
- Identify the various Multi-Layer Perception Network.
- Analyze the Deep Learning concepts of various Neural network and its Applications

SYLLABUS		
Unit	**Content**	**No. of Hours**
I	**Introduction:** Artificial Neural Model- Activation functions- Feed forward and Feedback, pattern recognition, linear classifier Linear Separability, Non-Linear Separable Problem, single layer perception- Simple perception- Multilayer Networks. Learning Algorithms- Error correction - Gradient Descent Rules, Perception Learning Algorithm, Perception Convergence Theorem	**-**
II	**Learning methods:** Error correction learning, Memory-based learning, Hebbian learning, Competitive learning, Boltzmann learning, credit assignment problem, Learning with and without teacher, learning tasks, Memory and Adaptation.	**-**

Text Books:

1. Neural Networks A Classroom Approach- Satish Kumar, McGraw Hill- Second Edition.
2. "Neural Network- A Comprehensive Foundation"- Simon Haykins, Pearson Prentice Hall, 2nd Edition, 1999.

References:

1. Artificial Neural Networks-B. Yegnanarayana, PHI, New Delhi 1998.
2. Neural Networks and Deep Learning: A Textbook Hardcover - Charu C. Aggarwal
3. Neural Networks: An Essential Beginners Guide to Artificial Neural Networks and their Role in Machine Learning and Artificial Intelligence Hardcover – 10 February 2020 by Herbert Jones

Web Resources:

http://interactivepython.org/courselib/static/pythonds2
http://www.ibiblio.org/g2swap/byteofpython/read/
http://www.diveintopython3.net/http://greenteapress.com/wp/think-python-2e/

Pedagogy: Teaching / Learning methods

1. Lecture
2. Tutorial
3. Assignment
4. PPT presentation
5. Seminar

Course Outcomes

On the successful completion of the course students will be able to

CO Number	CO Statement	Cognitive Level
CO1	Students will learn the basics of artificial neural networks with single layer and multi-layer perception networks.	**K1,K3,K3**
CO2	Learn about the Error Correction and various learning algorithms and tasks.	**K4**
CO3	Learn the various Perception Learning Algorithm.	**K6**
CO4	\Learn about the various Multi-Layer Perception Network.	**K5**
CO5	Understand the Deep Learning of various Neural network and its Applications.	**K3**

Cognitive Level:K1 - Remember; **K2 -** Understanding; **K3 -** Apply; **K4 -** Analyze; **K5 –** Evaluate; **K6 –** Create

Mapping with Programme Outcomes:

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	3	3	3	2	3	2	3
CO2	3	2	3	2	2	3	2
CO3	3	3	2	2	3	3	3
CO4	2	3	2	3	2	3	2
CO5	3	3	3	3	3	2	3

Semester	Course Code	Course Title	Hours of Teaching / Cycle	No. of Credits
V	**23U5CAC4**	**Operating Systems**	**6**	**5**

Nature of the course

Employability Oriented	√	To introduce various techniques for representation of the data in the real world		Addresses Gender Sensitization	
Entrepreneurship Oriented	√	Relevant to regional need		Addresses Environment and Sustainability	
Skill development Oriented	√	Relevant to national need		Addresses Human Values	√
		Relevant to Global development need	√	Addresses Professional Ethics	

Course Objectives

The main objectives of this course are to:

- Understanding the design of the Operating System
- Imparting knowledge on CPU scheduling, Process and Memory Management.
- To code specialized programs for managing overall resources and operations of the computer.
- To study about the concept of Job and processor scheduling
- To learn about to concept of memory organization and multiprogramming

SYLLABUS		
UNIT	**Content**	**No. of Hours**
I	**Introduction**: operating system, history (1990s to 2000 and beyond), distributed computing, parallel computation. **Process concepts:** definition of process, process states-Life cycle of a process, process management-process state transitions, process control block(PCB), process operations, suspend and resume, context switching, Interrupts -Interrupt processing, interrupt classes, Inter process communication-signals, message passing.	18
II	**Asynchronous concurrent processes:** mutual exclusion- critical section, mutual exclusion primitives, implementing mutual exclusion primitives, Peterson's algorithm, software solutions to the mutual Exclusion Problem-, n-thread mutual exclusion- Lamports Bakery Algorithm. Semaphores – Mutual exclusion with Semaphores, thread synchronization with semaphores, counting semaphores, implementing semaphores. **Concurrent programming:** monitors, message passing	18
III	**Deadlock and indefinite postponement:** Resource concepts, four necessary conditions for deadlock, deadlock prevention, deadlock avoidance and Dijkstra's Banker's algorithm, deadlock detection, deadlock recovery.	18
IV	**Job and processor scheduling:** scheduling levels, scheduling objectives, scheduling criteria, preemptive vs non-preemptive scheduling, interval timer	18

	or interrupting clock, priorities, scheduling algorithms- FIFO scheduling, RR scheduling, quantum size, SJF scheduling, SRT scheduling, HRN scheduling, multilevel feedback queues, Fair share scheduling.	
V	**Real Memory organization and Management::** Memory organization, Memory management, Memory hierarchy, Memory management strategies, contiguous vs non-contiguous memory allocation, single user contiguous memory allocation, fixed partition multiprogramming, variable partition multiprogramming, Memory swapping **Virtual Memory organization:** virtual memory basic concepts, multilevel storage organization, block mapping, paging basic concepts, segmentation, paging/segmentation systems. **Virtual Memory Management:** Demand Paging, Page replacement strategies	18

Self Study :

Linux system – Scheduling policy – The Sun Network file system – Hazndheld system – Inter process communication.

Text Book:

1.H.M. Deitel, Operating Systems, Third Edition, Pearson Education Asia, 2011

Reference Book:

1.William Stallings, Operating System: Internals and Design Principles, Seventh Edition, Prentice-Hall of India, 2012.

2.A.Silberschatz, and P.B. Galvin., Operating Systems Concepts, Nineth Edition, John Wiley &Sons(ASIA) Pte Ltd.,2012

3.Understanding Operating System 6th Edition by Ann McHoes Ida M. Flynn, Cengage Learning India

Web Resources:

1.https://www.tutorialspoint.com/operating_system/os_overview.htm

2.https://www.javatpoint.com/os-tutorial

3.https://www.guru99.com/operating-system-tutorial.html

Pedagogy: Teaching/Learning Methods

1. Lecture 2. Tutorial 3. Assignment 4. PPT presentation 5. Seminar & Quizzes.

Course Outcome

On the successful completion of the course students will be able to

CO Number	CO Statement	Cognitive Level
CO1	Define the fundamentals of OS and identify the concepts relevant to process , process life cycle, Scheduling Algorithms, Deadlock and Memory management	K1,K2,K3, K4
CO2	Know the critical analysis of process involving various algorithms, an exposure to threads and semaphores	K4,K5
CO3	Have a complete study about Deadlock and its impact over OS. Knowledge of handling Deadlock with respective algorithms and measures to retrieve from deadlock. .	K2,K4,K6
CO4	Have complete knowledge of Scheduling Algorithms and its types.	K2,K5,K6
CO5	Understand memory organization and management	K3,K4,

Cognitive Level :K1 – Remember **; K2** –Understanding **; K3 –**Apply; **K4**- Analyze; **K5** –Evaluate **; K6** – Create ;

Mapping with Programme Outcomes:

PO / CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1	2	3	3	2	2	2	3
CO 2	3	2	3	2	3	2	3
CO 3	2	3	2	2	3	3	2
CO 4	3	3	3	3	2	3	3
CO 5	3	2	3	3	2	3	2

3 - Strongly Correlated; 2 - Moderately Correlated; 1 - Weakly Correlated;
0 - No correlation.

Semester	Course Code	Course Title	Hours of Teaching / Cycle	No. of Credits
V	23U5CAC5	Java Programming	6	5

Nature of the course

Employability Oriented	√	To introduce various techniques for representation of the data in the real world		Addresses Gender Sensitization	
Entrepreneurship Oriented	√	Relevant to regional need		Addresses Environment and Sustainability	
Skill development Oriented	√	Relevant to national need		Addresses Human Values	
		Relevant to Global development need	√	Addresses Professional Ethics	√

Course Objectives

The main objectives of this course are to:

- To provide fundamental knowledge of object-oriented programming
- To equip the student with programming knowledge in Core Java from the basics up.
- To enable the students to use AWT controls, Event Handling and Swing for GUI.
- To provide fundamental knowledge of object-oriented programming.
- To equip the student with programming knowledge in Core Java from the basics up.

