

**Curriculum Framework and Syllabus for
Bachelor of Science (B.Sc) in Computer
Science**

**For the candidates admitted from the academic year
2019-2020**

**BASED ON CHOICE BASED CREDIT SYSTEM &
OUTCOME BASED EDUCATION-OBE**



(2019-2020)

**POST GRADUATE AND RESEARCH DEPARTMENT OF COMPUTER
SCIENCE**

**NEHRU MEMORIAL COLLEGE (AUTONOMOUS)
[Nationally Accredited with 'A' Grade by NAAC]
Affiliated to Bharathidasan University
Puthanampatti—621 007**

**(Approved by Board of Studies in Computer Science (UG) in its meeting
dated 24.09.2018 and Academic Council in its meeting 10.04.2019)**

PRELUDE

The Post Graduate and Research Department of Computer Science was established in the year 1983. The department is having a unique credit of first to introduce **B.Sc Computer Science** in the Arts and Science colleges in India. The famous writer cum Engineer **Sujatha** who visited our department for inspection predicted that the proposed course will bring the benefits of technology to the rural people. True to his wisdom the Department of Computer Science has been steadily striving for excellence in teaching and inculcating knowledge and employability skills to the students coming from rural background ever since the establishment of the department in the year 1983 and now slowly stepping into the directions of excellence in research.

VISION

To offer quality Higher Education in computer Science to the socially and economically downtrodden society

MISSION

To explore knowledge in computer science including inter disciplinary areas to the benefit of the society

To motivate the students to become successful developers capable of solving real life problems

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)	
The graduates of B.Sc Computer Science programme will be able to	
PEO1:	develop creative and innovative methodologies for enhancing career and entrepreneurial skills
PEO2:	solve real time problems and work in team to accomplish a common goal.
PEO3:	acquire hands-on practical training to meet the industrial needs.
PEO4:	apply new technologies in Computer Science to serve the needs of industry, society and the nation
PEO5:	obtain employment in the IT sector using the domain knowledge
PEO6:	pursue higher studies in the specialized domain.
PROGRAMME OUTCOME (PO)	
At the end of the program the students will be able to:	
P01:	Scientific Knowledge Apply the knowledge of computing fundamentals, principles of mathematical logic and domain knowledge to solve complex problems
P02:	Problem Analysis Design and analyses of complex problems with appropriate methods
P03:	Design and Development of Solution Finding solutions to the complex problems that meet the specific needs of the society
P04:	Conduct investigations of complex problems Ability to design and develop algorithms by providing solutions to complex problems
P05:	Modern tool usage Create, select and apply appropriate techniques, resources and IT tools to solve real life problems
P06:	Lifelong learning Explore the need for independent life long learning in the broad context of technological advancements in the field of computer science

PROGRAMME SPECIFIC OUTCOME (PSO)	
PSO-1:	Apply the computing knowledge to design and develop the real world applications in various domains
PSO-2:	Solve the complex problems in the field of computer science with an understanding of the societal, legal and cultural impacts of the solution.
PSO-3:	Ability to develop algorithms and programs and analyze for the complexity
PSO-4:	Understand the concepts and ability to design and apply appropriate models.

Eligibility & Other details:

Eligibility/Entry Requirements: 10+2 or its equivalent with science subjects as the subjects of study

Duration : 3 Years
 Level : Under Graduate
 Examination Type : Semester Pattern
 Medium of Instruction : English
 Credit System : Total Number of credits=140

BACHELOR OF SCIENCE IN COMPUTER SCIENCE							
Curriculum Framework for the candidates to be admitted for the year 2019-2020							
SEM	PART	TITLE	HRS	CRE	CIA	EE	TOT
I	I	LC - I (Tamil)	6	3	25	75	100
	II	ELC - I (English)	6	3	25	75	100
	III	CC - I Problem solving using Python	5	5	25	75	100
		CC - II Problem Solving Lab	3	2	40	60	100
		AC - I Basic Mathematics	4	4	25	75	100
		AC - II Operations Research	4	4	25	75	100
IV	VE - Value Education	2	2	25	75	100	
II	I	LC - II (Tamil)	6	3	25	75	100
	II	ELC - II (English)	6	3	25	75	100
	III	CC - III Programming in C and Data structures	6	5	25	75	100
		CC - IV Data structures using C Lab	3	2	40	60	100
		AC - III Numerical and Statistical Methods	5	4	25	75	100
	IV	SKBC - I Data Analytic Lab	2	2	25	75	100
EVS - Environmental Science		2	2	25	75	100	
III	I	LC - III (Tamil)	6	3	25	75	100
	II	ELC - III (English)	6	3	25	75	100
	III	CC - V Object oriented programming using C++	5	5	25	75	100
		CC - VI OOPS Lab	3	2	40	60	100
		AC - IV Applied Physics I	5	4	25	75	100
		AC - V Applied Physics I Lab	3	-	-	-	-
	IV	SKBC - II Image Editing Lab	2	2	25	75	100
GS - Gender Studies		0	1	25	75	100	

Skill Based Course - SKBC	
1	Data Analytic Lab
2	Image Editing Lab
Non Major Elective Course - NMEC	
1	Internet and Web Design BPO and Health Care
2	Office Automation Lab Image Editing Tools Lab

BACHELOR OF SCIENCE IN COMPUTER SCIENCE								
Curriculum Framework for the candidates to be admitted for the year 2019-2020								
SEM	PART	TITILE	HRS	CRE	CIA	EE	TOT	
IV	I	LC - IV (Tamil)	6	3	25	75	100	
	II	ELC – IV(English)	6	3	25	75	100	
			CC - VII Database Systems	5	5	25	75	100
			CC - VIII RDBMS Lab	3	2	40	60	100
			AC - V Applied Physics Lab	3	4	40	60	100
			AC - VI Applied Physics II	5	4	25	75	100
	IV	NMEC I	2	2	25	75	100	
	SSC - Soft Skills Course	0	2	25	75	100		
V	III	CC - IX Programming in JAVA	6	5	25	75	100	
		CC - X Principles of Operating System	5	5	25	75	100	
		CC - XI Computer System Architecture	6	5	25	75	100	
		CC - XII Java and System Administration Lab	6	4	40	60	100	
		EC - I	5	5	25	75	100	
	IV	NMEC II	2	2	25	75	100	
VI	III	CC - XIII Computer Networks	6	5	25	75	100	
		CC - XIV Software Engineering	6	5	25	75	100	
		CC - XV Application Development Lab	6	4	40	60	100	
		EC - II	5	5	25	75	100	
		EC - III	5	5	25	75	100	
	IV	EA - Extension Activities	0	1	-	-	-	
	III	Technical Skill Development	2	-	-	-	-	
			180	140	1105	2895	4000	
III	Comprehensive Course		4*					

*Additional Credit Course

List of Elective Courses:			
1	WAP and WML	6	Mobile Application Development
2	Principles of Interactive Computer Graphics	7	.NET programming
3	Service Oriented Architecture	8	Haskell programming
4	Web Technology	9	R Programming
5	Ruby On Rails		

LC	Language Course	ELC	English Language Course
CC	Core Course	AC	Allied Course
EC	Elective Course		
VE	Value Education	EVS	Environment Studies
SKBC	Skill Based Courses	NMEC	Non Major Elective Course
GS	Gender Studies	SSC	Soft Skill Course

Credit Distribution

S. No	Course Category	No. of Courses	Credit/course	Total Credit
1	Language courses	4	3	12
2	English language course	4	3	12
3	Core courses	9	5	45
4	Core practical	6	2*4=8,2*4=8	16
5	Allied courses	5	4	20
6	Allied practical	1	4	4
7	Elective Courses	3	5	15
8	SKBC	2	2	4
9	NMEC	2	2	4
10	Soft Skill Course	1	2	2
11	EA: Extension Activities	1	1	1
12	Technical Skill Development	1	2	-
13	EVS	1	2	2
14	Value education	1	2	2
15	Gender studies	1	1	1
Total		42		140

Average percentage of the courses having focus on skills				
Courses	Employability	Skill	Knowledge based	
CC-I Python	Y			
CC-II Python Lab	Y			
CC-III C and DS	Y			
CC-IV C and DS Lab	Y			
CC-V C++	Y			
CC-VI C++ Lab	Y			
CC-VII DBS			Y	
CC-VIII RDBMS Lab	Y			
CC-IX JAVA	Y			
CC-X OS			Y	
CC-XI MP and MC			Y	
CC-XII JAVA and System Admin Lab	Y			
CC-XIII Networks			Y	
CC-XIV SWE	Y			
CC-XV Lab based on Electives	Y			
EC-I			Y	
EC-II	Y			
EC-III	Y			
SKBC-I	Y			
SKBC-II	Y			
NMEC-I		Y		
NMEC-II		Y		
Total	15	2	5	22
%	68.18	9.0	22.73	100

Internal and External Assessment Pattern

Theory Papers	
Internal	External
<p>Distribution: Assignment - 5 Marks C.I.A Test 1 - 10 Marks C.I.A Test 2 – 10 Marks Total = 25</p>	<p>External Marks = 75 Question Paper Pattern Section - A 10*2 =20 Marks (Answer all questions) Section - B 5 * 5 =25 Marks (Either or pattern) Section - C 3 *10 = 30 Marks (Answer any 3 questions out of 5 questions)</p>
Practical Courses	
<p>Distribution: Observation – 10 Marks Test 1 - 15 Marks Test 2 - 15 Marks Total =40 Marks</p>	<p>Practical - 50 Marks Distribution Logic - 30 Marks Coding -10 Marks Result -10 Marks Record - 10 Marks Total - 60 Marks</p>

Part 1 Tamil - Proposed Course Structure under CBCS
(For the candidate admitted from the academic year 2019-2020 onwards)

Semester	Course	Course Title	Ins. Hrs/Week	Credits	Exam hrs	Int. Marks	Ext. Marks	Total
I	Language course 1 (LC 1)	செய்யுள் (இக்காலம்), சிறுகதை, பயன்முறைத் தமிழ், தமிழ் இலக்கிய வரலாறு	6	3	3	25	75	100
II	Language course 2 (LC 2)	செய்யுள் (இடைக்காலம்), உரைநடை, தமிழ்ச் செம்மொழி வரலாறு, மொழிபெயர்ப்பியல், தமிழ் இலக்கிய வரலாறு	6	3	3	25	75	100
III	Language course 3 (LC 3)	செய்யுள் (காப்பியங்கள்), கட்டுரை இலக்கியம், புதினம் , தமிழ் இலக்கிய வரலாறு	6	3	3	25	75	100
IV	Language course 4 (LC4)	செய்யுள் (பழந்தமிழ் இலக்கியம்) நாடகம், தமிழ் இலக்கிய வரலாறு, கட்டுரை வரைவியல்	6	3	3	25	75	100
Total			24	12				400

இளநிலைப் பட்டப் படிப்பு (கலையியல், அறிவியல், வணிகவியல் மற்றும் வணிக
மேலாண்மையியல்)

முதலாமாண்டு : முதற்பருவம்

பகுதி 1 தமிழ் - தாள் 1

செய்யுள் (இக்காலம்), சிறுகதை, பயன்முறைத் தமிழ்,
வரலாறு

தமிழ் இலக்கிய

பாட நோக்கம் (Course Objectives)

தன்னம்பிக்கை, பொறுப்புணர்வு, சமுதாய அக்கறை, மனித உறவுகளைப்
போற்றுதல், சுற்றுச்சூழல் விழிப்புணர்வு, உலக அமைதி, அற உணர்ச்சி,

தாய்மொழிப் பற்று முதலான இன்றைய இளம் தலைமுறையினருக்குத் தேவையான அடிப்படைப் பண்புகளைக் கற்பித்தல். இக்காலப் படைப்பிலக்கிய வகைமைகளை, படைப்பிலக்கியச் சூழல்களை, படைப்பாளர்களை அறிமுகம் செய்தல். பிழையின்றித் தமிழ் எழுதத் தேவையான அடிப்படைகளைக் கற்கச் செய்தல்.

பணித்தேர்வுகளுக்கு உதவக்கூடிய தமிழ்ப் பாடப்பகுதிகளைக் கற்பித்தல்.

அலகு - 1

1. பாரதியார் பாடல்கள் - புதுமைப்பெண் பா.எண்கள் 3,4,5,7,8
2. பாரதிதாசன் பாடல்கள் - எந்நாளோ
3. பெருஞ்சித்திரனார் - தமிழ் நெஞ்சம்
4. தமிழ் ஒளி - மழைக் காலம்
5. முருகுசுந்தரம் - சமுதாய தர்மம்
6. பொன்னடியான் - உள்ளம் உயர....
7. முடியரசன் - மொழியுணர்ச்சி
8. முத்துலிங்கம் - எது தேசியம்
9. தமிழேந்தி - தொண்டின் பழம்
10. தாரா பாரதி - வெறுங்கை என்பது
11. இன்குலாப் - கவலையும் கண்ணீரும் நம்முடன் இருக்கட்டும்
12. நா.காமராசன் -
13. ஈரோடு
14. காகிதப்பூக்கள்
15. தமிழன்பன் - இப்போது நினைந்து
15. தேவதேவன் - நுனிக்கொம்பர் நாரைகள்
15. காசி ஆனந்தன் - தமிழ் மண் வளம்

அலகு - 2

1. அப்துல் ரகுமான் - ஆறாத அறிவு
2. தணிகைச்செல்வன் - சுகம் எங்கே
3. மீரா - உழவன்
4. மு.மேத்தா - கண்ணீரின் கதை
5. சிற்பி - தம்பி உனக்காக
6. வைரமுத்து - கூடு
7. அறிவுமதி - வலி
8. பழநிபாரதி - கண்ணில் தெரியுது வானம், இரத்தத்தின் நிறம் பச்சை
9. பிச்சினிக்காடு இளங்கோ - பகல் நீ, தஸ்லிமா நஸ்ரின்
10. இளம்பிறை - மகளிர் நாள் வாழ்த்துகள், ஆசைகள்
11. சக்தி ஜோதி - நிலவென்று சொல்லாதே, பெண்
12. பாவலர் வையவன் - முறிந்த சிறகு, பாதை மறந்த போதை
13. தாமரை - என்னையும் அழைத்துப் போ, ஒரு கதவும் கொஞ்சம் கள்ளிப்பாலும்
14. ந.வீ.விசயபாரதி - தன்னம்பிக்கைத் தாமரைகள், புன்னகை மந்திரம், அன்புள்ள அம்மா
15. அ.வெண்ணிலா - ஆதியில் சொற்கள் இருந்தன

அலகு : 3

சிறுகதை - சிறுகதை மலர்

அலகு : 4

பயன்முறைத் தமிழ்

பிழைகளும், திருத்தங்களும் - வலிமிகுதல், வலி மிகாமை,

மயங்கொலி எழுத்துகளின் வேறுபாடுகள் - தமிழில் பிறமொழிச் சொற்கள்

அலகு : 5

தமிழ் இலக்கிய வரலாறு – இக்காலம்

கற்றல் விளைவுகள் (Course Outcome)

மாணவர்கள் வாழ்வியல் கூறுகளை அறிந்துகொள்வதோடு,

நற்பண்புகளை வளர்த்துக்கொள்வர்.