SYLLABUS

UNIT	Content	No. of Hours
I	**Introduction :**Review of Object Oriented concepts – History of Java – Java buzz words – JVM architecture – Data types - Variables - Scope and life time of variables - arrays - operators – control statements - type conversion and casting - simple java program - constructors - methods - Static block - Static Data – Static Method String and String Buffer Classes.	18
II	**Inheritance**: Basic concepts - Types of inheritance - Member access rules - Usage of this and Super key word - Method Overloading - Method overriding - Abstract classes - Dynamic method dispatch - Usage of final keyword. **Packages**: Definition- Access Protection –Importing Packages. **Interfaces** :Definition–Implementation–Extending Interfaces. **Exception Handling**: *try – catch - throw - throws – finally* – Built-in exceptions - Creating own Exception classes.	18
III	**Multithreaded Programming**: Thread Class - Runnable interface – Synchronization–Using synchronized methods– Using synchronized statement- Inter thread Communication –Deadlock. **I/O Streams:** Concepts of streams - Stream classes- Byte and Character stream - Reading console Input and Writing Console output - File Handling.	18

IV	**AWT Controls:** The AWT class hierarchy - user interface components- Labels - Button - Text Components - Check Box - Check Box Group - Choice - List Box - Panels – Scroll Pane - Menu - Scroll Bar. Working with Frame class - Colour - Fonts and layout managers. **Event Handling:** Events - Event sources - Event Listeners - Event Delegation Model (EDM) - Handling Mouse and Keyboard Events - Adapter classes - Inner classes	18
V	**Swing:** Introduction to Swing - Hierarchy of swing components. Containers - Top level containers – JFrame - JWindow - JDialog - JPanel - JButton - JToggleButton - JCheckBox - JRadioButton - JLabel,JTextField - JTextArea - JList - JComboBox - JScrollPane..	18

Self Study :

Introduction to GUI programming: the Basic GUI Application – Jframe and Jpanet components and layout – Events and listeners.

Text Books:

1.Herbert Schildt, The Complete Reference, Tata McGraw Hill, New Delhi, 7th Edition, 2010
2.Gary Cornell, *Core Java 2 Volume I – Fundamentals,* Addison Wesley, 1999

References :

1.Head First Java, O'Rielly Publications,
2.Y. Daniel Liang, *Introduction to Java Programming*, 7th Edition, Pearson Education India, 2010

Web Resources

1. https://javabeginnerstutorial.com/core-java-tutorial
2. http://docs.oracle.com/javase/tutorial/
3. https://www.coursera.org/

Pedagogy:Teaching/Learning Methods

1. Lecture
2. Tutorial
3. Assignment
4. PPT presentation
5. Seminar & Quizzes.

Course Outcome

On the successful completion of the course students will be able to

CO Number	CO Statement	Cognitive Level
CO1	Understand the basic Object-oriented concepts .Implement the basic constructs of Core Java.	K1, K3,K4
CO2	Implement inheritance, packages, interfaces and exception handling of Core Java.	K3,K4
CO3	Implement multi-threading and I/O Streams of Core Java	K1,K4
CO4	Implement AWT and Event handling	K2, K6
CO5	Use Swing to create GUI	K4,K5

Cognitive Level :K1 – Remember **; K2** –Understanding **; K3 –**Apply; **K4**- Analyze;
K5 –Evaluate **;K6** – Create ;

Mapping with Programme Outcomes:

PO / CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1	3	2	3	3	3	2	3
CO 2	3	3	3	2	3	3	2
CO 3	3	2	3	3	2	3	3
CO 4	2	3	2	3	2	2	3
CO 5	3	3	2	3	2	3	3

3 - Strongly Correlated; 2 - Moderately Correlated; 1 - Weakly Correlated;
0 - No correlation.

Semester	Course Code	Course Title	Hours of Teaching / Cycle	No. of Credits
V	**23U5CACP5**	**Java Programming Lab**	**3**	**4**

Nature of the course

Employability Oriented	√	To introduce various techniques for representation of the data in the real world	√	Addresses Gender Sensitization	
Entrepreneurship Oriented		Relevant to regional need		Addresses Environment and Sustainability	
Skill development Oriented	√	Relevant to national need		Addresses Human Values	
		Relevant to Global development need	√	Addresses Professional Ethics	√

Course Objectives

The main objectives of this course are:

1. To provide fundamental knowledge of object-oriented programming.
2. To equip the student with programming knowledge in Core Java from the basics up.
3. To enable the students to know about Event Handling .
4. To enable the students to use String Concepts.
5. To equip the student with programming knowledge in to create GUI using AWT controls.

SYLLABUS		
S.No	**CONTENT**	**No. of Hours**
1.	Write a Java program that prompts the user for an integer and then prints out all the prime numbers up to that Integer?	3
2.	Write a Java program to multiply two given matrices.	3
3.	Write a Java program that displays the number of characters, lines and words in a text?	3
4.	Generate random numbers between two given limits using Random class and print messages according to the range of the value generated.	3
5.	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	3
6.	Write a program to perform the following string operations using String class: a. String Concatenation	3

	b. Search a substring c. To extract substring from given string	
7.	Write a program to perform string operations using String Buffer class: a. Length of a string b. Reverse a string c. Delete a substring from the given string	3
8.	Write a java program that implements a multi-thread application that has three threads. First thread generates random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of cube of the number.	3
9.	Write a threading program which uses the same method asynchronously to print the numbers 1to10 using Thread1 and to print 90 to100 using Thread2.	3
10	Write a program to demonstrate the use of following exceptions. a. Arithmetic Exception b. Number Format Exception c. Array Index Out of Bound Exception d. Negative Array Size Exception	3
11	Write a Java program that reads on file name from the user, then displays information about whether the file exists, whether the file is readable, whether the file is writable, the type of file and the length of the file in bytes?	3
12	Write a program to accept a text and change its size and font. Include bold italic options. Use frames and controls.	3
13	Write a Java program that handles all mouse events and shows the event name at the center of the window when a mouse event is fired. (Use adapter classes).	3
14	Write a Java program that works as a simple calculator. 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.	3
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.	3

Text Books:

1.Herbert Schildt, The Complete Reference, Tata McGraw Hill, New Delhi, 7th Edition, 2010
2.Gary Cornell, *Core Java 2 Volume I – Fundamentals,* Addison Wesley, 1999

References :

1.Head First Java, O’Rielly Publications,
2.Y. Daniel Liang, *Introduction to Java Programming*, 7th Edition, Pearson Education India, 2010

Web Resources

1. https://javabeginnerstutorial.com/core-java-tutorial
2. http://docs.oracle.com/javase/tutorial/
3. https://www.coursera.org/

Pedagogy: Teaching/Learning Methods

1. Lecture
2. Tutorial
3. Assignment
4. PPT presentation
5. Seminar & Quizzes.

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Cognitive Level
CO1	Understand the basic Object-oriented concepts. Implement the basic constructs of Core Java.	**K1, K2, K4**
CO2	Implement inheritance, packages, interfaces and exception handling of Core Java.	**K3, K4,K5**
CO3	Implement multi-threading and I/O Streams of Core Java	**K1,K3, K4**
CO4	Implement AWT and Event handling.	**K2 ,K6**
CO5	Use Swing to create GUI.	**K4, K5**

Cognitive Level: K1 - Remember; **K2 -** Understanding; **K3 -** Apply; **K4 -** Analyze; **K5 –** Evaluate; **K6 –** Create

Mapping of Course Outcomes with Programme Outcomes

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	3	3	3	3	2	3	2
CO2	3	2	3	2	3	2	3
CO3	2	3	3	3	2	3	3
CO4	2	3	3	2	3	2	3
CO5	3	3	2	3	3	3	2

3 - Strongly Correlated; 2 - Moderately Correlated; 1 - Weakly Correlated; 0 – No correlation

Semester	Course Code	Course Title	Hours of Teaching / Cycle	No. of Credits
V	23U5CAEL1A	Major Elective – I INTRODUCTION TO DATA SCIENCE	4	3

Nature of the course

Employability Oriented	√	To introduce various techniques for representation of the data in the real world	√	Addresses Gender Sensitization	
Entrepreneurship Oriented	√	Relevant to regional need		Addresses Environment and Sustainability	
Skill development Oriented	√	Relevant to national need		Addresses Human Values	
		Relevant to Global development need		Addresses Professional Ethics	√

Course Objectives

The main objectives of this course are:

1. To learn about basics of Data Science and Big data.
2. To learn about overview and building process of Data Science.
3. To learn about various Algorithms in Data Science.
4. To learn about Hadoop Framework.
5. To learn about case study about Data Science.

SYLLABUS

UNIT	Content	No. of Hours
I	**Introduction:** Benefits and uses – Facts of data – Data science process – Big data ecosystem and data science	12
II	**The Data science process**: Overview – research goals - retrieving data - transformation – Exploratory Data Analysis – Model building .	12
III	**Algorithms** :Machine learning algorithms – Modeling process – Types – Supervised – Unsupervised - Semi-supervised	12
IV	**Introduction to Hadoop** : Hadoop framework – Spark – replacing Map Reduce No SQL – ACID – CAP – BASE – types	12
V	**Case Study**: Prediction of Disease - Setting research goals - Data retrieval – preparation - exploration - Disease profiling - presentation and automation	12

Text Book:

1.Davy Cielen, Arno D. B. Meysman, Mohamed Ali, "Introducing Data Science", manning publications 2016.

Reference Book:

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.
4. Annalyn Ng, Kenneth Soo, "Numsense! Data Science for the Layman: No Math Added", 2017,1st Edition
5. Cathy O'Neil, Rachel Schutt, "Doing Data Science Straight Talk from the Frontline", O'Reilly Media 2013.
6. Lillian Pierson, "Data Science for Dummies", 2017 II Edition

Web Resources:

1.https://www.w3schools.com/datascience/
2.https://en.wikipedia.org/wiki/Data_science
3.http://www.cmap.polytechnique.fr/~lepennec/en/post/references/refs/

Pedagogy:Teaching/Learning Methods

1. Lecture 2. Tutorial 3. Assignment 4. PPT presentation
5. Seminar & Quizzes.

Course Outcome

On the successful completion of the course, students will be able to

CO Number	CO Statement	Cognitive Level
CO1	Understand the basics in Data Science and Big data.	K1,K2,K4
CO2	Understand overview and building process in Data Science.	K2,K3,K4,K5
CO3	Understand various Algorithms in Data Science.	K1,K4,K6
CO4	Understand Hadoop Framework in Data Science.	K3,K2,K1,K6
CO5	Case study in Data Science.	K2,K4,K5

Cognitive Level :K1 – Remember **; K2** –Understanding **; K3 –**Apply; **K4**- Analyze; **K5** –Evaluate **; K6** – Create ;

Mapping with Programme Outcomes:

PO / CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1	2	3	2	3	3	3	3
CO 2	2	3	2	3	3	3	2
CO 3	3	2	2	2	2	3	2
CO 4	2	2	3	3	2	3	3
CO 5	3	2	3	3	3	3	2

3 - Strongly Correlated; 2 - Moderately Correlated; 1 - Weakly Correlated;
0 - No correlation.

Semester	Course Code	Course Title	Hours of Teaching / Cycle	No. of Credits
V	23U5CAEL1B	**Major Elective – I** **SOFTWARE ENGINEERING**	4	3

Nature of the course

Employability Oriented	√	To introduce various techniques for representation of the data in the real world	√	Addresses Gender Sensitization	
Entrepreneurship Oriented	√	Relevant to regional need		Addresses Environment and Sustainability	
Skill development Oriented		Relevant to national need		Addresses Human Values	
		Relevant to Global development need	√	Addresses Professional Ethics	√

Course Objectives

The main objectives of this course are to:

1. To know basic software engineering methods and practices, and their appropriate application.
2. To understand various phases in developing a Software.
3. To describe software engineering layered technology and Process frame work.
4. To understanding of the role of project management including planning, scheduling, risk management, etc.
5. To Understanding of approaches to verification and validation including static analysis, and reviews.

SYLLABUS

UNIT	Content	No. of Hours
I	**Introduction to Software Engineering**: Introduction-some definitions-some size factor-Total effort devoted to software-distribution of effort-project size categories-how programmer spend their time-quality and productivity factors-managerial issues **Planning a software project: Introduction** –defining the problem-goals and requirements-developing solution strategy-planning the development process-the phased life Cycle Model-Milestones, documents, and Reviews-the cost model –The prototype life Cycle Model.	12
II	**Software Cost Estimation:** Introduction software cost factor-programmer Ability –product complexity-product size-Available Time – Required level of Reliability-Level of technology-**Software cost estimation Techniques-**Expert Judgment-Delphi cost estimation-work breakdown structures-algorithmic cost models-staffing Level Estimation-Estimating software Maintenance costs.- **Software Requirements Definition**-The Software Requirement specification-Formal specification Techniques-Relational Notations- Implicit Equations /Recurrence Relations.	12

III	**Software Design:** Introduction-Fundamental design concepts-Abstraction-Information hiding-structure-modularity-concurrency-verification-Aesthetics-Modules and Modularization Criteria- design Notation-data flow diagrams-structure charts-HIPO Diagrams-procedure templates-pseudo code-structured flow charts-structured English-Design Tables-Design Techniques-Stepwise Refinement- Level of Abstractions-structured design-integrated top-down development-Jackson structured programming-summary of design techniques.	12
IV	**Implementation Issues**-introduction- structured coding techniques-single entry, single Exit Constructs-Efficiency considerations –Violations of single entry, single –data encapsulations-the go to statement-Recursions-coding style-standard and guidelines-documentation guidelines-supporting documents-internal documentations.	12
V	**Verification and Validation Techniques**- Introduction-quality assurance-walkthroughs and inspections- walkthroughs- inspections-static analysis-Symbolic Execution-unit Testing and Debugging-unit testing-Debugging-system testing-integration testing-acceptance testing-Formal Verification-input –output Assertions-weakest preconditions structural induction.	12

SELF STUDY :

Building and Testing deployment – software configuration management (SCM) – cyber security – safety engineering – user experience Design – software reuse.

TEXT BOOKS:

1. Richard E.Fairley,"Software Engineering Concepts", McGraw-Hill Book Company-1985.
2. Roger Pressman,"Software Enginering", Sixth Edition, McGraw-Hill Book Company, 2005.

REFERENCE BOOKS:-

1.Pressman, "Software Engineering and Application", 7th Edition, McGraw International Edition, 2009.
2. Ian Sommerville, "Software Engineering", 8th Edition, Pearson Education, 2008
3. Stephan Schach, "Software Engineering", Tata McGraw Hill, 2007
4. Pfleeger and Lawrance, "Software Engineering: Theory and Practice" Pearson Education, Second Edition, 2001
5. Rajib Mall, "Fundamentals of Software Engineering", Third Edition, PHI Learning Private Limited ,2009.
6. Pankaj Jalote, "Software Engineering, A Precise Approach", Wiley India, 2010.
7. Kelkar S.A., "Software Engineering", Prentice Hall of India Pvt Ltd, 2007.

Pedagogy:Teaching/Learning Methods

1. Lecture 2. Tutorial 3. Assignment 4. PPT presentation
5. Seminar & Quizzes.

Course Outcome

On the successful completion of the course , students will be able to

CO Number	CO Statement	Cognitive Level
CO1	Familiarization with the concept of software engineering and its relevance.	K1,K4
CO2	Understanding of various methods or models for developing a software product	K2,K4,K5
CO3	Ability to analyze existing system to gather requirements for proposed system.	K1,K3,K6
CO4	Skill to design and code a software	K5,K6
CO5	Learns the ability to acquire and apply new knowledge as needed, using appropriate learning strategies	K3,K5

Cognitive Level :K1 – Remember **; K2** –Understanding **; K3 –**Apply; **K4**- Analyze; **K5** –Evaluate **;K6** – Create ;

Mapping with Programme Outcomes:

PO / CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1	3	2	3	3	3	2	2
CO 2	2	2	3	2	3	3	2
CO 3	2	3	3	3	2	3	2
CO 4	3	2	2	3	2	3	3
CO 5	3	3	3	3	3	2	3

3 - Strongly Correlated; 2 - Moderately Correlated; 1 - Weakly Correlated;
0 - No correlation.

Semester	Course Code	Course Title	Hours of Teaching / Cycle	No. of Credits
V	23U5CAEL2A	Major Elective - II CLOUD COMPUTING	4	3

Nature of the course

Employability Oriented	√	To introduce various techniques for representation of the data in the real world	√	Addresses Gender Sensitization	
Entrepreneurship Oriented		Relevant to regional need		Addresses Environment and Sustainability	
Skill development Oriented	√	Relevant to national need		Addresses Human Values	
		Relevant to Global development need	√	Addresses Professional Ethics	√

Course Objectives

The main objectives of this course are :

1. Learning fundamental concepts and Technologies of Cloud Computing.
2. Learning various cloud service types and their uses and pitfalls.
3. To learn about Cloud Architecture and Application design.
4. To know the various aspects of application design, benchmarking and security on the Cloud.
5. To learn the various Case Studies in Cloud Computing.