இன்றைய இலக்கியப் படைப்புச் சூழலை அறிந்து கொள்வதால்

படைப்பிலக்கியவாதிகளாகும் ஆற்றல் பெறுவர்.

சமுதாய, அரசியல், சூழலியல் விழிப்புணர்வு பெறுவர்.

தாய்மொழியில் திறன் பெறுவர்.

பணித்தேர்வுகளுக்கு உரிய தமிழ்த்திறன் பெறுவர்.

பாட நூல்கள்

1. செய்யுள் திரட்டு, தமிழ்த்துறை வெளியீடு.
2. சிறுகதை மலர் - பிரமி பதிப்பகம், திருச்சி-21.
3. பயன்பாட்டுத் தமிழ் (இலக்கணக் கையேடு), தமிழ் நாதன் பதிப்பகம், சென்னை - 110.
4. தமிழ் இலக்கிய வரலாறு,
முனைவர் கோ.பாக்கியவதி, முனைவர் க.சுந்தரபாண்டியன்,
பிரமி பதிப்பகம், திருச்சி-21.

B.A/B.SC/B.COM/ BCA/BBA PART II ENGLISH COURSE PATTERN (FROM 2019-2020)

Sem.	Course	Course Title	Hrs / Week	Credits	MAX.MARKS		
					Int.	Ext.	Total
I	Core Course I	English For Communication I	6	3	25	75	100
	Core Course II	English For Communication II	6	3	25	75	100
	Core Course III	English For Communication III	6	3	25	75	100
	Core Course IV	English For Communication IV	6	3	25	75	100
		TOTAL		24	12	200	300

Programme Educational objectives (PEO)

Programme Educational Objectives are broad statements that describe the career and professional accomplishments that the program is preparing the graduates to achieve. PEO's are measured 4-5 years after graduation. The PEO is measured through employer satisfaction survey (yearly), alumni survey and placement records.

PEO 1: Learners will participate in critical conversations and prepare, organize, and deliver their work to the public

PEO 2: They will appreciate the literary works.

PEO 3: The Graduates will attain phonological and morphological aspects of English.

PEO 4: Learners can express a thorough command of English and its linguistic structures.

Program Outcome (PO)

The POs are narrower statements that describe what the students are expected to know and be able to do by the time of graduation. POs are based on relevance.

PO 1 Become knowledgeable in the subject of English for Communication and apply the principles of the same to the needs of the Employer/Institution/Enterprise/Society.

PO 2: Gain Analytical skills in the field/area of English for Communication.

PO 3: Understand and appreciate professional ethics, community living and Nation Building initiatives.

PO 4: Develop language learning skills like Listening, Speaking, Reading and Writing.

PO 5: Making the Learners to realize their own Identity.

PROGRAMME SPECIFIC OUTCOME (PSO)

PSOs are Statement that describe what the graduates of a specific educational Programme should be able to

PSO1: Design solution to overcome Communication Problems.

PSO 2: Apply Ethical Principles and Commit to Professional Ethics and Responsibilities.

PSO 3: Recognize the need of Extensive Reading Skills.

PSO 4: function as a team and an individual member amicably with other co-workers.

PSO 5: Use English effectively in formal and informal situations.

PSO 6: Develop vocabulary and communicative skills.

Course Code & Title	ENGLISH FOR COMMUNICATION - I		
Class	<u>I YEAR</u>	Semester	<u>I</u>
Cognitive Level	K – 1 Acquire K – 2 Understand K – 3 Apply K – 4 Evaluate K – 5 Analyze		
Course Objectives	The Course aims <ul style="list-style-type: none"> • To expose students to effective communication in the form of prose • To make the learners aware of social issues • To help them to know great personalities • To make them aware of dangers from human carelessness • To help them realize the need for honesty 		
UNIT	Content	No. of Hours	
I	1.Spoken English and Broken English: G.B.Shaw 2. Give us a Role Model : Dr. A.P. J. Abdul Kalam		
II	Water-The Elixir of Life : Sir C. V. Raman No Guarantee Please No Longer : A Newspaper Article		
III	I have a Dream : Martin Luther King Jr. The Gettysburg Address : Abraham Lincoln		
IV	Mosquitoes : Article Polluting the World :Article		
V	A Little Incident : Lu Hsun Jimmy Valentine : O. Henry		
	GRAMMAR: 1. Articles 2. Preposition 3. Adjective		

	4. Adverb	
Reference	Lessons will be edited and compiled.	
Course Outcomes	On completion of the course, students should be able to CO 1: communicate effectively CO 2: aware of social issues CO 3: know great personalities. CO 4: aware of dangers from human carelessness. CO 5: know the need for honesty	

Mapping of COs with PSOs & POs:

CO/PO	PO					PSO					
	1	2	3	4	5	1	2	3	4	5	6
CO1	S	M	S	M	M	M	S	S	M	M	S
CO2	S	M	M	M	M	S	M	S	M	M	M
CO3	S	M	S	M	M	M	S	S	M	M	S
CO4	S	M	M	M	M	S	M	S	M	M	M
CO5	S	M	S	M	M	M	S	S	M	M	S

- Strongly Correlating(S) - 3 marks
 Moderately Correlating (M) - 2 marks
 Weakly Correlating (W) - 1 mark
 No Correlation (N) - 0 mark

Programme : B.Sc Computer Science		SEM	I
Course Code	Title	Hours	Credit
	CC-I PROBLEM SOLVING USING PYTHON	5	5
Cognitive Level	K - 1 : understand K - 2 : apply K - 3 : analyze K - 4 : create		
Learning Objectives	The course aims to <ul style="list-style-type: none"> provide a platform to learn the fundamentals of problem solving techniques understand the syntax of the language and apply the concepts to write simple programs importance of the data structures and storage concepts 		

	<ul style="list-style-type: none"> • study the concepts of OOP • apply the concept to develop visual presentations 	
UNIT	Content	Hours
I	Using python: Installing python- The python Interpreter – Interactive mode –Writing and running programs in script mode- IDLE programming environment – Input, processing and output – Displaying output with print function -Strings and String literals- Comments – variables –Reading input from the Keyboard - Operators- more about output – Decision structures and Boolean logic – Repetition Structures	15
II	Lists and Tuples: Sequences – Introduction to Lists – List slicing – ‘in’ operator – list methods and built-in-functions – copying lists – processing lists – Two Dimensional Lists – Tuples. Strings: Basic String Operations – String Slicing – Testing, Searching and manipulating strings - Dictionaries and Set: Dictionaries – Set – Serializing Objects – Functions: introduction to functions – Defining and calling functions – designing a program to use functions – Local variables – passing arguments to functions – Global variable and Global Constants- –Value returning functions: generation – user defined value returning functions – Modules: math module- Storing functions in modules	15
III	File Handling: Introduction to File Input and Output – Using Loops to process files – processing records - Exceptions – Python Standard Library - Regular Expression	15
IV	Object Oriented Programming: Procedural and Object Oriented Programming –Classes – Working with instances – techniques for designing classes. – Inheritance: introduction to inheritance – Polymorphism	15
V	GUI programming: Graphical User Interfaces – Using the TKinter module – Display Text with label Widgets – Organizing widgets with frames – Button widgets and Info Dialog Boxes – Getting input with Entry widget – using Labels with Output Fields –Radio Buttons and Check Buttons – Event Driven Programming.	15
Reference	<p>Text Books:</p> <ol style="list-style-type: none"> 1. Tony Gaddis, “<i>Starting out with python</i>”, 2nd edition, Addison Wesley, Pearson <p>Reference Books:</p> <ol style="list-style-type: none"> 2. Michael Dawson, “Python programming for the absolute beginner”, Premier press, 2003. 3. “Core python Programming “by Wesley Chun Pearson Education- 2006, Second Edition, ISBN:0137061595. 4. Al Sweigart, “Invent your own computer games with python”, 2nd edition, 2008 <p>Web References:</p> <ol style="list-style-type: none"> 1. https://docs.python.org/3/tutorial 2. https://www.python-course.eu/python_tkinter.php 3. https://pythonprogramming.net/python-3-tkinter-basics- 	

	tutorial/ 4. https://www.datacamp.com/community/tutorials/python-oop-tutorial	
Course Outcomes	On completion of the course, students should be able to	
	CO1: write programs to solve simple problems	K1
	CO2: interpret and manipulate the data structures	K2
	CO3: store and manipulate data using file system and handling errors	K3
	CO4: solve problems using OOPs concept	K2
	CO5: design GUI forms using Tkinter	K4

Mapping of Cos with PSOs & POs:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	M	M	S	W	S	S	M	S	S
CO2	S	S	S	M	M	S	S	S	S	S
CO3	S	S	S	S	M	S	S	S	S	S
CO4	S	S	S	S	M	S	S	M	S	M
CO5	S	S	S	S	S	S	S	M	M	S

Strongly Correlating(S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark
No Correlation (N) - 0 mark

Prepared by	Dr.M.Muralidharan
Verified by	Mrs.K.P.Lakshmi

Programme : B.Sc Computer Science		SEM	I
Course Code	Title	Hours	Credit
	CC-II PROBLEM SOLVING LAB	3	2
Cognitive Level	K - 1 : understand K - 2 : apply K - 3 : analyze K - 4 : create		
Learning Objectives	Course Objectives: The course aims to <ul style="list-style-type: none"> • familiar with Operators and control Structures • generate programs using sequences, functions and modules • execute programs using OOPs concepts and Tkinter Module 		
	Content		
	Solve Problems using the concepts Operators Decision making statements Loops Data Structures Functions Modules Classes and Objects Inheritance Overloading Regular expressions Tkinter Module		
Course Outcomes:	Upon successful completion of the course the students will be able to		
	CO1: develop and execute programs using Operators and control Structures	K1	
	CO2: solve programs using sequences, functions and modules	K2	
	CO3: design and execute programs using OOPs concepts and Tkinter Module	K3	

Mapping of Cos with PSOs & POs:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	M	M	S	S	S	S	M	W	M
CO2	S	S	S	S	S	M	S	S	S	M
CO3	S	S	S	S	S	M	S	S	S	M

Strongly Correlating(S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark
No Correlation (N) - 0 mark

Prepared by	Dr.M.Muralidharan
Verified by	Mrs.K.P.Lakshmi

Programme : B.Sc Computer Science		SEM	I
Course Code	Title	Hours	Credit
	AC-I BASIC MATHEMATICS	4	4
Cognitive Level	K - 1 : Acquire K - 2 : Understand K - 3 : Apply K - 4 : Evaluate K - 5 : Analyze		
Learning Objectives	The Course aims to <ul style="list-style-type: none"> introduce the concepts of matrices, successive differentiation, Laplace transforms and Fourier series. 		
UNIT	Content	Hours	
I	Types of Matrices – Characteristic Equation – Eigen Values – Eigen Vectors – Cayley Hamilton’s Theorem (without proof	13	
II	Successive differentiation-Leibnitz’s theorem and its applications-Integration by parts – Definite integrals and its properties	13	
III	To solve the second order differential equations when the RHS is of the type $e^{kx}, \sin kx, \cos kx, x^k, e^{ax}$.	13	
IV	Definition of Laplace transform - Laplace transforms of $e^{at}, \cos at, \cos h at, t^n$, first shifting theorem – Laplace transforms of $f'(t), f''(t)$ Inverse Transforms relating to the above standard forms –Applications to the solutions of ODE with constant coefficients involving the above transformations.	13	
V	Definition of Fourier series- Finding Fourier constants for periodic function with period 2π - odd and even functions-Half-Range series.	13	
Reference	Text Books: <ol style="list-style-type: none"> S. Narayanan ,T.K. Manicavachagom Pillai, Ancillary Mathematics,Vol-I, S.V.Publications-2012 (Unit I,II) S. Narayanan ,T.K. Manicavachagom Pillai, Ancillary Mathematics,Vol-II, S.V.Publications-2012 (Unit II,IV,V) S.Narayanan ,T.K. Manicavachagom,Pillai, Calculus, Volume III, S.V.Publications 2010(Unit-III) Reference Books: <ol style="list-style-type: none"> M.K.Venkataraman, Engineering mathematics,NPC,1998 P.R.Vittal, Allied mathematics, Margham publishers,1997. 		
Course Outcomes	On completion of the course, students should be able to		
	CO 1: recollect the basic concepts of matrices and differentiation.	K1,K2	
	CO 2: understand the concepts about fundamental of ODE and characteristic equation of a linear transformation and CayleyHamilton theorem.	K5	
	CO 3: solving the differential equations when the RHS is of the type $e^{kx}, \sin kx, \cos kx, x^k, e^{ax}$.	K4	
	CO 4: demonstrate the Laplace transform and the apply the differential equation and Fourier series, finding Fourier constants	K3	

	for periodic function with period 2π and half range Fourier series with period π .	
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Mapping of Cos with PSOs & Pos:

CO/PO	PO						PSO					
	1	2	3	4	5	6	1	2	3	4	5	6
CO1	S	M	W	W	S	S	M	M	W	M	S	W
CO2	S	M	M	W	M	S	M	W	W	S	S	M
CO3	M	S	M	S	M	W	W	S	S	M	W	S
CO4	M	S	M	W	W	S	S	S	M	S	S	S

- Strongly Correlating(S) - 3 marks
 Moderately Correlating (M) - 2 marks
 Weakly Correlating (W) - 1 mark
 No Correlation (N) - 0 mark

Prepared by	Department of Mathematics
Verified by	Department of Mathematics

Programme : B.Sc Computer Science		SEM	I
Course Code	Title	Hours	Credit
	AC-II OPERATIONS RESEARCH	4	4
Cognitive Level	K - 1 : Acquire K - 2 : Understand K - 3 : Apply K - 4 : Evaluate K - 5 : Analyze		
Learning Objectives	The Course aims to <ul style="list-style-type: none"> understand the basic marketing concepts and its applications in markets. To enhance the student knowledge in linear programming problem, Transportation problem, Assignment problem, Sequencing and Network scheduling 		
UNIT	Content	Hours	
I	Linear Programming Problem (LPP): Introduction – Canonical and Standard forms of LPP -Mathematical formulation of LPP – Solution for LPP: Graphical Method - Simplex Method Charne’s Penalty (Big-M) Method – Two Phase Simplex Method	11	
II	Transportation problem (TP): Introduction – Solution of a TP: Finding an Initial Basic Feasible Solution (IBFS) – Test for Optimality – Degeneracy in TP – Unbalanced TP- Assignment Problem (AP): Introduction – Hungarian Method for finding the solution of AP- Unbalanced AP	11	
III	Network: Introduction-Basic Components-Rules of Network Construction –Critical Path Analysis- Measure of activity – PERT computations –CPM computation-Difference between PERT and CPM	10	
IV	Sequencing Problem (SP): Introduction- Basic Terms Used in Sequencing- Processing of n jobs through two machines – Processing of n jobs through three machines – Processing of two jobs through m machines	10	
V	Inventory Control: Introduction – Cost associated with inventories – factors affecting inventory control – EOQ: the concept of EOQ – Deterministic inventory problem with no shortages and with shortages.	10	
Reference	Text Books: <ol style="list-style-type: none"> A .Taha ,Operations Research,Keerthi Publishing House, 1997 (Unit – I) KantiSwarup, P.K.Gupta, Man Mohan, Operations Research, Sultan Chand &Company Ltd, 11th Edition, 2003(Unit – II,III,IV and V) Reference Books: <ol style="list-style-type: none"> Prem Kumar Gupta and D.S.Hira, Problems in Operations Research, S.Chand, 2010 		

Course Outcomes	On completion of the course, students should be able to	
	CO 1: understand linear programs from standard business problems.	K1
	CO 2: construct a project network and apply program evaluation review technique and critical path management.	K3
	CO 3: apply the fundamental concept of sequencing problem.	K2,K4
	CO 4: solve the problems using PERT and CPM methods.	K5

Mapping of Cos with PSOs & Pos:

CO/PO	PO						PSO					
	1	2	3	4	5	6	1	2	3	4	5	6
CO1	M	W	M	S	M	S	M	M	W	M	S	W
CO2	S	M	M	W	M	S	M	W	M	S	S	M
CO3	M	S	M	S	M	M	W	M	W	M	S	M
CO4	M	M	W	M	S	M	M	W	M	S	M	S

- Strongly Correlating(S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark
No Correlation (N) - 0 mark

இளநிலைப் பட்டப் படிப்பு (கலையியல், அறிவியல், வணிகவியல் மற்றும் வணிக
மேலாண்மையியல்)

Semester	Course	Course Title	Ins. Hrs/Week	Credits	Exam hrs	Int. Marks	Ext. Marks	Total
I	Value Education (VE)	வாழ்வியல் கல்வியும் மனித உரிமைகளும் (Value Education and Human Rights)	2	1	3	-	100	100

முதலாமாண்டு : முதற்பருவம்

வாழ்வியல் கல்வியும் மனித உரிமைகளும்

(Value

Education and Human Rights)

பாட நோக்கம் (Course Objectives)

தனித்திறன் மேம்பாடு, தன்னம்பிக்கை, நாட்டுப்பற்று, சமுதாயப் பொறுப்புணர்வு, மனித உறவுகளைப் போற்றும் பண்பு, அறச்சிந்தனை முதலான இன்றைய இளம் தலைமுறையினருக்குத் தேவையான அடிப்படை வாழ்வியல் பண்புகளைக் கற்பித்தல்.