SYLLABUS

UNIT	Content	No. of Hours
I	**Introduction to Cloud Computing:** Definition of Cloud Computing – Characteristics of Cloud Computing – Cloud Models – Cloud Service Examples – Cloud-based Services and Applications. Cloud Concepts and Technologies: Virtualization – Load balancing – Scalability and Elasticity – Deployment – Replication – Monitoring – Software Defined Networking – Network Function Virtualization – Map Reduce – Identity and Access Management – Service Level Agreements – Billing.	12
II	**Cloud Services Compute Services:** Amazon Elastic Computer Cloud - Google Compute Engine - Windows Azure Virtual Machines Storage Services: Amazon Simple Storage Service - Google Cloud Storage - Windows Azure Storage Database Services: Amazon Relational Data Store - Amazon Dynamo DB - Google Cloud SQL - Google Cloud Data Store - Windows Azure SQL Database - Windows Azure Table Service Application Services: Application Runtimes and Frameworks - Queuing Services - Email Services - Notification Services - Media Services Content Delivery Services: Amazon Cloud Front - Windows Azure Content Delivery Network	12

	Analytics Services: Amazon Elastic Map Reduce - Google Map Reduce Service - Google Big Query - Windows Azure HD Insight Deployment and Management Services: Amazon Elastic Bean stack - Amazon Cloud Formation Identity and Access Management Services: Amazon Identify and Access Management - Windows Azure Active Directory Open Source Private Cloud Software: Cloud Stack – Eucalyptus – Open Stack	
III	**Cloud Application Design:** Introduction – Design Consideration for Cloud Applications – Scalability – Reliability and Availability – Security – Maintenance and Upgradation – Performance – Reference Architectures for Cloud Applications – Cloud Application Design Methodologies: Service Oriented Architecture (SOA), Cloud Component Model, IaaS, PaaS and SaaS Services for Cloud Applications, Model View Controller (MVC), RESTful Web Services – Data Storage Approaches: Relational Approach (SQL), Non-Relational Approach (NoSQL).	12
IV	**Cloud Application Benchmarking and Tuning:** Introduction to Benchmarking – Steps in Benchmarking – Workload Characteristics – Application Performance Metrics – Design Consideration for Benchmarking Methodology – Benchmarking Tools and Types of Tests – Deployment Prototyping. **Cloud Security:** Introduction – CSA Cloud Security Architecture – Authentication (SSO) – Authorization – Identity and Access Management – Data Security : Securing data at rest, securing data in motion – Key Management – Auditing.	12
V	**Case Studies:** Cloud Computing for Healthcare – Cloud Computing for Energy Systems - Cloud Computing for Transportation Systems - Cloud Computing for Manufacturing Industry - Cloud Computing for Education.	12

TEXT BOOKS:

1.ArshdeepBahga, Vijay Madisetti, *Cloud Computing – A Hands On Approach*, Universities Press (India) Pvt. Ltd., 2018

REFERENCE BOOKS:-

1.Anthony T Velte, Toby J Velte, Robert Elsenpeter, *Cloud Computing: A Practical Approach*, Tata McGraw-Hill, 2013.
2.Barrie Sosinsky, *Cloud Computing Bible*, Wiley India Pvt. Ltd., 2013.
3.David Crookes, *Cloud Computing in Easy Steps*, Tata McGraw Hill, 2012.
4..Dr. Kumar Saurabh, *Cloud Computing*, Wiley India, Second Edition 2012

Web Resources:

1.https://en.wikipedia.org/wiki/Cloud_computing
2. https://link.springer.com/chapter/10.1007/978-3-030-34957-8_7
3. https://link.springer.com/chapter/10.1007/978-3-030-34957-8_7

Pedagogy :Teaching/Learning Methods

1. Lecture 2. Tutorial 3. Assignment 4. PPT presentation
5. Seminar & Quizzes.

Course Outcome

On the successful completion of the course , students will be able to

CO Number	CO Statement	Cognitive Level
CO1	Understand the fundamental concepts and Technologies in Cloud Computing.	K1,K4,K3
CO2	Able to understand various cloud service types and their uses and pitfalls.	K1,K3,K4
CO3	Able to understand Cloud Architecture and Application design.	K2,K4,K6
CO4	Understand the various aspects of application design, benchmarking and security in the Cloud.	K4,K5
CO5	Understand various Case Studies in Cloud Computing.	K2,K4

Cognitive Level :K1 – Remember **; K2** –Understanding **; K3 –**Apply; **K4**- Analyze; **K5** –Evaluate **;K6** – Create ;

Mapping with Programme Outcomes:

PO / CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1	2	3	3	2	3	3	3
CO 2	2	2	2	3	2	3	2
CO 3	3	3	3	2	2	3	3
CO 4	3	2	3	3	3	2	2
CO 5	2	3	2	2	2	3	3

3 - Strongly Correlated; 2 - Moderately Correlated; 1 - Weakly Correlated;
0 - No correlation.

Semester	Course Code	Course Title	Hours of Teaching / Cycle	No. of Credits
V	23U5CAEL2B	Major Elective – II AGILE PROJECT MANAGEMENT	4	3

Nature of the course

Employability Oriented	√	To introduce various techniques for representation of the data in the real world	√	Addresses Gender Sensitization	
Entrepreneurship Oriented	√	Relevant to regional need		Addresses Environment and Sustainability	
Skill development Oriented	√	Relevant to national need		Addresses Human Values	
		Relevant to Global development need		Addresses Professional Ethics	√

Course Objectives

The main objectives of this course are to:

1. Learning of software design, software technologies and APIs.
2. Detailed demonstration about Agile development and testing techniques.
3. Learning about Agile Planning and Execution.
4. Agile Management Design and Quality Check.
5. Detailed examination of Agile development and testing techniques.

SYLLABUS

UNIT	Content	No. of Hours
I	**Introduction: Modernizing Project Management:** Project Management Needed a Makeover – Introducing Agile Project Management. **Applying the Agile Manifesto and Principles:** Understanding the Agile manifesto – Outlining the four values of the Agile manifesto – Defining the 12 Agile Principles – Adding the Platinum Principles – Changes as a result of Agile Values – The Agile litmus test. **Why Being Agile Works Better:** Evaluating Agile benefits – How Agile approaches beat historical approaches – Why people like being Agile.	12
II	**Being Agile** **Agile Approaches:** Diving under the umbrella of Agile approaches – Reviewing the Big Three: Lean, Scrum, Extreme Programming - Summary **Agile Environments in Action:** Creating the physical environment – Low-tech communicating – High-tech communicating – Choosing tools. **Agile Behaviors in Action:** Establishing Agile roles – Establishing new values – Changing team philosophy	12
III	**Agile Planning and Execution** **Defining the Product Vision and Roadmap:** Agile planning – Defining the product vision – Creating a product roadmap – Completing the product backlog. **Planning Releases and Sprints:** Refining requirements and estimates – Release	12

	planning – Sprint planning. **Working Throughout the Day:** Planning your day – Tracking progress – Agile roles in the sprint – Creating shippable functionality – The end of the day. **Showcasing Work, Inspecting and Adapting:** The sprint review – The sprint retrospective. **Preparing for Release:** Preparing the product for deployment (the release sprint) – Preparing the operational support – Preparing the organization for product deployment - Preparing the marketplace for product	
IV	**Agile Management** **Managing Scope and Procurement:** What's different about Agile scope management – Managing Agile scope – What's different about Agile procurement – Managing Agile procurement. **Managing Time and Cost:** What's different about Agile time management – Managing Agile schedules – What's different about Agile cost management – Managing Agile budgets. **Managing Team Dynamics and Communication:** What's different about Agile team dynamics – Managing Agile team dynamics – What's different about Agile communication – Managing Agile communication. **Managing Quality and Risk:** What's different about Agile quality – Managing Agile quality – What's different about Agile risk management – Managing Agile risk.	12
V	**Implementing Agile** **Building a Foundation:** Organizational and individual commitment – Choosing the right pilot team members – Creating and environment that enables Agility – Support Agility initially and over time. **Being a Change Agent:** Becoming Agile requires change – why change doesn't happen on its own – Platinum Edge's Change Roadmap – Avoiding pitfalls – Signs your changes are slipping. **Benefits, Factors for Success and Metrics:** Ten key benefits of Agile project management – Ten key factors for project success – Ten metrics for Agile Organizations.	12

Self Study :

The movement to Agile methodologies – Agile Versus plan driven development – Relating PMBOX practices to Agile Practices.

TEXT BOOKS:

1.Mark C. Layton, Steven J. Ostermiller, Agile Project Management for Dummies, 2nd Edition, Wiley India Pvt. Ltd., 2018.
2.Jeff Sutherland, Scrum – The Art of Doing Twice the Work in Half the Time, Penguin, 2014.

REFERENCE BOOKS:-

1.Mark C. Layton, David Morrow, *Scrum for Dummies*, 2nd Edition, Wiley India Pvt. Ltd., 2018.
2.Mike Cohn, Succeeding with Agile – Software Development using Scrum, Addison-Wesley Signature Series, 2010.
3.Alex Moore, Agile Project Management, 2020.
4.Andrew Stellman and Jennifer Greene, *Learning Agile: Understanding Scrum, XP, Lean, and Kanban*, Shroff/O'Reilly, First Edition, 2014.

Web Resources:
1. www.agilealliance.org/resources

Pedagogy: Teaching/Learning Methods
1. Lecture 2. Tutorial 3. Assignment 4. PPT presentation
5. Seminar & Quizzes.

Course Outcome
On the successful completion of the course , students will be able to

CO Number	CO Statement	Cognitive Level
CO1	Understanding of software design, software technologies and APIs using Agile Management.	K2,K4,K3
CO2	Understanding of Agile development and testing techniques.	K2,K3,K4
CO3	Understanding about Agile Planning and Execution using Sprint.	K2,K3K4,K6
CO4	Understanding of Agile Management Design, scope , Procurement, managing Time and Cost and Quality Check.	K2,K3,K5
CO5	Analyzing of Agile development and testing techniques	K6,K4

Cognitive Level :K1 – Remember **; K2** –Understanding **; K3 –**Apply; **K4**- Analyze;
K5 –Evaluate **;K6** – Create ;

Mapping with Programme Outcomes:

PO / CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1	2	3	3	2	3	3	3
CO 2	2	2	2	3	2	3	2
CO 3	3	3	3	2	2	3	3
CO 4	3	2	3	3	3	2	2
CO 5	2	3	2	2	2	3	3

3 - Strongly Correlated; 2 - Moderately Correlated; 1 - Weakly Correlated;
0 - No correlation.

Semester	Course Code	Course Title	Hours of Teaching / Cycle	No. of Credits
V	23U5CANME	Non Major Elective - Content Writer	2	2

Nature of the course

Employability Oriented	√	To introduce various techniques for representation of the data in the real world	√	Addresses Gender Sensitization	
Entrepreneurship Oriented	√	Relevant to regional need		Addresses Environment and Sustainability	
Skill development Oriented	√	Relevant to national need		Addresses Human Values	
		Relevant to Global development need	√	Addresses Professional Ethics	√

Course Objectives

The main objectives of this course are to:

1. To learn the features of Python.
2. To understand why Python is a useful scripting language for developers.
3. To learn how to design and program Python applications.
4. To learn how to use lists, tuples, and dictionaries in Python programs.
5. Build basic programs using fundamental programming constructs like variables, conditional logic, looping, and functions.

SYLLABUS		
Unit	**Content**	**No. of Hours**
I	**Basics of Content writing:** Writing for the Web-The Concept of Content Writing and its relevance-Role and Functions of Content Writers-. Print and Web Content Writing- Types of Content Writing-**Social Media**: Understanding the basics of social media-Understanding social media content writing- Understanding PR-Plagiarism laws in Content Writing	**6**
II	**Visual communications:** Visual Content-Interactive Content-Adding Motion-Sound-Images-Free tools and paid tools-Writing Blogs	**6**

Textbook:

1. writing for the web,LYNDA FELDER

Unit	Chapter	Sections
I	Chapter –2	Section (Pages:13-28)
II	Chapter– 3,4,5,6,12	Section(Pages:31-80,141-152)

Web Resources-

1.https://www.simplilearn.com/how-to-become-content-writer-article
2. https://www.digitalvidya.com/blog/how-to-start-content-writing/ 3. http://www.diveintopython3.net/
3.https://www.masterclass.com/articles/types-of-content-writing

Pedagogy : Teaching / Learning methods

1. Lecture
2. Tutorial
3. Assignment
4. PPT presentation
5. Seminar&Quizzes

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Cognitive Level
CO1	The basic concepts of Content Writing	K1, K2, K3, K4
CO2	The knowledge of various styles and techniques of writing and editing	K2, K3, K4,K5
CO3	A nourishment of their creative skills	K1,K3, K4, K6
CO4	An enhancement of their employability	K2,K5,K6
CO5	A creation of an industry-academia interface through institutional support	K3, K4, K5

Cognitive Level: K1 - Remember; **K2 -** Understanding; **K3 -** Apply; **K4 -** Analyze; **K5 –** Evaluate; **K6 –** Create

Mapping of Course Outcomes with Programme Outcomes

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	3	3	3	3	3	3	3
CO2	3	3	3	3	3	3	3
CO3	1	3	3	2	2	3	3
CO4	2	3	3	3	3	2	3
CO5	2	3	2	3	3	3	3

3 - Strongly Correlated; 2 - Moderately Correlated;
1 - Weakly Correlated; 0 – No correlation

Semester	Course Code	Course Title	Hours of Teaching / Cycle	No. of Credits
V	23U5CAC6PR	PROJECT	5	4

Main Project

- To teach technical and software development skills.
- To inculcate the importance of the front end and back and tools in developing the modules.
- To explain the working principles of the modules and test the modules.
- To illustrate the different phases of software development life cycle.
- To describe the different testing types and know the importance of testing and debugging.
- To cultivate have to undergo industrial software development projects using recent technologies.

Course Outcomes

After completion of the course students will be able to:

- To develop the software codes using front end and the back end tools.
- Build the modules.
- Understand the different process modes involved in project development.
- Develop the skills to test the code.
- Work in a MNC project leader and project manager.

Semester	Course Code	Course Title	Hours of Teaching / Cycle	No. of Credits
VI	**23U6CAC7**	**R-Programming**	**6**	**4**

Nature of the course

Employability Oriented	√	Relevant to Local need		Addresses Gender Sensitization	
Entrepreneurship Oriented		Relevant to regional Need	√	Addresses Environment and Sustainability	
Skill development Oriented	√	Relevant to national need		Addresses Human Values	
		Relevant to Global development need	√	Addresses Professional Ethics	

Course Objectives

The main objectives of this course are:

- To understand the problem solving approaches
- To learn the basic programming constructs in R Programming
- To learn the basic programming constructs in R Programming
- To use R Programming data structures - lists, tuples, and dictionaries.
- To do input/output with files in R Programming.

SYLLABUS		
Unit	**Content**	**No. of Hours**
I	**Introduction:** Evolution of Big data — Best Practices for Big data Analytics — Big data characteristics — Validating — The Promotion of the Value of Big Data — Big Data Use Cases- Characteristics of Big Data Applications — Perception and Quantification of Value -Understanding Big Data Storage — A General Overview of High-Performance Architecture — HDFS — Map Reduce and YARN — Map Reduce Programming Model	**12**
II	**Control structures and vectors:** Control structures, functions, scoping rules, dates and times, Introduction to Functions, preview of Some Important R Data Structures, Vectors, Character Strings, Matrices, Lists, Data Frames, Classes Vectors: Generating sequences, Vectors and subscripts, Extracting elements of a vector using subscripts, Working with logical subscripts, Scalars, Vectors, Arrays, and Matrices, Adding and Deleting Vector Elements, Obtaining the Length of a Vector, Matrices and Arrays as Vectors Vector Arithmetic and Logical Operations, Vector Indexing, Common Vector Operations	**12**
III	**Lists:** Creating Lists, General List Operations, List Indexing Adding and Deleting List Elements, Getting the Size of a List, Extended Example: Text Concordance Accessing List Components and Values Applying Functions to Lists, Data Frames, Creating Data Frames, Accessing Data Frames, Other Matrix-Like Operations	**12**

IV	**FACTORS AND TABLES**: Factors and Levels, Common Functions Used with Factors, Working with Tables, Matrix/Array-Like Operations on Tables, Extracting a Sub table, Finding the Largest Cells in a Table, Math Functions, Calculating a Probability, Cumulative Sums and Products, Minima and Maxima, Calculus, Functions for Statistical Distributions R-PROGRAMMING .	**12**
V	**OBJECT-ORIENTED PROGRAMMING:** S_3 Classes, S_3 Generic Functions, Writing S_3 Classes, Using Inheritance, S_3 Classes, Writing S_3 Classes, Implementing a Generic Function on an S_3 Class, visualization, Simulation, code profiling, Statistical Analysis with R, data manipulation	12

Self Study :

R-Packages, GNU projects, role of R-Language in Artificial Intelligence.

Text Books:

1. Roger D. Peng," R Programming for Data Science ", 2012
2. Norman Matloff,"The Art of R Programming- A Tour of Statistical Software Design", 2011

References:

1. Garrett Grolemund, Hadley Wickham,"Hands-On Programming with R: Write Your Own Functions and Simulations" , 1st Edition, 2014
2. Venables , W.N.,and Ripley,"S programming", Springer, 2000.