கவலை, சினம், பொறாமை, சோம்பல் முதலான தீமை தரும் பண்புகளை விலக்கச் செய்தல். உடல்நலத்தில் அக்கறை கொள்ளச் செய்தல்.

மனித உரிமைகளை அறியச் செய்தல்.

அலகு :1

வாழ்வியல் கல்வி : திறன் மேம்பாடும் உயர் பண்புகளும்

கல்வி, வாழ்வியல் கல்வியின் நோக்கம் - வாழ்வியல் கல்வியின் பரிணாம வளர்ச்சி - வாழ்வியல் கல்வியின் கூறுகள் - சுய முன்னேற்றம் - திறன் மேம்பாடு - உயர்பண்புகள் - தன்மதிப்பீடும் சுயபரிசோதனையும் - பாலினச் சமத்துவத்தை உளமாரப் பின்பற்றுதல் - மாற்றுத் திறனாளிகள், மனவளம் குன்றியோர், வயதில் பெரியவர்கள், அனுபவசாலிகள், சான்றோர்கள், குடும்ப உறுப்பினர்கள், அருகில் வசிப்பவர்கள், சுற்றத்தார், உடன் பணியாற்றுவோர் இவர்களுக்கு மதிப்பளித்தல் -

நற்பண்புகளும் நடத்தை உருவாக்கமும் - உண்மை - ஆக்கத்திறன் -
தியாகம் - நேர்மை - கட்டுப்பாடு - உதவி செய்யும் மனப்பான்மை -
சகிப்புத்தன்மை - அறிவியல் கண்ணோட்டம்

அலகு : 2

தேசிய, உலக முன்னேற்றத்திற்கான வாழ்வியல் கல்வி

தேசம், சர்வ தேசங்கள் குறித்த எண்ணங்கள் - நமது நாடு - அரசமைப்பு -
மக்களாட்சித் தத்துவம் - சமதர்மம் - மதச்சார்பின்மை - சமத்துவம் -
சமூக நீதி, தனியுரிமை - சுதந்திரமும் சகோதரத்துவமும் சமூகப் பண்புகள் -
இரக்கம் மற்றும் நேர்மை, சுயகட்டுப்பாடு, உலகளாவிய சகோதரத்துவம் -
தொழில் சார் பண்புகள் - அறிவு வேட்கை - தொழிலில் நேர்மை -
முறைமை - காலந்தவறாமையும் நம்பிக்கையும் - மதம் சார்ந்த பண்புகள் -
சகிப்புத்தன்மை, மெய்யறிவு, நன்னடத்தை - அழகியல் பண்புகள் -
இலக்கியம், நுண்கலைகள் ஆகியவற்றைப் பயில்தல், சுவைத்தல்,
மனதாரப் பாராட்டுதல் மதித்தல், பாதுகாத்தல், தேசிய ஒருமைப்பாடும்
சர்வதேசப் புரிதலும்.

அலகு : 3

அறப்பண்புகள் மற்றும் வாழ்வியலில் உலகளாவிய பெருவளர்ச்சிகள்
ஏற்படுத்தும் தாக்கங்கள்

அறிவியல் வளர்ச்சியின் தாக்கங்கள் - பண்பண்பாட்டு
முரண்பாடுகளின் தாக்கங்கள் - பொருளியல் சிந்தனைகள் - மக்கள்
தொடர்புச் சாதனங்கள் - இளமை உணர்ச்சி வேக நடத்தையின் நவீன
அறைகூவல்கள் - இல்லறமும் நல்லுணர்வும் - ஒப்பீடும் போட்டி இடுதலும்
- நேர்மறை, எதிர்மறை எண்ணங்கள் - அகந்தை - சினம் - சுயநலம் -
அறைகூவல்கள்

அலகு : 4

உடல், உள்ள நலமும்

நோய் தீர்க்கும் செயல்பாடுகளும் உணவுப் பழக்கமும் உணவு முறைகளும் - பொருந்தும் உணவுகள் - பொருந்தா உணவுகள் - மனக் கட்டுப்பாடு - மனத்திண்மை - எளிய உடற்பயிற்சி - தியானம் - மனம், ஆன்மா சார்ந்த விளைவுகள் - யோகா - நோக்கங்கள் - வகைகள் - முறைகள் - ஆசனங்கள் - ஆசைகளை ஒழுங்குபடுத்துதல் - கவலை நீக்குதல் - சினம் தணிதல் - நெடுநீர், மறதி, சோம்பல் தவிர்த்தல் - தூக்கம் முறைப்படுத்துதல் - துக்கம், இழப்புகளை எதிர்கொள்ளல் - புகை, மது முதலானவைகளின் தீங்கு உணர்தல்- வாழ்த்துகளின் பயன்கள்

குறிப்பு : இந்த அலகு உடற்பயிற்சி : தியானம் - யோகா செய்முறைப் பயற்சிகளுடன் கூடியது.

அலகு : 5

மனித உரிமை, மனித உரிமைக் கருத்துகள்

தேசிய மற்றும் பன்னாட்டுக் கண்ணோட்டங்கள் - மனித உரிமையின் பரிணாமம் - மனித உரிமையின் பரந்த வகைப்பாடுகள் வாழ்தற்கான உரிமை, சுதந்திரம், கண்ணியத்துடன் வாழ்வதற்கான உரிமைகள் - கலாச்சாரம் மற்றும் கல்விக்கான உரிமைகள் - பொருளாதார உரிமைகள் - அரசியல் உரிமைகள் - சமூக உரிமைகள் - பெண்கள் மற்றும் குழந்தைகளின் மனித உரிமை - சமூகப் பழக்கங்களும் அரசியலமைப்புப் பாதுகாப்புகளும்.

கற்றல் விளைவுகள் (Course Outcome)

மாணவர்கள் வாழ்வியல் கூறுகளை அறிந்துகொள்வதோடு நற்பண்புகளை வளர்த்துக்கொள்வர். தீமை தரும் பண்புகளை அறிந்து அவற்றிலிருந்து தம்மைக் காத்துக்கொள்வர்.

உடல்நலத்தில் அக்கறை கொள்வர்.

மனித உரிமைகளை அறிந்து கொள்வர்.

பாடநூல்

வாழ்வியல் கல்வியும் மனித உரிமைகளும்,
தமிழ்த்துறை வெளியீடு,
நேரு நினைவுக் கல்லூரி, புத்தனாம்பட்டி.

முதலாமாண்டு : இரண்டாம் பருவம்

பகுதி 1 தமிழ் - தாள் 2

**செய்யுள் (இடைக்காலம்), உரைநடை, தமிழ்ச் செம்மொழி வரலாறு,
மொழிபெயர்ப்பியல், தமிழ் இலக்கிய வரலாறு**

பாட நோக்கம் (Course Objectives)

பக்தி இலக்கியம், சிற்றிலக்கியங்களை அறிமுகம் செய்தல்.

இக்காலத் தமிழ் உரைநடையை அறிமுகம் செய்தல்.

தமிழ்ச் செம்மொழி வரலாற்றைக் கற்கச் செய்தல்.

ஆங்கிலச் சொற்களுக்கு இணையான தமிழ்ச்சொற்களைப் பயன்பாட்டு முறையில் அறியச்செய்தல்.

பணித்தேர்வுகளுக்கு உதவக்கூடிய தமிழ்ப் பாடப்பகுதிகளைக் கற்பித்தல்.

அலகு - 1 இடைக்கால இலக்கியங்கள்

1.தேவாரம் - திருநாவுக்கரசர் தேவாரம்

திருவையாற்றுப் பதிகம் - 3 பாடல்கள்

1. ஏருமதிக் கண்ணி யானை (பா.எண் -5)
2. விரும்பு மதிக் கண்ணி யானை (பா.எண் -8)
3. திங்கள் மதிக் கண்ணி யானை (பா.எண் -10)

தனித்திருத் தாண்டகம் - 4 பாடல்கள்

1. முடிகொண்டார் முளையிளவெண் (பா.எண் -3)
2. பொக்கணமும் புலித்தோலும் (பா.எண் -4)
3. அணிதில்லை அம்பலமா (பா.எண் -7)
4. கடையொன்றிற் கங்கையையுந் (பா.எண் -10)

2.திருவாசகம் - திருப்பூ வல்லி - 3 பாடல்கள்

1. எந்தை யெந்தாய் சுற்றம் (பா.எண் -276)
2. தேனாடு கொன்றை (பா.எண் -279)
3. வானவன் மாலயன் (பா.எண் 286)

திருச்சதகம் - 4 பாடல்கள்

1. மெய்தான் அரும்பி (பா.எண் -5)
2. நாடகத்தா லுன்னடியார் (பா.எண் -15)

3. ஆமாறுன் திருவடிக்கே (பா.எண் -18)

4. வானாது மண்ணாது (பா.எண் -19)

3.திருமந்திரம் - 10 பாடல்கள்

1. நான் பெற்ற இன்பம் பெறுக (பா.எண் -85)

2. அன்பும் சிவமும் இரண்டென்ப (பா.எண் -270)

3. என்பே விறகா இறைச்சி (பா.எண் -272)

4. நிற்கின்ற போதே (பா.எண் -292)

5. கல்லாத மூடரைக் காணவும் (பா.எண் -317)

6. உள்ளத்தின் உள்ளே (பா.எண் -509)

7. உள்ளம் பெருங்கோயில் (பா.எண் -823)

8. உடம்பினை யானிருந்து (பா.எண் -725)

9. ஒன்றே குலம் ஒருவனே தேவனும் (பா.எண் -2103)

10. அறிவுக்கு அழிவில்லை (பா.எண் 2358)

4.நாலாயிரத் திவ்ய பிரபந்தம் - 10 பாடல்கள்

குலசேகர ஆழ்வார் - பெருமாள் திருமொழி - நான்காம் திருமொழி

திருவேங்கடத்தில் இருத்தலும் போதியது எனல்

1. ஊனேறு செல்வத்து பா.எண் 677

2. ஆனாத செல்வத்து பா.எண் 678

3. ஒன்பவள வேலை பா.எண் 680

4. மின்னனைய நுண்ணியர் பா. எண் 682

5. வான்ஆளும் மாமதிபோல் பா.எண் 683

வித்துவக்கோட்டு அம்மாளை வேண்டி நின்றல்

1. தருதுயரம் தடாயேல் பா.எண் 688
2. கண்டார் பா.எண் 689
3. மீன் நோக்கும் பா.எண் 690
4. வாளால் அறுத்து பா.எண் 691
5. வெங்களத்தின் பா.எண் 692

5.இயேசு காவியம் - மலைப்பொழிவு

6.தீன் குறள் - இரு அதிகாரங்கள் - நல்லிணக்கம், வரன் தட்சணை

7. கலிங்கத்துப் பரணி - களம் பாடியது - 10 பாடல்கள்

1. தேவாசுரம், இராமாயணம் (பா.எண் -473)
2. உடலின் மேல் பல காயம் (பா.எண் -476)
3. நெடுங்குதிரை மிசைக் கலணை (பா.எண் -477)
4. விருந்தினமும் வறியவரும் (பா.எண் -478)
5. மா மழைபோல் பொழிகின்ற (பா.எண் -480)
6. தன் கணவருடன் தாமும் (பா.எண் -482)
7. வாய் மடித்துக் கிடந்ததலை (பா.எண் -483)
8. பொரு தடக்கை வாள் எங்கே (பா.எண் -485)
9. ஆடல் துரங்கம் பிடித்து (பா.எண் -486)
10. சாதுரங்கத் தலைவனைப் போர்க் களத்தில் . . . (பா.எண்-502)

8. குற்றாலக் குறவஞ்சி - குறத்தி கூறும் நாட்டு வளம் - 5 பாடல்கள்

1. சூழ மேதி இலங்குந் துறையில் (பா.எண் -3)
2. தக்க பூமிக்கு முன்புள்ள நாடு (பா.எண் -5)
3. அஞ்சநூறு மகம்கொண்ட நாடு (பா.எண் -6)
4. மாதம் மூன்றும் மழையுள்ள நாடு (பா.எண் -7)

5. நீங்கக் காண்பது சேர்ந்தவர் பாவம் (பா.எண் -8)

9. தமிழ் விடுதாது - 110 -120 கண்ணிகள்

அலகு : 2

உரைநடை - காற்றின் கையெழுத்து - பழநிபாரதி

அலகு - 3

தமிழ்ச் செம்மொழி வரலாறு

செம்மொழி விளக்கம் - செம்மொழி வரலாறு - உலகச்
செம்மொழிகள் - இந்தியச் செம்மொழிகள் - செம்மொழிக்கான தகுதிகள்
அல்லது செம்மொழிப் பண்புகள் - தமிழ்ச் செம்மொழி நூல்கள்.

அலகு - 4

மொழிபெயர்ப்பியல் - ஒரு மடல்(கடிதம்) , ஒரு பத்தி
ஆங்கிலத்திலிருந்து தமிழில் மொழிபெயர்த்தல்.

அலகு - 5

தமிழ் இலக்கிய வரலாறு - இடைக்காலம்

கற்றல் விளைவுகள் (Course Outcome)

மாணவர்கள் ஆன்மீகச் சிந்தனையுடன் கூடிய நற்பண்புகளை
வளர்த்துக்கொள்வர்.

இடைக்கால இலக்கியப் படைப்புச் சூழலை அறிந்து கொள்வதால்
இலக்கிய வரலாற்று அறிவு பெறுவர்.

சமுதாய, அரசியல், சூழலியல் விழிப்புணர்வு பெறுவர்.
தாய்மொழியில் திறன் பெறுவர்.

பணித்தேர்வுகளுக்கு உரிய தமிழ்த்திறன் பெறுவர்.

பாட நூல்கள்

1. செய்யுள் திரட்டு, தமிழ்த்துறை வெளியீடு.
2. தமிழ்ச் சொம்மொழி வரலாறு, முனைவர் மு.சாதிக்காட்சா, இராஜா பப்ளிகேசன், திருச்சி-23.
3. மொழிபெயர்ப்புகள் (கடிதங்களும் பத்திகளும்) மகிழினி பதிப்பகம், சென்னை- 106.
4. தமிழ் இலக்கிய வரலாறு -பிரமி பதிப்பகம், திருச்சி-21.
5. காற்றின் கையெழுத்து, பழநிபாரதி, தமிழ்நாதன் பதிப்பகம், சென்னை.

Course Code & Title	ENGLISH FOR COMMUNICATION – II		
Class	<u>I YEAR</u>	Semester	<u>II</u>
Cognitive Level	K – 1 Acquire K – 2 Understand K – 3 Apply K – 4 Evaluate K – 5 Analyze		
Course Objectives	The Course aims To expose students to the wisdom of great men To familiarize students with the danger of modern food and entertainment To make them realize to treat all equally To make them know to use science carefully To make them understand the need to help others		
UNIT	Content		No. of Hours
I	It is Personality that matters : Swami Vivekananda Pele		
II	Fun Food Keep Television at Arm's length		

III	Women not the weaker sex : M.K. Gandhi A Tree Speaks : C. Rajagopalachary	
IV	The Despair of the Ganges : A. Damodharan The Fukushima- Nuclear Disaster :	
V	The Verger : William Somerset Maugham The Selfish Giant : Oscar Wilde	
Reference	Lessons will be edited and compiled.	
Course Outcomes	On completion of the course, students should be able to CO 1: Know the wisdom of great men. CO 2: know the dangers in modern life. CO 3: accept to treat all equally CO 4:realize the need to use science carefully. CO 5: understand the need to help others.	

Mapping of COs with PSOs & POs:

CO/PO	PO					PSO					
	1	2	3	4	5	1	2	3	4	5	6
CO1	S	M	M	M	M	S	M	S	M	M	M
CO2	S	M	S	M	M	M	S	S	M	M	S
CO3	S	M	M	M	M	S	M	S	M	M	M
CO4	S	M	S	M	M	M	S	S	M	M	S
CO5	S	M	M	M	M	S	M	S	M	M	M

Strongly Correlating(S) - 3 marks

Moderately Correlating (M) - 2 marks

Weakly Correlating (W) - 1 mark

No Correlation (N) - 0 mark

Programme : B.Sc Computer Science		SEM	II
Course Code	Title	Hours	Credit
	CC- III PROGRAMMING IN C AND DATA STRUCTURES	6	5

Cognitive Level	K - 1 : Acquire K - 2 : Understand K - 3 : Apply K - 4 : Evaluate K - 5 : Analyze	
Learning Objectives	The Course aims to <ul style="list-style-type: none"> • familiarize the basic concepts of Programming • present the syntax and semantics of 'C' Language • introduce problem solving techniques using arrays, functions, structures and pointers • provide foundations on the data structures namely stacks, queues, linked list and trees • provide knowledge on implementing the fundamental data structures 	
UNIT	Content	Hours
I	Overview of C: History of C – Importance of C – Basic structure of C programs - Character set – C Tokens – Keywords and identifiers – Constants – Variables – Data types – Declaration of variables – Assigning values to variables – Defining symbolic constants – Declaring a variable as constant – Input and Output Functions. Operators: Arithmetic - Relational - Logical - Assignment - Increment and Decrement - Conditional - Bitwise - Special operators - Expressions : Arithmetic expressions - Evaluation of expressions - Precedence of Arithmetic operators - Managing I/O operations - Decision Making: Branching-Looping.	15
II	Arrays: One dimensional array – Declaration – Initialization- Two dimensional array – Declaration – Initialization – User defined Functions: Need for user-defined functions – Elements – Definition - Return values and their types – Function calls – Function declaration – Category of functions – Nesting of functions – Recursion. Structures: Defining a structure – Declaring structure variables – Accessing structure through members – Initialization – Copying and comparing structure variables – Arrays of structures – Unions – Preprocessor.	20
III	Pointers: Understanding pointers – Accessing address of a variable – Declaring pointer variables – Initialization of pointer variables – Accessing a variable through its pointers – Chain of pointers – Pointer expressions – Pointer increment and scalar factor – Pointers and arrays - File Management in C: Defining a file – Opening and closing a file – I/O operations on files – Error handling.	15
IV	Stacks and Queues: stacks - stacks using dynamic arrays - Queues - Circular Queues using dynamic arrays.	20
V	Linked List: Singly linked lists and chains - Representing chains in C - Trees: Introduction - Representation of trees - Binary Trees: The Abstract data type - properties of binary trees-Binary tree representations – Binary Tree Traversal.	20
Reference	Text Books:	

	<ol style="list-style-type: none"> 1. E. Balagurusamy, “<i>Programming in ANSI C</i>” — Tata McGraw Hill Publication - Sixth Edition. (For Unit I to III) ISBN-13: 978-1259004612 2. Ellis Horowitz, Sartaj Sahni and Susan Anderson-Freed, "Fundamentals of Data Structures in C", 2nd edition, University Press(India) Pvt. Ltd., Computer Science, Hyderabad, India, ISBN:978 81 7371 605 8 (Unit IV, V) <p>Reference Books:</p> <ol style="list-style-type: none"> 1. Byron S. Gottfried, “<i>Programming with C</i>”, Schaum’s Outline Series – Tata McGraw- Hill Publication, Second Edition, ISBN-13: 978-0070240353 2. Yashavant P. Kanetkar, “ <i>Let us C</i>” , 13th Edition, BPB, ISBN-13: 978-8183331630 <p>Web References:</p> <ol style="list-style-type: none"> 1. https://www.youtube.com/watch?v=KJgsSFOSQv0 2. https://www.youtube.com/watch?v=-CpG3oATGIs 3. https://www.tutorialspoint.com/cprogramming/ 4. https://www.learn-c.org/ 5. 	
Course Outcomes	On completion of the course, students should be able to	
	CO1: understand the basic concepts of C programming language	K1
	CO2: apply arrays, functions, structures and union concepts in solving problems	K3
	CO3: develop programs using pointers	K2
	CO4: design and develop file handling tasks	K4
	CO5: implement the fundamental data structures using C language	K5

Mapping of Cos with PSOs & POs:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	S	S	S	W	S	S	S	S	W
CO2	S	S	W	W	S	S	S	S	S	W
CO3	S	W	W	S	S	S	S	S	S	W
CO4	S	M	M	M	M	S	S	S	S	M
CO5	S	S	S	S	S	M	M	S	S	S

Strongly Correlating(S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark
No Correlation (N) - 0 mark

Prepared by	Ms.P.Kalpna		
Verified by	Mrs.K.P.Lakshmi		
Programme : B.Sc Computer Science			SEM
Course Code	Title	Hours	II Credit
	CC-IV DATA STRUCTURES USING C LAB	3	2

Cognitive Level	K - 2 : Understand K - 3 : Apply K - 4 : Evaluate	
Learning Objectives	Course Objectives: The course aims to <ul style="list-style-type: none"> • provide in depth practical knowledge in solving problems using C language • provide practical exposure to storage and memory aspects • implement the basic data structures namely stack, queue, linked list and trees using arrays and pointer 	
	Content	
	Preliminaries <ol style="list-style-type: none"> 1. Simple C Program 2. Programs using conditional operators 3. Programs using while do ... while 4. Programs using IF statement and FOR statement Programs Using <ol style="list-style-type: none"> 1. Functions 2. Storage Classes 3. Arrays Programs Using <ol style="list-style-type: none"> 1. Structure and Union Programs Using <ol style="list-style-type: none"> 1. Pointers 2. File Implementation of <ol style="list-style-type: none"> 1. Stack using arrays and pointer 2. Queue using array and pointers 3. Linked List using pointers 4. Trees 	
Course Outcomes:	Upon successful completion of the course the students will be able to	
	CO1: solve the problems using C language concepts	K4
	CO2: implement the data structures using arrays and pointers	K2,K3

Mapping of Cos with PSOs & POs:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	S	S	S	W	S	S	S	S	W
CO2	S	S	W	W	S	S	S	S	S	W

Strongly Correlating(S)	-	3 marks
Moderately Correlating (M)	-	2 marks
Weakly Correlating (W)	-	1 mark
No Correlation (N)	-	0 mark

Prepared by	Ms.P.Kalpana
Verified by	Mrs.V.Priya

Programme : B.Sc Computer Science		SEM	II
Course Code	Title	Hours	Credit
	ACIII- NUMERICAL AND STATISTICAL METHODS	4	5
Cognitive Level	K - 1 : Acquire K - 2 : Understand K - 3 : Apply K - 4 : Evaluate K - 5 : Analyze		
Learning Objectives	The Course aims to <ul style="list-style-type: none"> enable the students to gain knowledge in solving system of equations. It also provides the techniques to find numerical solutions for various integrals. 		
UNIT	Content	Hours	
I	Introduction - The Solution of numerical algebraic & Transcendental equations – Bisection method – Newton Raphson method – Iteration Method – Simultaneous Linear Algebraic equations – Gauss Elimination method – Jacobi and Gauss- Seidel methods .	13	
II	Finite differences – Forward, Backward differences – Interpolation formulae – Newton-Gregory forward interpolation - Newton backward interpolation - Lagrange’s interpolation- Numerical Differentiation.	13	
III	Numerical Integration – Trapezoidal rule – Simpson’s 1/3 rd rule – Numerical Solution of ODE – Taylor series methods - Solution by Euler’s method – RungeKutta 2 nd and 4 th order methods.	13	
IV	Mean, Median, Mode, Standard Deviation – Correlation & Regression – Properties	13	
V	Discrete & continuous distributions: Binomial, Poisson, Normal distributions – Mean, Variance, Recurrence relation, Additive property, Moment generating function of these distributions – Properties of normal distribution.	13	
Reference	Text Books: <ol style="list-style-type: none"> M.K Venkataraman, Numerical Methods in Science and Engineering, The National Publishing company, Chennai. Vth edition (Revised and enlarged), Sep 2007. (For Units I, II and III) S.C.Gupta, Fundamentals of Statistics, ,Himalaya Publishing House, 2009 (Units 4, and 5) (Problems only) Reference Books: <ol style="list-style-type: none"> S.C. Gupta and V.K. Kapoor , Fundamentals of Statistics ,Himalayan Publishing House, 2000, ISBN: 81-7014-791-3 S.S. Sastry, Introductory Methods of Numerical Analysis, Prentice Hall Publications ,2012 , ISBN: 8120345924 		

Course Outcomes	On completion of the course, students should be able to	
	CO 1: understands different methods to solve the non-linear equations	K2,K4
	CO 2: acquire the knowledge of regression analysis	K1,K2
	CO 3: apply various methods to solve various integrals	K3
	CO 4: apply various methods to solve various integrals	K3,K5

Mapping of Cos with PSOs & Pos:

CO/PO	PO						PSO					
	1	2	3	4	5	6	1	2	3	4	5	6
CO1	M	M	S	W	S	S	M	M	W	M	S	W
CO2	S	M	M	M	M	S	M	W	M	S	S	M
CO3	M	S	M	S	M	W	W	S	S	M	W	S
CO4	M	S	S	W	S	S	M	S	M	S	S	S

Strongly Correlating(S) - 3 marks
 Moderately Correlating (M) - 2 marks
 Weakly Correlating (W) - 1 mark
 No Correlation (N) - 0 mark

Prepared by	Department of Mathematics
Verified by	Department of Mathematics

Programme : B.Sc Computer Science		SEM	II																				
Course Code	Title	Hours	Credit																				
	SKBC - I DATA ANALYTIC LAB	2	2																				
Cognitive Level	K - 1 : Acquire K - 2 : Understand K - 3 : Apply K - 4 : Evaluate K - 5 : Analyze																						
Learning Objectives	The Course aims to <ul style="list-style-type: none"> provide in depth practical knowledge on built-in-functions in spreadsheet inculcate the practical exposure to graph drawing and matrix processing introduce descriptive statistics using Data Analysis Toolpak 																						
	Content																						
	<ol style="list-style-type: none"> Demonstrate the usage of the following built-in-functions in spreadsheet. MAX, SUM, AVERAGE, CONCATENATE, LEN, LOWER, UPPER and TRIM Demonstrate the usage of the following logical functions in spreadsheet. AND, OR, NOT, IF and IFERROR Demonstrate any 10 math and trigonometric functions in spreadsheet. Create and demonstrate the usage of a pivot table in spreadsheet. Create a bar-chart for the following data <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Region</th> <th>A</th> <th>B</th> <th>C</th> </tr> </thead> <tbody> <tr> <td>North</td> <td>17235</td> <td>15793</td> <td>12114</td> </tr> <tr> <td>East</td> <td>12456</td> <td>6000</td> <td>5500</td> </tr> <tr> <td>South</td> <td>13122</td> <td>13623</td> <td>17224</td> </tr> <tr> <td>West</td> <td>5000</td> <td>8000</td> <td>5000</td> </tr> </tbody> </table> Display the transpose of a given matrix using spreadsheet. Add the Data Analysis Toolpak in the spreadsheet. Demonstrate the descriptive statistics in spreadsheet. Perform the Student's T-test in spreadsheet. Find the Correlation between two variables in spreadsheet. Perform Regression analysis in spreadsheet. Generate a Histogram for the data in spreadsheet. 		Region	A	B	C	North	17235	15793	12114	East	12456	6000	5500	South	13122	13623	17224	West	5000	8000	5000	
Region	A	B	C																				
North	17235	15793	12114																				
East	12456	6000	5500																				
South	13122	13623	17224																				
West	5000	8000	5000																				
Course Outcomes	On completion of the course, students should be able to																						
	CO1: apply built in functions of spread sheet	K1, K3																					
	CO2: prepare charts using the data in the spreadsheet.	K2																					

	CO3: to transpose a matrix and use pivot table	K4
	CO4: demonstrate the data analysis using Data Analysis Toolpak in spreadsheet.	K5

Mapping of Cos with PSOs & POs:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	S	S	W	M	S	S	S	M	M
CO2	S	S	S	S	S	S	S	S	M	M
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	W	M	S	S	S	M	M

Strongly Correlating(S)	-	3 marks
Moderately Correlating (M)	-	2 marks
Weakly Correlating (W)	-	1 mark
No Correlation (N)	-	0 mark

Prepared by	Ms.P.Kalpana
Verified by	Mrs.D.Jayachitra

இரண்டாமாண்டு : மூன்றாம் பருவம்

பகுதி 1 தமிழ் - தாள் 3

செய்யுள் (காப்பியங்கள்), கட்டுரை இலக்கியம், புதினம்,
இலக்கிய வரலாறு

தமிழ்

பாட நோக்கம் (Course Objectives)

பண்டைத் தமிழரின் அரசியல் நேர்மை, குடிமக்களின் உரிமை, குடிமக்களின் பொறுப்புணர்வு, அறச்சிந்தனைகளை அறியச்செய்தல்.