Web Resources:

https://www.simplilearn.com

Pedagogy: Teaching / Learning methods

1. Lecture 2. Tutorial 3. Assignment 4. PPT presentation 5. Seminar

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Cognitive Level
CO1	Work with big data tools and its analysis techniques.	**K3**
CO2	Analyze data by utilizing clustering and classification algorithms.	**K4**
CO3	Learn and apply different mining algorithms and recommendation systems for large volumes of data.	**K6**
CO4	Perform analytics on data streams.	**K5**
CO5	Learn NoSQL databases and management.	**K3**

Cognitive Level:K1 - Remember; **K2 -** Understanding; **K3 -** Apply; **K4 -** Analyze; **K5 –** Evaluate; **K6 –** Create

Mapping of Course Outcomes with Programme Outcomes

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	3	3	3	3	3	3	3
CO2	3	3	3	3	3	3	3
CO3	1	3	3	2	2	3	3
CO4	2	3	3	3	3	2	3
CO5	2	3	2	3	3	3	3

3 - Strongly Correlated; 2 - Moderately Correlated;
1 - Weakly Correlated; 0 – No correlation

Semester	Course Code	Course Title	Hours of Teaching / Cycle	No. of Credits
VI	23U6CAC8	Computer Networks	5	4

Nature of the course

Employability Oriented	√	Relevant to Local need		Addresses Gender Sensitization	
Entrepreneurship Oriented		Relevant to regional Need		Addresses Environment and Sustainability	
Skill development Oriented	√	Relevant to national need		Addresses Human Values	
		Relevant to Global development need	√	Addresses Professional Ethics	

Course Objectives

The main objectives of this course are:

- To learn the basic concepts of Data communication and Computer network
- To learn about wireless Transmission
- To learn about networking and data link layer.
- To study about Network communication.
- To learn the concept of Transport layer

SYLLABUS		
Unit	**Content**	**No. of Hours**
I	**Introduction:** Network Hardware – Software – Reference Models – OSI and TCP/IP Models – Example Networks: Internet, ATM, Ethernet and Wireless LANs - Physical Layer – Theoretical Basis for Data Communication - Guided Transmission Media	**12**
II	**Wireless Transmission**-Communication Satellites – Telephone System: Structure, Local Loop, Trunks and Multiplexing and Switching. Data Link Layer: Design Issues – Error Detection and Correction.	**12**
III	**Elementary Data Link Protocols**: Sliding Window Protocols – Data Link Layer in the Internet - Medium Access Layer – Channel Allocation Problem – Multiple Access Protocols – Bluetooth.	**12**
IV	**Network layer:**Network Layer Design Issues - Routing Algorithms - Congestion Control Algorithms – IP Protocol – IP Addresses – Internet Control Protocols.	**12**
V	**Transport Layer:**Services - Connection Management - Addressing, Establishing and Releasing a Connection – Simple Transport Protocol – Internet Transporet Protocols (ITP) - Network Security: Cryptography	**12**

Self Study :

IPV4, IPV6, Network virtualization symmetric key cryptography, Applications.

Text Books:

1. A. S. Tanenbaum, "Computer Networks", 4th Edition, Prentice-Hall of India, 2008.

References:

1. B.A.Forouzan, "Data Communications and Networking", Tata McGraw Hill, 4th Edition, 2017
2. F. Halsall,"DataCommunications,Computer Networks and Open Systems", Pearson Education, 2008
3. D. Bertsekas and R. Gallagher, "Data Networks", 2nd Edition, PHI, 2008.
4. Lamarca, "Communication Networks", Tata McGraw- Hill, 2002

Pedagogy: Teaching / Learning methods

1. Lecture
2. Tutorial
3. Assignment
4. PPT presentation
5. Seminar

Course Outcomes

On the successful completion of the course, students will be able to

CO. Number	Course Outcomes	Cognitive Level
1	To Understand the basics of Computer Network architecture, OSI and TCP/IP reference models	**K1,K2,K3**
2	To gain knowledge on Telephone systems using wireless network	**K3**
3	To understand the concept of MAC	**K6**
4	To analyze the characteristics of Routing and Congestion control algorithms	**K4**
5	To understand network security and define various protocols such as FTP, HTTP, Telnet, DNS	**K5**

Cognitive Level:K1 - Remember; **K2 -** Understanding; **K3 -** Apply; **K4 -** Analyze; **K5 –** Evaluate; **K6 –** Create

Mapping of Course Outcomes with Programme Outcomes

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	3	3	3	2	3	3	3
CO2	3	3	2	3	3	3	2
CO3	2	3	3	2	2	3	3
CO4	2	3	2	3	3	3	2
CO5	2	3	2	3	2	3	3

3 - Strongly Correlated; 2 - Moderately Correlated;
1 - Weakly Correlated; 0 – No correlation

Semester	Course Code	Course Title	Hours of Teaching / Cycle	No. of Credits
VI	**23U6CACP6**	**R-Programming Lab**	**5**	**4**

Nature of the course

Employability Oriented	√	Relevant to Local need		Addresses Gender Sensitization
Entrepreneurship Oriented		Relevant to regional Need	√	Addresses Environment and Sustainability
Skill development Oriented	√	Relevant to national need		Addresses Human Values
		Relevant to Global development need	√	Addresses Professional Ethics

Course Objectives

The main objectives of this course are:

- To understand the problem solving approaches
- To learn the basic programming constructs in R-Language
- To practice various computing strategies for R-Programming based solutions to real world problems
- To use R- data structures - lists, tuples, dictionaries.
- To do input/output with files in R-Programming.

S. No.	Details	No. of Hours
1	Program to convert the given temperature from Fahrenheit to Celsius and vice versa depending upon user's choice.	3
2	Program, to find the area of rectangle, square, circle and triangle by accepting suitable input parameters from user.	3
3	Write a program to find list of even numbers from 1 to n using R-Loops	3
4	Create a function to print squares of numbers in sequence	3
5	Write a program to join columns and rows in a data frame using cbind() and rbind() in R	3
6	Implement different String Manipulation functions in R	3
7	Implement different data structures in R (Vectors, Lists, Data Frames)	3
8	Write a program to read a csv file and analyze the data in the file in R	3
9	Create pie chart and bar chart using R.	3
10	Create a data set and do statistical analysis on the data using R.	3
11	Program to find factorial of the given number using recursive function	3
12	Write a R program to count the number of even and odd numbers from array of N numbers.	3

Text Book:

1. Roger D. Peng," R Programming for Data Science ", 2012
   Norman Matloff,"The Art of R Programming- A Tour of Statistical Software Design", 2011

References:

1. Garrett Grolemund, Hadley Wickham,"Hands-On Programming with R: Write Your Own Functions and Simulations" , 1st Edition, 2014
2. Venables , W.N.,and Ripley,"S programming", Springer, 2000.

CO Number	Course Outcomes	Cognitive Level
1	Acquire programming skills in core R Programming	**K1,K2,K3**
2	Acquire Object-oriented programming skills in R Programming.	**K3**
3	Develop the skill of designing graphical-user interfaces (GUI) in R Programming	**K6**
4	Acquire R Programming skills to move into specific branches	**K4**
5	To perform data experiments with statistics	**K5**

Cognitive Level:K1 - Remember; **K2 -** Understanding; **K3 -** Apply; **K4 -** Analyze; **K5 –** Evaluate; **K6 –** Create

Mapping of Course Outcomes with Programme Outcomes

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	2	3	3	2	3	3	3
CO2	3	2	2	3	3	3	2
CO3	2	3	3	2	2	2	3
CO4	2	3	2	3	3	2	2
CO5	2	3	2	3	2	3	3

3 - Strongly Correlated; 2 - Moderately Correlated;
1 - Weakly Correlated; 0 – No correlation

Semester	Course Code	Course Title	Hours of Teaching / Cycle	No. of Credits
VI	23U6CAEL3A	Major Elective – III ROBOTICS	5	3

Nature of the course

Employability Oriented	√	Relevant to Local need		Addresses Gender Sensitization	
Entrepreneurship Oriented		Relevant to regional Need		Addresses Environment and Sustainability	
Skill development Oriented	√	Relevant to national need	√	Addresses Human Values	
		Relevant to Global development need	√	Addresses Professional Ethics	

Course Objectives

The main objectives of this course are:

- To understand the robotics fundamentals
- Understand the sensors and matrix methods
- Understand the Localization: Self-localizations and mapping
- To study about the concept of Path Planning, Vision system
- To learn about the concept of robot artificial intelligence

SYLLABUS		
Unit	**Content**	**No. of Hours**
I	**Introduction:** Introduction, brief history, components of robotics, classification, workspace, work-envelop, motion of robotic arm, end-effectors and its types, service robot and its applications, Artificial Intelligence in Robotics.	**12**
II	**Actuators and sensors :**Types of actuators, stepper-DC-servo-and brushless motors- model of a DC servo motor-types of transmissions-purpose of sensor-internal and external sensors-common sensors-encoders tachometers-strain gauge based force torque sensor-proximity and distance measuring sensors Kinematics of robots: Representation of joints and frames, frames transformation, homogeneous matrix, D-H matrix, Forward and inverse kinematics: two link planar (RR) and spherical robot (RRP). Mobile robot Kinematics: Differential wheel mobile robot.	**12**
III	**Localization:** Self-localizations and mapping - Challenges in localizations – IR based localizations – vision based localizations – Ultrasonic based localizations - GPS localization systems.	**12**
IV	**Path Planning:** Introduction, path planning-overview-road map path planning-cell decomposition path planning potential field path	**12**

	planning-obstacle avoidance-case studies Vision system: Robotic vision systems-image representation-object recognition-and categorization-depth measurement- image data compression-visual inspection-software considerations.	
V	**Applications:** Aerial robots-collision avoidance robots for agriculture-mining-exploration-underwater-civilian- and military applications-nuclear applications-space Applications-Industrial robots-artificial intelligence in robots-application of robots in material handling-continuous arc welding-spot welding-spray painting-assembly operation-cleaning-etc.	**12**

Self Study :

Advanced Neuro technologies for Human Machine collaboration : Integrating Brain – computer Interfaces Advanced seneing, learning and control for Human –Robot Interaction.