நேர்மை, பிறருக்கு உதவும் பண்பு, நன்னெறிகளைப் பின்பற்றுதல் முதலான வாழ்வியல் பண்புகளை வளர்த்தல்.

வாழ்வின் எல்லா நிலைகளிலும் திறம்படச் செயலாற்றக் கற்றுத்தருதல்.

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பெண்களை மதிக்கச் செய்தல், சொல்லாடல் திறன் வளர்த்துக்கொள்ள உதவுதல்.

மிகச் சிறந்த தமிழ் உரைநடைகளை அறிமுகம் செய்தல்.

பணித்தேர்வுகளுக்கு உதவக்கூடிய தமிழ்ப் பாடப்பகுதிகளைக் கற்பித்தல்.

அலகு - 1

1. சிலப்பதிகாரம் : வழக்குரை காதை

2. மணிமேகலை : சிறைக்கோட்டத்தை அறக்கோட்டம் ஆக்கிய

காதை 3. கம்பராமாயணம் - வாலி வதைப் படலம் – 106 பாடல்கள்

அலகு - 2

1. வில்லிபாரதம் : கன்னபருவம் – பதினேழாம் போர்ச்சுருக்கம்-

104பா-ள்

2. சீறாப் புராணம் : மானுக்குப் பிணைநின்ற

படலம் - 30 பாடல்கள்

3. தேம்பாவணி - வளன் சனித்த படலம் - 30 பாடல்கள்

4. இராவண காவியம் : இலங்கைக் காண்டம்-அரசியற்படலம் -40
பா-ள்

அலகு : 3 கட்டுரை இலக்கியம் - 'கட்டுரை இலக்கியம்' , பிரமி பதிப்பகம்

அலகு : 4 புதினம் - வேரில் பழுத்த பலா, சு.சமுத்திரம்

அலகு : 5

தமிழ் இலக்கிய வரலாறு - காப்பிய காலம்

கற்றல் விளைவுகள் (Course Out Come)

மாணவர்கள் நேர்மைப் பண்பு, துணிவுடைமை, சமுதாய அக்கறை உள்ளவர்களாக வளம்பெறுவர்.

இல்லற வாழ்வில் பெண்களை மதித்தல் வேண்டும் என்ற உணர்வு பெறுவது. □ □ □ □ ல், சூழலியல் விழிப்புணர்வு பெறுவர்.

□ □ □ □ ல், சூழலியல் விழிப்புணர்வு பெறுவர்.

நல்ல தமிழ் உரைநடையில் பயிற்சி பெறுவர்.

பணித்தேர்வுகளுக்கு உரிய தமிழ்த்திறன் பெறுவர்.

பாடநூல்கள்

1. செய்யுள் திரட்டு, தமிழ்த்துறை வெளியீடு.
2. கட்டுரை இலக்கியம் - பிரமி பதிப்பகம், திருச்சி-21.
3. வேரில் பழுத்த பலா, சு.சமுத்திரம் என்.சி.பி.எச்.வெளியீடு, சென்னை.

தமிழ் இலக்கிய வரலாறு – பிரமி பதிப்பகம், திருச்சி-21.

Course Code & Title	ENGLISH FOR COMMUNICATION III		
Class	<u>II YEAR</u>	Semester	<u>III</u>
Cognitive Level	K – 1 Acquire K – 2 Understand K – 3 Apply K – 4 Evaluate K – 5 Analyze		
Course Objectives	The Course aims <ul style="list-style-type: none"> • To expose students to vocabulary • To familiarize students with different levels of meaning. • To help them to think logically • To read and analyze a passage • To make them competent to face an interview 		
UNIT	Content	No. of Hours	
I	1. Synonyms : 100 2. Antonyms : 100 3. Words that Confuse : 50 4. Single Word Substitution : 100		
II	5. Phrasal verbs : 50 6. Idioms : 50		
III	7. Errors and How to avoid them :100 8. Spotting Errors :100 9. Jumbled Sentences :25		
IV	10. Reading Comprehension : 15 11. Dialogue Writing : 20		
V	12. Letter Writing (Application, Business& Complaints): 15 13. Report Writing : 10 14. Interview Skills 15. Group Discussion		
Reference	Lessons will be edited and compiled.		
Course Outcomes	On completion of the course, students should be able to CO 1: use words correctly. CO 2: understand different levels of meaning. CO 3: think logically.		

	CO 4: analyze a passage. CO 5: face an interview successfully
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Mapping of COs with PSOs & POs:

CO/PO	PO					PSO					
	1	2	3	4	5	1	2	3	4	5	6
CO1	S	M	S	M	M	M	S	S	M	M	S
CO2	S	M	M	M	M	S	M	S	M	M	M
CO3	S	M	S	M	M	M	S	S	M	M	S
CO4	S	M	M	M	M	S	M	S	M	M	M
CO5	S	M	S	M	M	M	S	S	M	M	S

- Strongly Correlating(S) - 3 marks
- Moderately Correlating (M) - 2 marks
- Weakly Correlating (W) - 1 mark
- No Correlation (N) - 0 mark

Programme : B.Sc Computer Science		SEM	III
Course Code	Title	Hours	Credit
	CC-V OBJECT ORIENTED PROGRAMMING USING C++	5	5
Cognitive Level	K - 1 : Acquire K - 2 : Understand K - 3 : Apply K - 4 : Evaluate K - 5 : Analyze		
Learning Objectives	The Course aims to <ul style="list-style-type: none"> • introduce the basics of object oriented programming and basic syntax of C++ • provide knowledge about functions, classes and objects • imbibe the knowledge of initialization, destruction of objects and usage of overloading • familiarize the concept of inheritance and polymorphism • inculcate the usage of file concepts 		
UNIT	Content	Hours	
I	Principles of Object Oriented Programming: Software Evolution – Procedure Oriented Programming – OOP Paradigm – Concepts, Benefits, Object Oriented Languages and Applications – Structure of C++ program: – Tokens, Keywords, Identifiers, Data Types, Variables, Manipulators – Expressions – Dynamic Initialization of variables- Reference	15	

	Variables – Operators – Control Structures	
II	Functions: Main Function – Function Prototyping – Call by Reference – Return by Reference – Constant arguments – Inline Functions – Default Arguments – Function Overloading and ambiguity – Classes and Objects – Array of Objects – Static Data Members and Static Member Function.	10
III	Constructors and Destructors - Friend Functions – Overloading Unary and Binary Operators – Type Conversions	15
IV	Inheritance: Single Inheritance – Multiple Inheritance – Hierarchical, Hybrid Inheritance – Polymorphism – Constructors in Derived Classes – Virtual Base Class – Pointers – Virtual Functions – Polymorphism	15
V	Managing Console I/O Operations – Files: Classes for file Stream operations – Opening, Closing and Processing Files – End of File Detection – File Pointers – Sequential Input and Output Operations – Error Handling during File Operations – Command line Arguments.	20
Reference	<p>Text Books:</p> <ol style="list-style-type: none"> 1. E. Balagurusamy, “<i>Object Oriented Programming with C++</i>”, Tata McGraw Hill Publishing Ltd., New Delhi., Sixth Edition, ISBN-10: 125902993X <p>Reference Books:</p> <ol style="list-style-type: none"> 1. Robert Lafore, “<i>Object Oriented Programming in C++</i>”, Sams Publishing, Fourth Edition, ISBN-13: 978-0672323089. 2. Herbert Schilt, “<i>The Complete Reference</i>”, McGraw-Hill Osborne Media, Ninth Edition (March 11, 2014), ISBN-13: 978-0071808552. <p>Web References:</p> <ol style="list-style-type: none"> 1. http://www.cplusplus.com/doc/tutorial/ 2. https://www.javatpoint.com/cpp-tutorial 3. https://www.youtube.com/watch?v=vLnPwxZdW4Y 	
Course Outcomes	On completion of the course, students should be able to	
	CO1: describe the basic concepts of OOP and the syntax of C++ language	K1
	CO2: apply the knowledge of functions, classes and objects to solve problems in the real world.	K3
	CO3: experiement the concepts of initialization and destruction of objects	K4
	CO4: test the usage of overloading of unary and binary operators	K5
	CO5: demonstrate the usage of inheritance and polymorphism while solving real time problem	K2
	CO6: apply file concepts and solve problems related to data files.	K3

Mapping of Cos with PSOs & POs:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	S	S	S	S	S	M	S	S	M
CO2	S	S	S	M	M	W	S	S	S	M
CO3	S	S	S	S	S	M	S	S	S	M
CO4	S	S	S	S	S	S	S	M	M	S
CO5	S	S	S	S	S	M	M	S	S	S
CO6	S	S	S	S	S	M	M	M	S	S

Strongly Correlating(S)	-	3 marks
Moderately Correlating (M)	-	2 marks
Weakly Correlating (W)	-	1 mark
No Correlation (N)	-	0 mark

Prepared by	Ms.P.Kalpna
Verified by	Dr.S.Murugan

Programme : B.Sc Computer Science		SEM	III
Course Code	Title	Hours	Credit
	CC- VI OOPS LAB	3	2
Cognitive Level	K - 1 : Acquire K - 2 : Understand K - 3 : Apply		
Learning Objectives	The Course aims to <ul style="list-style-type: none"> introduce problem solving using C++ basics provide in depth practical exposure to the basic concepts of OOPs inculcate the storage aspects using C++ programming constructs 		
	Content		

	<ol style="list-style-type: none"> 1. Simple Programs (Convert C to C++) 2. Control structures 3. Call by reference & call by value 4. Function Overloading and ambiguity 5. Program using Class and object 6. Array of Object 7. Object as a argument 8. Constructor and Destructors 9. Static, abstract classes 10. Friend Function 11. Operator overloading 12. Programs using Inheritance 13. Object pointer 14. Virtual Function 15. Virtual base class 16. Files (Simple Programs) 	
Course Outcomes	On completion of the course, students should be able to	
	CO1: apply the concepts of C++ language to solve problems.	K1-K3

Mapping of Cos with PSOs & POs:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	S	S	W	M	S	S	S	S	M

Strongly Correlating(S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark
No Correlation (N) - 0 mark

Prepared by	Ms.P.Kalpana
Verified by	Dr.S.Murugan

Programme : B.Sc Computer Science		SEM	III
Course Code	Title	Hours	Credit
	AC-IV ALLIED PHYSICS -I	3	4
Cognitive Level	K - 1 : Acquire K - 2 : Understand K - 3 : Apply K - 4 : Evaluate K - 5 : Analyze		
Learning Objectives	The Course aims to <ul style="list-style-type: none"> • This course designed to impart the knowledge of semiconducting devices such as diodes, transistors • To analyze the characteristics of Transistors • To give clear understanding of op-amp and its importance. • To study the binary conversion and properties of Boolean algebra • To know the idea for the simplification of Boolean expression using K Maps • To learn the idea of combinational and sequential logic 		
UNIT	Content	Hours	
I	V-I characteristics of PN junction - Zener diode –characteristics- Zener diode as voltage stabilizer -Light Emitting Diode – Photo diode –operation and characteristics – Transistor :Characteristics of Common emitter connection – Transistor as an amplifier in CE arrangement-JFET- Principles and working – Characteristics and Parameters-Difference between JFET and Bipolar transistor	13	
II	Operational amplifier Operational amplifier – ideal characteristics – Inverting amplifier –Non inverting amplifier – voltage follower – Summing amplifiers – Subtractor -Integrator – Differentiator	13	
III	BINARY SYSTEMS, BOOLEAN ALGEBRA Binary numbers - Number base conversions - Octal and Hexa decimal numbers - Complements -1's and 2's complement addition and subtraction -Boolean algebra - Basic definitions and properties of Boolean algebra	13	
IV	DIGITAL LOGIC GATES AND BOOLEAN FUNCTIONS Digital logic gates - Universal gates De Morgan's theorem - Karnaugh Map method of simplification of Boolean expression – Product of sums simplification -Two, three and four variable map methods - - Don't care conditions	13	
V	COMBINATIONAL AND SEQUENTIAL LOGIC Half and Full adders - Half and Full Subtractors - Decoders - Demultiplexers - Encoders – Multiplexers-Flip flops - Basic flip flop circuit - D flip flop -JK flip flop Shift registers- Ripple counters – 4-bit binary ripple counter -Binary up-down counter	13	
Reference	Text Books: <ol style="list-style-type: none"> 1. V. K.Mehta, Rohit Mehta, Principles of Electronics, S.Chand& Company, New Delhi, Eleventh Edition, 2010. 		

	<ol style="list-style-type: none"> 2. L D.Roy Choudhury, Shail Jain, Linear Integrated Circuits, New Age International Pvt., Ltd., New Delhi, 2018 3. M.Morris Mano, Digital Logic and Computer Design, Prentice Hall of India Private Limited, New Delhi, 2013. 4. V. Vijayendran, Digital fundamentals –Viswanathan, S., Printers & Publishers Pvt Ltd, 2015. <p>Reference Books:</p> <ol style="list-style-type: none"> 1. S.Salivahanan, N. Suresh Kumar, A.Vallavaraj, Electronic Devices and Circuits, Tata McGraw- Hill Publishing Company Limited, New Delhi, 2006 2. Leach and Malvino, Digital Principles and Applications, Tata McGraw Hill Publishing Company Limited, New Delhi, Second reprint, 2010. 3. R. P. Jain, Digital Electronics and Systems, Tata Mc Graw Hill, New Delhi, 2004 4. Rajeev Ratan, Deepak Batra, Digital Electronics, Acme Learning Pvt., Ltd., New Delhi, First Edition, (2009) <p>Web References:</p>	
Course Outcomes	On completion of the course, students should be able to	
	CO 1: Students should be able to apply the idea of transistors	K3
	CO 2: Students can be evaluating the electronic devices for specific applications.	K4
	CO 3: Students can be able to perform various conversion processes in digital electronics.	K2
	CO 4: They can analyze and design various combinational and sequential circuits.	K5
	CO 5: we learn the combinational circuits.	K1

Mapping of Cos with PSOs & Pos:

CO/PO	PO						PSO					
	1	2	3	4	5	6	1	2	3	4	5	6
CO1	3	2	1	1	3	3	2	2	1	2	3	1
CO2	2	3	2	3	2	1	1	3	3	2	1	3
CO3	2	3	2	3	2	1	1	3	3	2	1	3
CO4	2	3	2	1	1	3	3	3	2	3	3	3
CO5	3	2	3	2	3	3	3	3	3	3	3	2

Strongly Correlating(S) - 3 marks
 Moderately Correlating (M) - 2 marks
 Weakly Correlating (W) - 1 mark
 No Correlation (N) - 0 mark

Prepared by	Department of Physics
Verified by	Department of Physics

Programme : B.Sc Computer Science		SEM	III
Course Code	Title	Hours	Credit
	SKBC - II IMAGE EDITING LAB	2	2
Cognitive Level	K - 1 : Acquire K - 2 : Understand K - 3 : Apply		
Learning Objectives	The Course aims to <ul style="list-style-type: none"> • learn the concepts of layer masking, image conversion and creating own backgrounds • provide various effects to the images • introduce various techniques involved in animation 		
	Content		
	Exercises using GIMP <ol style="list-style-type: none"> 1. Two Images Layer Masking 2. Compose old Images to New Images 3. Convert New Images into old Images 4. Wind Effect on an Image 5. Create own Background Using Various Tools 6. Color Management 7. Pattern Filling 8. Image Slicing with path Tool and Marquee Tool 9. Creating a Blazing Flame Text 10. A simple Animation 		
Course Outcomes	On completion of the course, students should be able to		
	CO1: apply various animation techniques		K1,K3
	CO2: apply various concepts of image editing using GIMP tool		K2,K3

Mapping of Cos with PSOs & POs:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	S	S	S	S	M	M	S	S	M
CO2	S	S	S	S	S	S	S	S	S	M

Strongly Correlating(S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark
No Correlation (N) - 0 mark

Prepared by	Mrs.K.Deepa
Verified by	Mrs.D.Nandhini

இரண்டாமாண்டு : நான்காம் பருவம்
பகுதி 1 தமிழ் - தாள் 4

செய்யுள் (பழந்தமிழ் இலக்கியம்) நாடகம், தமிழ் இலக்கிய வரலாறு, கட்டுரை
வரைவியல்

பாட நோக்கம் (Course Objectives)

பழந்தமிழரின் வாழ்வியல் அறம், வாழ்வியல் நுட்பங்கள், அக வாழ்வுச் சிந்தனைகளை அறியச்செய்தல்.

தனித் திறன்களை மேம்படுத்திக் கொள்ள உதவுதல்.

கடமை உணர்ச்சி, பெரியோரை மதித்தல் முதலான உயர்பண்புகளை வளர்த்தல்.

தமிழர்தம் இயற்கை வளம், செல்வ வளம், இலக்கிய வளங்களை அறிமுகம் செய்தல்.

நிகழ்கால வாழ்வியல் சிக்கல்களில் தெளிவுபெறச் செய்தல், சமுதாய அக்கறை கொள்ளச்செய்தல்.

பணித்தேர்வுகளுக்கு உதவக்கூடிய தமிழ்ப் பாடப்பகுதியைக் கற்பித்தல்.

அலகு - 1

1. குறுந்தொகை - 10 பாடல்கள்

குறிஞ்சி

1. நிலத்தினும் பெரிதே (பா.எண் -3)
2. வேரல் வேலி (பா.எண் -18)
3. யாயும் ஞாயும் (பா.எண் -40)
4. இடிக்கும் கேளிர் (பா.எண் -58)

நெய்தல்

1. அணிற்பல் அன்ன (பா.எண் -49)
2. ஞாயிறு பட்ட அகல்வாய் (பா.எண் -92)

3. கடும்புனல் தொடுத்த (பா.எண் -103)

மருதம்

1. தச்சன் செய்த சிறுமா (பா.எண் -61)

2. நன்நலம் தொலைய (பா.எண் -100)

3. வேம்பின் பைங்காய் (பா.எண் -205)

2. நற்றிணை – 5 பாடல்கள்

1. நின்ற சொல்லர் ,... (குறிஞ்சி) . (பா.எண் -1)

2. விளம்பழம் கமழும் (பாலை) . (பா.எண் -12)

3. தடமருப்பு எருமை (மருதம்) . (பா.எண் 120)

4. விளையாடு ஆயமொடு (நெய்தல்) . (பா.எண் -172)

5. அம்ம வாழி தோழி (முல்லை) . (பா.எண் -289)

3. கலித்தொகை - 5 பாடல்கள்

1. பாலைக் கலி - வயக்குறு மண்டிலம் (பா.எண் 24)

2. குறிஞ்சிக் கலி - பாடுகம் வா வாழி தோழி (பா.எண் 05)

3. மருதக்கலி - ஈண்டு, நீர்மிசைத் தோன்றி (பா.எண் 24)

4. முல்லைக் கலி - தனி பெறு தண் புலத்துத் (பா.எண் 1)

5. நெய்தற் கலி - மா மலர் முண்டகம் (பா.எண் 16)

4. ஐங்குறுநூறு - 10 பாடல்கள்

வேழப்பத்து

1. மனைநடு வயலை வேழம் (பா.எண் 11)

2. பரியுடை நன்மான் (பா.எண் 13)

3. ஓங்குபூ வேழத்துத் (பா.எண் 16)
4. இருஞ்சாய் அன்ன (பா.எண் 18)
5. நெகிழ்பு ஓடும் வளை (பா.எண் 20)

அன்னாய் வாழிப் பத்து

1. அன்னாய் வாழி! வேண்டு அன்னை! நம் படப்பை (பா.எண் 203)
2. அன்னாய் வாழி! வேண்டு அன்னை! அஃதெவன்கொல்?.. (பா. 204)
3. அன்னாய் வாழி! வேண்டு அன்னை! எந்தோழி (பா.எண் 206)
4. அன்னாய் வாழி! வேண்டு அன்னை! நன்றும் (பா.எண் 208)
5. அன்னாய் வாழி! வேண்டு அன்னை! கானவர் (பா.எண் 208)

5. புறநானூறு - 5 பாடல்கள்

1. இரும்பனை வெண்தோடு. . . (பா.எண் 54)
2. உண்டாலம்ம இவ்வுலகம்... (பா.எண் 14)
3. யாண்டு பலவாக . . . (பா.எண் 191)
4. யாதும் ஊரே... (பாடல் எண் 192)
5. செய்குவம் கொல்லோ நல்வினை... (பா.எண் 214)

6. பத்துப்பாட்டு - பட்டினப்பாலை முழுவதும்

அலகு - 2

1. திருக்குறள் - 3 அதிகாரங்கள்

1. மடியின்மை
2. இடுக்கண் அழியாமை
3. சொல்வன்மை

2. நாலடியார் - 12 பாடல்கள்

பொறையுடைமை

1. காதலர் சொல்லுங் (பா.எண் 73)
2. அறிவதறிந்தடங்கி (பா.எண் 74)
3. இன்னா செயினும் (பா.எண் 76)
4. தான்கெடினும் தக்கார். . . (பா.எண் 80)

தீவினையச்சம்

1. அக்கே போல் அங்கை . . . (பா.எண் 123)
2. நெருப்பழல் சேர்ந்தக் கால் . . . (பா.எண் 124)
3. பெரியவர் கேண்மை . . . (பா.எண் 125)
4. யாஅர் ஒருவர் (பா.எண் 127)

பெரியாரைப் பிழையாமை

1. பொறுப்பரென் . . . (பா.எண் 161)
2. அவமதிப்பும் ஆன்ற . . . (பா.எண் 163)
3. நளிகடல் தண்சேர்ப்ப (பா.எண்166)
4. பெரியார் பெருமை (பா.எண் 170)

3.பழமொழி - 12 பாடல்கள்

அறிவுடைமை

1. அறிவின் மாண்பு (பா.எண் 27)
2. அறிவினர் மாண்பு(பா.எண் 28)
3. அறிவுடையாருடன் அறிவுடையார் சேர்தல் (பா.எண் 30)
4. அறிவிலாரை அறிவுடையார் புகவிடாமை(பா.எண் 31)

இன்னா செய்யாமை

1. முற்பகல் செய்யின் பிற்பகல் விளையும்(பா.எண்- 47)
2. நலியப் பெற்ற எளியர் அழுத கண்ணீர்(பா.எண் 48)
3. மதிப்பு மிக்கவரை அழிக்க முயலுதல்(பா.எண்-49)
4. நலிந்தாரை நலியாமை(பா.எண் 50)

சான்றோர் இயல்பு

1. சான்றோர் பெருமை(பா.எண் 70)
2. வறுமையினும் நின்ற நிலையில் வழுவாமை(பா.எண் 71)
3. பீடிலாவிடத்தும் பெருந்தகைமையில் வழுவாமை(பா.எண் 72)
4. இடருற்ற விடத்தும் மதிப்பிற் குறையாமை(பா.எண் 73)

4.இன்னா நாற்பது – 5 பாடல்கள்

1. அறமனத்தர் கூறும் கடுமொழி (பா.எண் 6)
2. உண்ணாது வைக்கும் பெரும் பொருள் . . . (பா.எண் 16)
3. குலத்துப் பிறந்தவன் கல்லாமை யின்னா . . . (பா.எண் 19)
4. யானையின் மன்னரைக் கண்டால் . . . (பா.எண் 22)
5. பிறன் மனையாள் பின்னோக்கும் பேதைமை யின்னா . . . (பா.எண் 38)

5. இனியவை நாற்பது – 5 பாடல்கள்

1. பிச்சை புக்காயினும் கற்றல் (பா.எண் 1)
2. மானமழிந்தபின் வாழாமை முன்னினதே . . . (பா.எண் 13)
3. குழவிதளர் நடை காண்டல் இனிதே . . . (பா.எண் 14)
4. வருவா யறிந்து வழங்கல் . . . (பா.எண் 22)
5. பத்து கொடுத்தும் பதியிருந்து (பா.எண் 40)

அலகு : 3

நாடகம் - பிசிராந்தையார் - பாரதிதாசன்

அலகு : 4

கட்டுரை வரைவியல் - பொதுக்கட்டுரைகள்

அலகு : 5

தமிழ் இலக்கிய வரலாறு – சங்க காலம், சங்கம் மருவிய காலம்

கற்றல் விளைவுகள் (Course OutCome)

மாணவர்கள் வாழ்வியல் நுட்பங்களில் வல்லமை பெறுவர்.

சமுதாய அக்கறை உள்ளவர்களாக மனவளம் பெறுவர்.

சமுதாய, பொருளியல், சூழலியல் விழிப்புணர்வு பெறுவர்.

பணித்தேர்வுகளுக்கு உரிய தமிழ்த்திறன் பெறுவர்.

பாடநூல்கள்

1. செய்யுள் திரட்டு, தமிழ்த்துறை வெளியீடு.
2. பிசிராந்தையார் - பாரதிதாசன், தமிழ் நாதன் பதிப்பகம், சென்னை – 110
3. பொதுக்கட்டுரைகள், மகிழினி பதிப்பகம், சென்னை- 106.
4. தமிழ் இலக்கிய வரலாறு,
பிரமி பதிப்பகம், திருச்சி-21.

Course Code & Title	ENGLISH FOR COMMUNITION IV		
Class	<u>II YEAR</u>	Semester	<u>IV</u>
Cognitive Level	K – 1 Acquire K – 2 Understand K – 3 Apply		

	K – 4 Evaluate K – 5 Analyze	
Course Objectives	The Course aims <ul style="list-style-type: none"> • To make the students to live meaningfully • To Familiarize students with various great personalities • To understand qualities like freedom • To know human values like patriotism and universal brotherhood • To realize the value of comradeship 	
UNIT	Content	No. of Hours
I	A Poison Tree : William Blake King Bruce and the Spider : Eliza Cook The Character of a Happy Life : Henry Wotton	
II	Ulysses : Lord Alfred Tennyson Money Madness : D. H. Lawrence I vow to thee my Country	
III	The Ocean : Lord Byron The Unknown Citizen : W. H. Auden Night of the Scorpion : Nissim Ezekiel	
IV	The Rising of the Moon : Lady Gregory The Little Man : John Galsworthy The Path Finder : Herman Ould	
V	A Tale of two cities : Charles Dickens	
Reference	Lessons will be edited and compiled.	
Course Outcomes	On completion of the course, students should be able to CO 1: live meaningfully. CO 2: know great qualities like leadership. CO 3: understand qualities like freedom and parenthood CO 4: live as a group in unity CO5: realize the value of comradeship	

Mapping of COs with PSOs & POs:

CO/PO	PO					PSO					
	1	2	3	4	5	1	2	3	4	5	6
CO1	S	M	M	M	M	S	M	S	M	M	M

CO2	S	M	S	M	M	M	S	S	M	M	S
CO3	S	M	M	M	M	S	M	S	M	M	M
CO4	S	M	S	M	M	M	S	S	M	M	S
CO5	S	M	M	M	M	S	M	S	M	M	M

Strongly Correlating(S) - 3 marks

Moderately Correlating (M) - 2 marks

Weakly Correlating (W) - 1 mark

No Correlation (N) - 0 mark

Programme : B.Sc Computer Science		SEM	IV
Course Code	Title	Hours	Credit
	AC-V - APPLIED PHYSICS PRACTICAL – II	4	5
Cognitive Level	K - 1 : Acquire K - 2 : Understand K - 3 : Apply K - 4 : Evaluate K - 5 : Analyze		
Learning Objectives	The Course aims to <ul style="list-style-type: none"> The objective of the course is to provide the student hands-on experiences in analog digital electronics and microcontroller through laboratory experiments that explore the knowledge on electronics. They can get knowledge on hardware processing 		
	Content		
	<p style="text-align: center;">LIST OF EXPERIMENTS</p> <p style="text-align: center;">(Any 12 experiments)</p> <ol style="list-style-type: none"> V-I characteristics of Semiconductor Diode V-I characteristics of Zener Diode-Determination of breakdown voltage. Characteristics of LED Construction and study of Inverting and Non-Inverting amplifier using operational amplifier Construction of adder and subtractor circuits using Op-Amp Study of logic gates using ICs Verification of De-Morgan's theorem Universality of NAND gate. Universality of NOR gate. Construction and verification of Half adder and full adder circuits Construction and verification of Half subtractor and 		

	<p>Full subtractor circuits</p> <p>12. Study of R-S flip flop</p> <p>13. Study of JK and D flip flops</p> <p>14. Addition and subtraction of two 8-bit numbers using microcontroller 8051 kit</p> <p>15. Multiplication and division using microcontroller 8051 kit</p> <p>16. 8051 kit</p> <p>17. Interfacing of LED to a microcontroller 8051 kit</p> <p>18. Interfacing of LCD to a microcontroller 8051 kit</p> <p>19. Interfacing of stepper motor to a microcontroller 8051 kit</p> <p>20. Generation of waveform using timers to a microcontroller 8051 kit</p> <p>21. Counting of pulses to a microcontroller 8051 kit</p> <p>22. Find the biggest number in a given array using 8051 microcontroller kit</p> <p>23. Find the smallest number in a given array using 8051 microcontroller kit</p>	
Course Outcomes	On completion of the course, students should be able to	
	CO 1: Understand the concepts and use research equipment (microscope, oscilloscope, etc.)	K1,K2
	CO 2: Design and conduct experiments that probe materials properties.	K4
	CO 3: Work independently and function as a team.	K5
	CO 4: Develop communication skills (oral, graphic and written).	K3

Mapping of Cos with PSOs & Pos:

CO/PO	PO						PSO					
	1	2	3	4	5	6	1	2	3	4	5	6
CO1	3	2	3	2	3	2	3	2	3	2	3	2
CO2	3	3	2	3	2	3	2	3	2	3	2	3
CO3	2	1	2	1	1	2	2	3	2	1	3	1
CO4	3	2	3	2	3	2	3	2	2	3	2	3

Strongly Correlating(S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark
No Correlation (N) - 0 mark

Prepared by	Department of Physics
Verified by	Department of Physics

Programme : B.Sc Computer Science		SEM	IV
Course Code	Title	Hours	Credit
	CC - VII DATABASE SYSTEMS	5	5
Cognitive Level	K - 1 : Acquire K - 2 : Understand K - 3 : Apply K - 4 : Evaluate K - 5 : Analyze		
Learning Objectives	The Course aims to <ul style="list-style-type: none"> introduce the concept of database management and database system architecture imbibe the knowledge of basic file system create tables using SQL apply the various normalization techniques introduce the concept of network and hierarchical database system 		
UNIT	Content	Hours	
I	An Overview of Database Management : Introduction - Definition Of Database System - Data Independence - Relational Systems. Database System Architecture : The Three Levels of the Architecture - Database Administrator - Client Server Architecture - Distributed Processing	15	
II	Basic File System: Introduction – Factors affecting physioUSBC – File organization – Heap, Sequential Indexed sequential – Hashed file organization – key – address – Transformations	20	
III	Relational Data Model: Basic Definition and terminology – Relational Algebra - SEQUEL or SQL – QUEL - QBE. The Relational Calculus: The tuple Calculus	15	
IV	Relational Database Design: Functional Dependencies - Introduction - Basic Definitions – Normalization - First, Second, Third Normal Forms - BOYCE / CODD Normal Form	10	
V	Network and Hierarchical Data Base System: Network Data Model – Introduction – CODASYL model – Commands for data manipulation – Hierarchical Data base system _ IMS Physical Database – TMS External model – The PCB mask – Security – Access control cryptosystem	15	
Reference	Text Books: <ol style="list-style-type: none"> J.Date, “<i>An Introduction to Database Systems</i>”, Pearson Education, Seventh Edition 2000. (Unit I – Chapters 1,2. Unit IV – Chapters 10,11). ISBN 81-7808-231-4 Arun K.Majumdar & Pritmoy Bhattacharyya, “<i>Data Base Management System</i>”, Tata McGraw Hill, New Delhi, 1999. (Unit II, Unit III, Unit V) ISBN 0-07-462239-0. 		