Text Books:

1. RichardD.Klafter. Thomas Achmielewski and MickaelNegin, Robotic Engineering and Integrated Approach, Prentice Hall India-Newdelhi-2001
2. SaeedB.Nikku, Introduction to robotics, analysis, control and applications, Wiley-India, 2nd edition 2011

References:

1. Industrial robotic technology-programming and application by M.P.Groover et.al, McGrawhill2008
2. Robotics technology and flexible automation by S.R.Deb, THH-2009

Pedagogy: Teaching / Learning methods

1. Lecture 2. Tutorial 3. Assignment 4. PPT presentation 5. Seminar

CO Number	Course Outcomes	Cognitive Level
1	Describe the different physical forms of robot architectures.	**K3**
2	Kinematically model simple manipulator and mobile robots.	**K4**
3	Mathematically describe a kinematic robot system	**K6**
4	Analyze manipulation and navigation problems using knowledge of coordinate frames, kinematics, optimization, control, and uncertainty.	**K5**
5	Program robotics algorithms related to kinematics, control, optimization, and uncertainty.	**K3**

Cognitive Level:K1 - Remember; **K2 -** Understanding; **K3 -** Apply; **K4 -** Analyze; **K5 –** Evaluate; **K6 –** Create

Mapping with Programme Outcomes:

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	3	3	3	2	3	2	3
CO2	3	2	3	2	2	3	2
CO3	3	3	2	2	3	3	3
CO4	2	3	2	3	2	3	2
CO5	3	3	3	3	3	2	3

3 - Strongly Correlated; 2 - Moderately Correlated;
1 - Weakly Correlated; 0 – No correlation

Semester	Course Code	Course Title	Hours of Teaching / Cycle	No. of Credits
VI	23U6CAEL3B	**Major Elective - III** **Data Mining And Warehousing**	5	3

Nature of the course

Employability Oriented	√	Relevant to Local need		Addresses Gender Sensitization	
Entrepreneurship Oriented		Relevant to regional Need		Addresses Environment and Sustainability	
Skill development Oriented	√	Relevant to national need		Addresses Human Values	
		Relevant to Global development need	√	Addresses Professional Ethics	

Course Objectives

The main objectives of this course are:

- To provide the knowledge on Data Mining and Warehousing concepts and techniques
- To study the basic concepts of Data Mining, Architecture and Comparison.
- To study a set of Mining Association Rules, Data Warehouses.
- To study about Classification and Prediction, Classifier Accuracy
- To study the basic concepts of cluster analysis, Cluster Methods

SYLLABUS		
Unit	**Content**	**No. of Hours**
I	**Introduction:** Data mining – Functionalities – Classification – Introduction to Data Warehousing – Data Preprocessing: Preprocessing the Data – Data cleaning – Data Integration and Transformation – Data Reduction.	**12**
II	**Data Mining, Primitives, Languages and System Architecture:** Data Mining – Primitives – Data Mining Query Language, Architecture of Data mining Systems. Concept Description, Characterization and Comparison: Concept Description, Data Generalization and Summarization, Analytical Characterization, Mining Class Comparison – Statistical Measures.	**12**
III	**Mining Association Rules:** Basic Concepts – Single Dimensional Boolean Association Rules From Transaction Databases, Multilevel Association Rules from transaction databases – Multi dimension Association Rules from Relational Database and Data Warehouses.	**12**
IV	**Classification and Prediction:** Introduction – Issues – Decision Tree Induction–Bayesian Classification – Classification of Back Propagation. Classification based on Concepts from Association Rule Mining– Other Methods. Prediction – Introduction – Classifier Accuracy.	**12**

V	**Cluster Analysis:** Introduction – Types of Data in Cluster Analysis, Petitioning Methods – Hierarchical Methods-Density Based Methods – GRID Based Method – Model based Clustering Method.	**12**

Self Study :

Data warehouse development process – Data Mart – OLAP – Dimentional Model.

Text Books:

1. Han and M. Kamber, "Data Mining Concepts and Techniques", 2001, Harcourt India Pvt. Ltd, New Delhi.

References:

1. K.P. Soman, ShyamDiwakar, V. Ajay "Insight into Data Mining Theory and Practice ",Prentice Hall of India Pvt. Ltd, New Delhi
2. Parteek Bhatia, 'Data Mining and Data Warehousing: Principles and Practical Techniques', Cambridge University Press, 2019

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1. Lecture 2. Tutorial 3. Assignment 4. PPT presentation
6. Seminar

CO. Number	Course Outcomes	Cognitive Level
1	To understand the basic concepts and the functionality of the various data mining and data warehousing component	**K1,K2,K3**
2	To know the concepts of Data mining system architectures	**K4,K5**
3	To analyze the principles of association rules	**K6**
4	To get analytical idea on Classification and prediction methods	**K5**
5	To Gain knowledge on Cluster analysis and its methods.	**K3**

Cognitive Level:K1 - Remember; **K2 -** Understanding; **K3 -** Apply; **K4 -** Analyze; **K5 –** Evaluate; **K6 –** Create

Mapping of Course Outcomes with Programme Specific Outcomes:-

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	3	3	3	2	3	2	3
CO2	3	2	3	2	2	3	2
CO3	3	3	2	2	3	3	3
CO4	2	3	2	3	2	3	2
CO5	3	3	3	3	3	2	3

3 - Strongly Correlated; 2 - Moderately Correlated;
1 - Weakly Correlated; 0 – No correlation

Semester	Course Code	Course Title	Hours of Teaching / Cycle	No. of Credits
VI	**23U6CAEL4A**	**Major Elective – IV Computational Intelligence**	**5**	**3**

Nature of the course

Employability Oriented	√	Relevant to Local need		Addresses Gender Sensitization	
Entrepreneurship Oriented		Relevant to regional Need	√	Addresses Environment and Sustainability	
Skill development Oriented	√	Relevant to national need		Addresses Human Values	
		Relevant to Global development need	√	Addresses Professional Ethics	

Course Objectives

The main objectives of this course are:

- To identify and understand the basics of AI and its search.
- To study about the Fuzzy logic systems.
- Understand and apply the concepts of Neural Network and its functions
- Understand the concepts of Artificial Neural Network
- To study about the Genetic Algorithm.

SYLLABUS		
Unit	**Content**	**No. of Hours**
I	**Introduction to AI**: Problem formulation – AI Applications – Problems – State Space and Search – Production Systems – Breadth First and Depth First – Travelling Salesman Problem – Heuristic search techniques: Generate and Test – Types of Hill Climbing.	**12**
II	**Fuzzy Logic Systems:** Notion of fuzziness – Operations on fuzzy sets – T-norms and other aggregation operators – Basics of Approximate Reasoning – Compositional Rule of Inference – Fuzzy Rule Based Systems – Schemes of Fuzzification – Inferencing – Defuzzification – Fuzzy Clustering – fuzzy rule-based classifier.	**12**
III	**Neural Networks:** What is Neural Network, Learning rules and various activation functions, Single layer Perceptions, Back Propagation networks, Architecture of Back propagation (BP) Networks, Back propagation Learning, Variation of Standard Back propagation Neural Network, Introduction to Associative Memory, Adaptive Resonance theory and Self Organizing Map, Recent Applications	**12**
IV	**Artificial Neural Networks:** Fundamental Concepts – Basic Models of Artificial Neural Networks – Important Terminologies of ANNs – McCulloch-Pitts Neuron – Linear Separability – Hebb Network.	**12**

V	**Genetic Algorithm:** Introduction – Biological Background – Genetic Algorithm Vs Traditional Algorithm – Basic Terminologies in Genetic Algorithm – Simple GA – General Genetic Algorithm – Operators in Genetic Algorithm.	**12**

Self Study :

Fuzzy based application – Introduction on evolutionary computation – probabilistic method – learning theory.