	Reference Books: 1. Bepin C.Desai, “ <i>An Introduction to Data base system</i> ”, Galgotia publications Private limited. 2. Ivan Bayross, “ <i>SQL and PL/SQL</i> ”, BPB Publications, New Delhi. Web References: 1. https://en.wikibooks.org/wiki/Introduction_to_Computer...Systems/Database 2. https://www.c-sharpcorner.com/UploadFile/.../types-of-database-management-systems/	
Course Outcomes	On completion of the course, students should be able to	
	CO1: understand the fundamentals of database system.	K2
	CO2: design and create tables in database and execute queries.	K3
	CO3: have knowledge about file system.	K1
	CO4: design a database based on a data models using normalization.	K4
	CO5: have knowledge in network and hierarchical database system.	K1,K2

Mapping of Cos with PSOs & POs:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	S	M	M	S	S	S	S	M	S
CO2	S	S	S	S	S	S	M	S	S	M
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	M	M	M	S	S	S	S
CO5	M	M	S	S	S	S	S	W	M	M

Strongly Correlating(S) - 3 marks
 Moderately Correlating (M) - 2 marks
 Weakly Correlating (W) - 1 mark
 No Correlation (N) - 0 mark

Prepared by	Dr.D.Jayachitra
Verified by	Ms.P.Kalpna

Programme : B.Sc Computer Science		SEM	IV
Course Code	Title	Hours	Credit
	CC - VIII RDBMS LAB	3	2
Cognitive Level	K - 1 : Acquire K - 2 : Understand K - 3 : Apply K - 4 : Evaluate K - 5 : Analyze		
Learning Objectives	The Course aims to <ul style="list-style-type: none"> • populate and query using DDL,DML,DCL,TCL • create tables in database using logical operator, set operator sequence • prepare SQL reports • create implicit and explicit cursor • create trigger procedure and function 		
UNIT	Content	Hours	
	Exercises using <ol style="list-style-type: none"> 1. DDL Commands 2. DML Commands 3. DCL Commands 4. <i>TCL Commands</i> 5. Queries using operators <ol style="list-style-type: none"> a. Logical operators b. SET operators 6. Nested queries using SQL <ol style="list-style-type: none"> a. Sub query b. Join Operations 7. Built in functions of SQL 8. Creating views and querying in views 9. Sequences 10. SQL Reports 11. Cursors <ol style="list-style-type: none"> i. Implicit ii. Explicit 12. Triggers 13. Functions 14. Procedure 		
Course Outcomes	On completion of the course, students should be able to		
	CO1: design and implement database schema for the given problem		K3
	CO2: populate and query using DDL,DML,DCL,TCL		K1
	CO3: prepare SQL reports.		K2
	CO4: create implicit and explicit cursor.		K4
	CO5: capable to create triggers, procedures and function.		K5

Mapping of Cos with PSOs & POs:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	S	M	M	S	S	S	S	M	S
CO2	S	S	S	S	S	S	M	S	S	M
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	M	M	M	S	S	S	S
CO5	M	M	S	S	S	S	S	W	M	M

- Strongly Correlating(S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark
No Correlation (N) - 0 mark

Prepared by	Dr.D.Jayachitra
Verified by	Ms.P.Kalpna

Programme : B.Sc Computer Science		SEM	IV
Course Code	Title	Hours	Credit
	AC-VI APPLIED PHYSICS -II	4	5
Cognitive Level	K - 1 : Acquire K - 2 : Understand K - 3 : Apply K - 4 : Evaluate K - 5 : Analyze		
Learning Objectives	The Course aims to <ul style="list-style-type: none"> This subject deals about the 8-bit microcontrollers and their internal organization, interfacing an external device with the microcontrollers To know how to interface the I/O port with the external peripherals To understand the fundamental concepts of communication with the external world 		
UNIT	Content	Hours	
I	Microcontroller Architecture Microcontroller Versus General Purpose Microprocessor - Microcontroller for Embedded Systems – Criteria For Choosing a Microcontroller – Overview of the 8051 – Internal Architecture – Registers – Internal RAM – 8051 Register Banks and Stack – Program Counter – Addressing Modes.	13	
II	Instruction Set Instruction Set – Data Transfer Instructions – Arithmetic – Logical – Boolean Variables Manipulation – Program Branching – Simple Programs: Addition – Subtraction – Multiplication-Division – addressing modes – DPTR pointer register and external memory – stack operation – subroutines.	13	
III	I/O Port Programming and interfacing I/O Port Pins and their Functions – Interface 0804 with 8051 Microcontroller – LCD Interfacing – DAC Interfacing	13	
IV	Timers and Serial Port Programming Programming 8051 Timers – TMOD Register – TCON Register – Mode 1 Programming – Mode 2 Programming – Program for Generating Square Wave Generator using Mode 1 and Mode 2 – Counter Programming	13	
V	Serial Port Programming Basics of Serial Communications – Serial Port Programming – SBUF Register – SCON Register – Simple Program: Transfer and Receive Data Serially – 8051 Interrupts – IE Registers – Interrupt Priority	13	
Reference	Text Books: <ol style="list-style-type: none"> Muhammad Ali Mazidi, Janice GillispieMazidi, Rolin D. Mckinlay, "8051 Microcontroller and Embedded Systems using Assembly and C", Pearson Education 2008. MykePredko, "Programming and customizing the 8051 microcontroller", Tata McGraw Hill 2001. Michael J. Pont, "Embedded C", Pearson Education, First 		

	Edition,2013.	
	Reference Books	
	1. K.UmaRao, AndhePallavi, “ <i>The 8051 Microcontrollers Architecture, Programming and Applications</i> ”, Pearson, Second impression 2011.	
	2. Kenneth.J.Ayala, ” <i>The 8051 Microcontroller</i> ”, Thomson, Third Edition 2007	
	3. ZdraUkoKarakehayou, KnudSmedChristengen, ” <i>Embedded System Design with 8051 Microcontroller</i> ”, Marcel Dekker Inc, First Edition, 2010.:	
	Web References:	
Course Outcomes	On completion of the course, students should be able to	
	CO 1: Understand the basic working of 8051, which is the basic of all microcontroller	K2
	CO 2: Know the working nature of microcontroller architecture, and programming techniques.	K1
	CO 3: Know the fundamentals of port programming and interfacing techniques	K2
	CO 4: Learn the techniques of serial port programming in 8051 and on interrupts.	K4
	CO 5: To apply 8051 Interrupts for the Programming.	K3,K5

Mapping of Cos with PSOs & Pos:

CO/PO	PO						PSO					
	1	2	3	4	5	6	1	2	3	4	5	6
CO1	3	2	1	1	3	3	2	2	1	2	3	1
CO2	3	2	2	1	2	3	2	1	1	3	3	2
CO3	2	3	2	3	2	1	1	3	3	2	1	3
CO4	2	3	2	1	1	3	3	3	2	3	3	3
CO5	3	2	3	2	3	3	3	3	3	3	3	2

Strongly Correlating(S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark
No Correlation (N) - 0 mark

Prepared by	Department of Physics
Verified by	Department of Physics

Programme : B.Sc Computer Science		SEM	IV
Course Code	Title	Hours	Credit
	NMEC - I INTERNET AND WEB DESIGN	2	2
Cognitive Level	K - 1 : Acquire K - 2 : Understand K - 3 : Apply		
Learning Objectives	The Course aims to <ul style="list-style-type: none"> • introduce the fundamentals of HTML markup language • familiarize the various sections of HTML document and basic tags • create a HTML document using ordered and unordered lists and tables • imbibe the knowledge of DHTML, style sheets and HTML frames • design an UI using forms tags 		
UNIT	Content	Hours	
I	Introduction to the Internet: Electronic mail- Remote Login- World wide web-Browsers-Introduction to static, dynamic web pages. Introduction to Html: Designing a home page-History of HTML-HTML Documents-Anchor tags-Sample HTML Documents.	10	
II	Head and Body sections:Header section-Title -Colorful web page-Comment lines. Designing the body section: Heading-Aligning the headings-Horizontal Rule-Paragraph-Tab Setting-Images and Pictures.	5	
III	Ordered and Unordered Lists: List-Unordered lists-Headings in a list-Ordered list-Nested list. Table Handling: Tables-Table creation in HTML-cell spanning Multiple Rows/Columns-Coloring Cells-Column specification	5	
IV	DHTML and Style sheets: Defining styles-Elements of styles-Linking a style sheet to an HTML documents-Inline Styles-Internal and External style sheets-Multiple Styles. Frames: Frameset definition-Frame definition-Nested framesets	5	
V	Forms: Action attribute - Method attribute-Dropdown list - Checkboxes - Radiobuttons-Textfield - Textarea - Password and Hidden fields - Submit and Reset Buttons - Designing sample forms.	5	
Course Outcomes	On completion of the course, students should be able to		
	CO1: design and develop a static web page using HTML	K1, K2	
	CO2: create an user interface using HTML forms	K3	

Mapping of Cos with PSOs & POs:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	S	S	S	S	M	M	S	S	S
CO2	S	S	S	M	M	W	S	S	S	S

Strongly Correlating(S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark
No Correlation (N) - 0 mark

Prepared by	Mrs.D.Nandhini
Verified by	Mrs.K.Deepa

Programme : B.Sc Computer Science		SEM	IV
Course Code	Title	Hours	Credit
	NMEC-I BPO AND HEALTH CARE	2	2
Cognitive Level	K - 1 : Acquire K - 2 : Understand K - 3 : Apply K - 4 : Evaluate K - 5 :Analyze		
Learning Objectives	The Course aims to <ul style="list-style-type: none"> examine the outsourcing from the perspective of its application and implementation in business processes of all sizes describe BPO as a socio-technical phenomenon give a details of BPO Industry and models. focus on India as an outsourcing destination and to discuss relevant functions and sectors in outsourcing. introduce applications of BPO 		
UNIT	Content	Hours	
I	Introduction to BPO: What is BPO - Features of Outsourcing - Effects of BPO in the global trends of outsourcing opportunities - Types of BPO – Voice & Non-Voice Process – Different BPO Domain -Indian’s Strength towards positive outsourcing from US &UK	10	
II	USHC Industry: BPO Industry – Employment Opportunities – Employee Structure – Skill Set Required– Contact Centre BPO – Types of Call Centers –Components and working of a Call center – Issues and Problems.	5	
III	Output Format: Introduction to ANSI and NSF – Objectives - Version & Overview of ANSI - Formats of ANSI - Components & Structure of ANSI - Sample ANSI Layout	7	
IV	Quality: Quality concepts - Quality View Point - Statistical Process Control & QC Techniques - Problem Solving Techniques – Quality Management systems- QMA	5	
V	Human Resource BPO – Reasons for outsourcing HR – Activities involved in HR BPO – HR Outsourcing Trends – Career in HR BPO – Publishing BPO.	3	
Reference	Text Books: Material provided by the Department		
Course Outcomes	On completion of the course, students should be able to		
	CO1: evaluate research and using measurement tools for quality and safety.	K4	
	CO2: access the skills in managing across boundaries - and evaluate how high quality services can best be designed, configured and delivered.	K3	
	CO3: effectively manage people, finances and organizational resources	K3	
	CO4: describe the opportunities and challenges in Indian Context	K1,K2	

	CO5: carry out an organisational development project, demonstrate skills in learning from reflection of this experience and the skills to disseminate their projects.	K3
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Mapping of Cos with PSOs & POs:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	S	S	S	S	M	M	S	S	S
CO2	S	S	S	M	M	W	S	S	S	S
CO3	S	S	S	S	S	S	S	S	M	W
CO4	S	S	S	S	S	M	M	S	S	S
CO5	S	S	S	M	M	W	S	S	S	S

Strongly Correlating(S) - 3 marks
 Moderately Correlating (M) - 2 marks
 Weakly Correlating (W) - 1 mark
 No Correlation (N) - 0 mark

Prepared by	Mrs.D.Nandhini
Verified by	Mrs.V.Priya

Programme : B.Sc Computer Science		SEM	V
Course Code	Title	Hours	Credit
	CC - IX PROGRAMMING IN JAVA	6	5
Cognitive Level	K - 1 : Acquire K - 2 : Understand K - 3 : Apply K - 4 : Evaluate K - 5 : Analyze		
Learning Objectives	The Course aims to <ul style="list-style-type: none"> • identify the distinct properties and features of object orientations. • analyze the name space, exception conditions and concurrency conditions of JAVA • discuss input/output functions in java. • investigate GUI Programming and its applications. • develop applications using Networking, Swing and JDBC. 		
UNIT	Content	Hours	
I	Fundamentals of JAVA: Basic concepts of OOP – Benefits and Applications of OOP - Java Evolution - Overview of Java language – classes and Objects – Arrays , Strings and Vectors- Constructors - Garbage collection - The finalize method - Method overloading – this, static and final usage - Nested and Inner classes – Inheritance – Method overriding – abstract methods and abstract classes – final methods and final classes.	20	
II	Concepts of Java: Interfaces – Packages – Exception Handling: Types of Exception – try and catch – Nested try – throw and throws – Multithreading: Thread Life Cycle – Thread Exceptions – Thread Priority – Synchronization.	15	
III	I/O Streams: Stream Classes – Byte Stream – Character Stream – I/O Exceptions- Sequential Files. Networking Basics - Socket Programming - Proxy server - TCP/IP Sockets - Net address-datagram.	15	
IV	Introducing Swing: swing- components and containers - the swing packages - Exploring Swing: JLabel and ImageIcon - JTextField - The Swing Buttons - JTabbed Pane - JScroll Pane - JComboBox - Trees- JTable.	20	
V	Applet Programming: Applet Life Cycle – HTML applet tag – Passing parameters to Applets - Java Database Connectivity: Establishing Connection – Creation of data tables – Entering data into the tables – Table Updating – Use of Prepared Statements – Result Sets – Stored Procedures.	20	
Reference	Text Books: <ol style="list-style-type: none"> 1. Patrick Naughton and Herbert Schildt, “ JAVA – The CompleteReference”, Ninth Edition, Tata-McGraw-Hill, New Delhi, 2002, ISBN: 9780071808569. 2. C. Muthu, “Programming with Java”, Vijay Nicole Imprints Pvt. Ltd., 		