Text Books:

1. S.N. Sivanandam and S.N. Deepa, "Principles of Soft Computing", 2nd Edition, Wiley India Pvt. Ltd.
2. Stuart Russell and Peter Norvig, "Artificial Intelligence - A Modern Approach", 2nd Edition, Pearson Education in Asia.
3. S. Rajasekaran, G. A. Vijayalakshmi, "Neural Networks, Fuzzy Logic and Genetic Algorithms: Synthesis & Applications", PHI.

References:

1. F. Martin, Mc neill, and Ellen Thro, "Fuzzy Logic: A Practical approach", AP Professional, 2000. Chin Teng Lin, C. S. George Lee," Neuro-Fuzzy Systems", PHI
2. Chin Teng Lin, C. S. George Lee," Neuro-Fuzzy Systems", PHI.

Pedagogy: Teaching / Learning methods

1. Lecture 2. Tutorial 3. Assignment 4. PPT presentation
5. Seminar

Course Outcomes

On the successful completion of the course, students will be able to

CO. Number	Course Outcomes	Cognitive Level
1	Describe the fundamentals of artificial intelligence concepts and searching techniques.	**K1,K2,K3**
2	Develop the fuzzy logic sets and membership function and defuzzification techniques.	**K4,K5**
3	Understand the concepts of Neural Network and analyze and apply the learning techniques	**K6**
4	Understand the artificial neural networks and its applications.	**K5**
5	Understand the concept of Genetic Algorithm and Analyze the optimization problems using GAs.	**K3**

Cognitive Level: K1 - Remember; **K2 -** Understanding; **K3 -** Apply; **K4 -** Analyze; **K5 –** Evaluate; **K6 –** Create

Mapping of Course Outcomes with Programme Specific Outcomes

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	3	3	3	2	3	2	3
CO2	3	2	3	2	2	3	2
CO3	3	3	2	2	3	3	3
CO4	2	3	2	3	2	3	2
CO5	3	3	3	3	3	2	3

3 - Strongly Correlated; 2 - Moderately Correlated;
1 - Weakly Correlated; 0 – No correlation

Semester	Course Code	Course Title	Hours of Teaching / Cycle	No. of Credits
VI	**23U6CAEL4B**	**Major Elective – IV Grid Computing**	**5**	**3**

Nature of the course

Employability Oriented	√	Relevant to Local need		Addresses Gender Sensitization	
Entrepreneurship Oriented		Relevant to regional Need		Addresses Environment and Sustainability	
Skill development Oriented	√	Relevant to national need		Addresses Human Values	
		Relevant to Global development need	√	Addresses Professional Ethics	

Course Objectives

The main objectives of this course are:

- To learn the basic construction and application of Grid computing.
- To learn grid computing organization and their Role.
- To learn Grid Computing Anatomy.
- To learn Grid Computing road map.
- To learn various type of Grid Architecture.

Unit	Content	No. of Hours
I	**Introduction**: Early Grid Activity, Current Grid Activity, Overview of Grid Business areas, Grid Applications, Grid Infrastructures.	**12**
II	**Grid Computing organization and their Roles:** Organizations Developing Grid Standards, and Best Practice Guidelines, Global Grid Forum (GCF), #Organization Developing Grid Computing Toolkits and Framework#, Organization and building and using grid based solutions to solve computing, commercial organization building and Grid Based solutions	**12**
III	**Grid Computing Anatomy:** The Grid Problem, The conceptual of virtual organizations, # Grid Architecture # and relationship to other distributed technology.	**12**
IV	**The Grid Computing Road Map**: Autonomic computing, Business on demand and infrastructure virtualization, Service-Oriented Architecture and Grid, #Semantic Grids#.	**12**
V	**Merging the Grid services Architecture with the Web Services Architecture:** Service-Oriented Architecture, Web Service Architecture, #XML messages and Enveloping#, Service message description Mechanisms, Relationship between Web Services and Grid Services, Web services Interoperability and the role of the WS-I Organization.	**12**

Self Study :

Differences between cloud computing and Grid computing – Grid computing applications in cloud computing – Grid computing types.

Text Books:

1. Joshy Joseph and Craig Fellenstein, Grid computing, Pearson / IBM Press, PTR, 2004.

References:

1. Ahmer Abbas and Graig computing, A Practical Guide to technology and applications, Charles River Media, 2003.

Pedagogy: Teaching / Learning methods

1. Lecture
2. Tutorial
3. Assignment
4. PPT presentation
5. Seminar

On the successful completion of the course students will be able to

CO. Number	Course Outcomes	Cognitive Level
1	To understand the basic elements and concepts of Grid computing.	**K1,K2,K3**
2	To understand the Grid computing toolkits and Framework.	**K4,K5**
3	To understand the concepts of Anotomy of Grid Computing.	**K6**
4	To understand the concept of service oriented architecture.	**K5**
5	To Gain knowledge on grid and web service architecture.	**K3**

Cognitive Level:K1 - Remember; **K2 -** Understanding; **K3 -** Apply; **K4 -** Analyze; **K5 –** Evaluate; **K6 –** Create

Mapping of Course Outcomes with Programme Specific Outcomes:-

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	3	3	3	2	3	2	3
CO2	3	2	3	2	2	3	2
CO3	3	3	2	2	3	3	3
CO4	2	3	2	3	2	3	2
CO5	3	3	3	3	3	2	3

3 - Strongly Correlated; 2 - Moderately Correlated;
1 - Weakly Correlated; 0 – No correlation

Semester	Course Code	Course Title	Hours of Teaching / Cycle	No. of Credits
VI	**23U6CASEC2**	**Skill Enhancement Course - DOT NET PROGRAMMING**	**2**	**2**

Nature of the course

Employability Oriented	√	To introduce various techniques for representation of the data in the real world	√	Addresses Gender Sensitization	
Entrepreneurship Oriented	√	Relevant to regional need	√	Addresses Environment and Sustainability	
Skill development Oriented	√	Relevant to national need		Addresses Human Values	
		Relevant to Global development need	√	Addresses Professional Ethics	√

Course Objectives

The main objectives of this course are to:

- To identify and understand the goals and objectives of the .NET framework and ASP.NET with C# language.
- To develop ASP.NET Web application using standard controls.
- To implement file handling operations.
- To handles SQL Server Database using ADO.NET.
- Understand the concepts of validation controls, server controls and hash table objects.

SYLLABUS

Unit	Content	No. of Hours
I	**Introduction to C#:** .NET - Features of C#, similarities and Differences between C# and VB- similarities and Differences between C# – Classes and Objects in C#– Operators, Types and Variables in C#- Selective and Iterative flow of Controls.	**-**
II	**ADO.NET and its components** : Database project in VB.NET , Structured Query Language – Navigate database with VB.NET – Database coding with Oracle and SQL server - **ASP.NET:** Introduction – Components – Web pages – Server Controls – Validation Controls – Data Binding – Array list object - Hash table object.	**-**

Self Study :

Create Dot Net application for inventory process, payroll process of a company, student mark list of a class. Etc.

Textbook:
1. Writing for the web, LYNDA FELDER

References:
1. Kevin Hoffman & Jeff Gabriel, **"*Professional .NET Framework*"** Shorff Publishers and Distributors Pvt. Ltd .

Pedagogy: Teaching / Learning methods
1. Lecture
2. Tutorial
3. Assignment
4. PPT presentation
5. Seminar and Quizzes

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	CO Statement	Cognitive Level
CO1	Explain the process of creating dynamic Web pages and the differences between c# and vb.net.	K1, K2, K3, K4
CO2	Recognize, diagram, and implement introductory programming concepts using C#	K2, K3, K4,K5
CO3	Determine locgical alternatives with C# decision structures utilizing iteration, class methods, fields, and properties.	K1,K3, K4, K6
CO4	Explain how to create dynamic Web pages by using ASP.NET.	K2,K5,K6
CO5	Create a user interface on an ASP.NET page by using standard Web server controls.	K3, K4, K5

Cognitive Level: K1 - Remember; **K2 -** Understanding; **K3 -** Apply; **K4 -** Analyze; **K5 –** Evaluate; **K6 –** Create

Mapping of Course Outcomes with Programme Outcomes:-

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	3	3	3	3	3	3	3
CO2	3	3	3	3	3	3	3
CO3	1	3	3	2	2	3	3
CO4	2	3	3	3	3	2	3
CO5	2	3	2	3	3	3	3

3 - Strongly Correlated; 2 - Moderately Correlated;
1 - Weakly Correlated; 0 – No correlation