	<p>Chennai, 2004. (Unit V). ISBN 981-254-265-5.</p> <p>3. Cays Horstmann and Gary Cornell, "Core Java", Volume II, Pearson Edition, 2001, ISBN: 978-0137081899 and 978-0137081608</p> <p>Reference Books:</p> <p>1. P. RadhaKrishna, "Object Oriented Programming through JAVA", Universities Press, 2007.</p> <p>2. E. Balagurusamy, "Programming with Java A Primer 3e", Tata McGraw Hill Publishing Company Ltd., ISBN 0-07-061713-9.</p> <p>Web References:</p> <p>1. URL: http://Docs.oracle.com/javase/tutorials/java/index.html</p> <p>2. URL: http://javabeginnerstutorial.com/core-java</p> <p>3. URL: http://www.w3schools.in/java-tutorial/</p> <p>4. URL: http://Docs.oracle.com/javase/tutorials/java/index.html</p> <p>5. URL: http://javabeginnerstutorial.com/core-java</p> <p>6. URL: http://www.w3schools.in/java-tutorial/</p>	
Course Outcomes	On completion of the course, students should be able to	
	CO1: identify the distinct properties and features of Object Orientations using JAVA	K1,K2
	CO2: analyze the name space, Exception conditions and concurrency condition in JAVA using package and Exception handling and Thread.	K5
	CO3: discuss Input/Output functions with file manipulations using I/O Streams.	K3
	CO4: analyze GUI programming applications using AWT packages.	K5
	CO5: plan to develop Java based applications using GUI and user interface and database Connectivity.	K4

Mapping of Cos with PSOs & POs:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	S	S	S	S	W	W	S	S	S
CO2	S	S	S	M	M	S	S	S	W	M
CO3	S	S	S	S	S	S	S	M	M	S
CO4	S	S	S	S	S	S	M	M	S	S
CO5	S	S	S	S	S	S	S	M	M	S

Strongly Correlating (S)	-	3 marks
Moderately Correlating (M)	-	2 marks
Weakly Correlating (W)	-	1 mark
No Correlation (N)	-	0 mark

Prepared by	Mrs.V.Priya
Verified by	Ms.P.Kalpana

Programme : B.Sc Computer Science		SEM	V
Course Code	Title	Hours	Credit
	CC - X PRINCIPLES OF OPERATING SYSTEM	5	5
Cognitive Level	K - 1 : Acquire K - 2 : Understand K - 3 : Apply K - 4 : Evaluate K - 5 : Analyze		
Learning Objectives	The Course aims to <ul style="list-style-type: none"> • learn about the types, design, implementation of operating system and I/O programming concepts. • cover the policies of different memory management schemes. • gain knowledge of processor management. • study the concepts of device management. • know about the management of information. 		
UNIT	Content	Hours	
I	Evolution of Operating systems - Types of Operating System - Different views of OS Design and Implementation of Operating Systems – I/O programming concepts- Interrupt structure & processing	15	
II	Memory Management: - Single Contiguous Allocation- Partitioned Allocation- Relocatable Partitioned Allocation-Paged and Demand paged Memory management- Segmented Memory Management-Segmented and Demand paged Memory Management-Swapping and overlay techniques.	10	
III	Processor Management: Job scheduling-process scheduling- Functions and policies-Evaluation of Round Robin Multiprogramming Performance-Process Synchronization-Race condition – Synchronization mechanism – Deadly embrace - Prevention and Detect and Recover methods.	15	
IV	Device Management:- Techniques for Device Management- Device Characteristics - I/O Traffic Controller, I/O scheduler, I/O Device Handlers-Virtual Devices - Spooling.	20	
V	Information Management: Simple File System, General model of a File system, Physical and Logical File systems.	15	
Reference	Text Books: <ol style="list-style-type: none"> 1. Stuart E.Madnick and John J.Donavan, “<i>Operating Systems</i>”,Tata McGraw Hill Book Company Ltd, Third Edition, ISBN 0-07-039455-5. Reference Books: <ol style="list-style-type: none"> 1. Milan Milenkovic, “<i>Operating Systems (Concepts and Design)</i>”, Tata McGraw Hill Publishing Company Limited, New Delhi 1999, ISBN 0-07-463272-82. Web References:		

	1. www.geeksforgeeks.org 2. www.tutorialspoint.com 3. www.studytonight.com	
Course Outcomes	On completion of the course, students should be able to	
	CO1: understand the types, design, implementation of operating system and I/O programming concepts	K2
	CO2: recognize the management of main and virtual memory schemes.	K1
	CO3: work out different scheduling algorithms.	K3
	CO4: analyze the management of devices.	K4
	CO5: understand and analyze the information management.	K5

Mapping of Cos with PSOs & POs:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	S	S	S	S	M	M	S	S	S
CO2	S	S	S	M	M	W	S	S	S	S
CO3	S	S	S	S	S	S	S	S	M	W
CO4	S	S	S	S	S	M	M	S	S	S
CO5	S	S	S	M	M	W	S	S	S	S

Strongly Correlating(S) - 3 marks
 Moderately Correlating (M) - 2 marks
 Weakly Correlating (W) - 1 mark
 No Correlation (N) - 0 mark

Prepared by	Mrs. K.Saraswathi
Verified by	Dr.K.Mani

Programme : B.Sc Computer Science		SEM	V
Course Code	Title	Hours	Credit
	CC- XI COMPUTER SYSTEM ARCHITECTURE	6	5
Cognitive Level	K - 1 : Acquire K - 2 : Understand K - 3 : Apply K - 4 : Evaluate K - 5 : Analyze		
Learning Objectives	The Course aims to <ul style="list-style-type: none"> • introduce the basic concepts of Computer Organization, Design, programming concepts and basic computer arithmetic. • deal with input - output and memory organization concepts. • understand the basic structure and operation of digital computer. • expose the concept of computer arithmetic. • expose with different ways of communicating with I/O devices and standard I/O interfaces. • familiarize with hierarchical memory system including cache memories and virtual memory. 		
UNIT	Content	Hours	
I	Basic Computer Organization and Design: Instruction Codes – Computer registers – Computer Instructions – Timing and Control – Instruction Cycle – Memory reference Instructions – Input – Output and Interrupt	20	
II	Central Processing Unit: Introduction – General Register Organization – Stack Organization – Instruction Formats – Addressing Modes – Data Transfers and Manipulation-Program control.	20	
III	Computer Arithmetic: Introduction – Addition and Subtraction Algorithm – Multiplication Algorithms – Division Algorithms – Decimal Arithmetic Unit – Decimal Arithmetic Operators	15	
IV	Input – Output Organization: Peripheral Devices – I – O Interface – Asynchronous Data Transfer – Modes of Transfer – Priority Interrupt – DMA.	20	
V	Memory Organization: Memory Hierarchy - Main Memory – Auxiliary Memory - Associative memory – Cache memory – Virtual memory.	15	
Reference	Text Books: <ol style="list-style-type: none"> 1. M. Morris Mano, “<i>Computer System Architecture</i>”, Prentice Hall of India Private Ltd, New Delhi. Third Edition, ISBN 81-203-0855-7. Reference Books: <ol style="list-style-type: none"> 1. Thomas c Bartee, “<i>Computer Architecture and Logic Design</i>”, McGraw – Hill, 1991, ISBN 0070039097, 9780070039094. Web References: <ol style="list-style-type: none"> 1. www.studytonight.com/ 2. www.tutorialspoint.com/computer_logical_organization/ 		

	3. www.studytonight.com 4. http://nptel.ac.in/ 5. en.wikipedia.org/wiki/Computer_architecture 6. www.slideshare.net/.../basic-computer-architecture 7. www.slideshare.net/.../computer-arithmetic 8. www.webopedia.com/.../computer-architecture 9. www.elsevier.com/.../computer-architecture
Course Outcomes	On completion of the course, students should be able to
	CO1: understand the basics of computer arithmetic K1,K2
	CO2: know the importance and functions of CPU, ALU K3
	CO3: understand the memory and input-output organization K4,K5

Mapping of Cos with PSOs & POs:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	S	S	M	M	S	S	S	S	M
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	S	M	M	W	S	S	S	S	S

Strongly Correlating(S) - 3 marks
 Moderately Correlating (M) - 2 marks
 Weakly Correlating (W) - 1 mark
 No Correlation (N) - 0 mark

Prepared by	Dr.A.R.Ponperiyasami
Verified by	Dr.M.Muralidharan

Programme : B.Sc Computer Science		SEM	V
Course Code	Title	Hours	Credit
	CC - XII JAVA AND SYSTEM ADMINISTRATION LAB	6	4
Cognitive Level	K - 1 : Acquire K - 2 : Understand K - 3 : Apply K - 4 : Evaluate		
Learning Objectives	The Course aims to <ul style="list-style-type: none"> • provide a practical exposure to OOPs concept using JAVA programming • introduce practical knowledge to the advanced concepts viz., Applet, AWT, SWING and database connectivity • familiarize the fundamentals and system administration using LINUX OS 		
	Content		
	<p style="text-align: center;">Programming in JAVA</p> <ol style="list-style-type: none"> 1. Basic Syntax 2. Control structures 3. Arrays 4. String Manipulation 5. Classes and objects 6. Constructors 7. Method Overloading 8. Abstract class 9. Inheritance 10. Method overriding 11. 'static', 'This', 'Final' and 'super' keyword 12. Packages 13. Interfaces 14. Exception handling 15. Thread 16. Streams 17. AWT and SWING 18. Applet 19. Database connectivity <p style="text-align: center;">System Administration</p> <ol style="list-style-type: none"> 1. Linux Installation 2. Linux Basic Commands 3. Usage of date command 4. Usage of du & df commands 5. User account management 6. Shutdown the system 7. Usage of find, cron, at, wall & crontab 8. Troubleshooting Practice 		

Course Outcomes	On completion of the course, students should be able to	
	CO1: implement simple softwares using JAVA	K1,K3
	CO2: install LINUX operating system	K2
	CO3: apply basic commands and solve simple administrative tasks using LINUX	K4

Mapping of Cos with PSOs & POs:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	S	S	S	S	S	S	S	S	M
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	S	M	S	M	S	S	S	S	W

Strongly Correlating(S) - 3 marks
 Moderately Correlating (M) - 2 marks
 Weakly Correlating (W) - 1 mark
 No Correlation (N) - 0 mark

Prepared by	Ms.P.Kalpna and Mrs. V. Priya
Verified by	Mrs.V.Priya and Ms.P.Kalpna

Programme : B.Sc Computer Science		SEM	V
Course Code	Title	Hours	Credit
	EC-I WAP and WML	5	5
Cognitive Level	K - 1 : Acquire K - 2 : Understand K - 3 : Apply K - 4 : Evaluate K - 5 : Analyze		
Learning Objectives	The Course aims to <ul style="list-style-type: none"> • study the WAP and its architecture • learn about WAP gateway • understand the basics of WML and its features • provide exposure to WML Script • provide knowledge about securing applications 		
UNIT	Content	Hours	
I	Overview of WAP: WAP and the wireless world – WAP application architecture – WAP internal structure – WAP versus the Web – WAP 1.2 – WTA and push features. Setting up WAP: Available software products – WAP resources – The Development Toolkits.	15	
II	WAP gateways: Definition – Functionality of a WAP gateway – The Web model versus the WAP model – Positioning of a WAP gateway in the network – Selecting a WAP gateway.	15	
III	WML: Basics of WML - WML structure - WML card - Text formatting - Navigation - Advanced Display Features - Interaction with the user: Making a selection - events - variables- Input and parameter passing.	15	
IV	WML Script: Lexical structure - variables and literals - operators - Automatic data type conversion - control constructs - Functions: using standard library - Pragmas - Dealing with errors.	15	
V	Secure Applications: Introduction - Security Basics: Wireless security setup - WAP Security Architecture: Sample Configuration of WAP technology- Comparison between WAP and Internal Protocol Layers - Session Management: Client Authentication - WML for secure applications.	15	
Reference	Text Books: <ol style="list-style-type: none"> 1. Charles Arehart and Others. "Professional WAP with WML, WML script, ASP, JSP, XML, XSLT, WTA Push and Voice XML", Shroff Publishers and Distributors Pvt. Ltd, ISBN: 9781861004048, 2000. (For unit I to IV) 2. "WAP and WML", Lovely Professional University, Phagwara, Excel Books private Limited, Copyright @ 2012, Tapas Mahapatra. (For unit - V) Reference Books: <ol style="list-style-type: none"> 1. Martin Frost, "Learning WML and WMLScript", O'Reilly Media, Inc, ISBN: 		

	1565929470,2000. 2. Kris Jamsa, "WML and WML Script : A Beginner's Guide", Osborne/McGraw-Hill, ISBN: 0-07-219294-1, 2001.	
Course Outcomes	On completion of the course, students should be able to	
	CO1: understand the WAP architecture	K1, K2
	CO2: analyze the WAP gateway	K3
	CO3: demonstrate the WML concepts	K3
	CO4: solve problems using WML Script	K4
	CO5: apply the methodologies for securing applications	K5

Mapping of Cos with PSOs & POs:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	S	S	S	S	S	W	S	S	M
CO2	S	S	S	S	S	S	S	S	S	M
CO3	S	S	S	M	M	S	S	M	W	S
CO4	S	S	S	S	S	S	S	S	S	M
CO5	S	S	S	M	M	S	S	M	W	S

Strongly Correlating(S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark
No Correlation (N) - 0 mark

Prepared by	Ms.P.Kalpana
Verified by	Dr.K.Sridevi

Programme : B.Sc Computer Science		SEM	V
Course Code	Title	Hours	Credit
	EC-II PRINCIPLES OF COMPUTER GRAPHICS	5	5
Cognitive Level	K - 1 : Acquire K - 2 : Understand K - 3 : Apply K - 4 : Evaluate K - 5 : Analyze		
Learning Objectives	The Course aims to <ul style="list-style-type: none"> • introduce the concepts of computer graphics. • gain knowledge about graphics hardware devices and software used. • understand the two dimensional graphics and their transformations. • understand the three dimensional graphics and their transformations. • be familiar with understand clipping techniques. 		
UNIT	Content	Hours	
I	Introduction: Applications of Computer Graphics, Raster Scan System, Random Scan System, Raster Scan Display Processors. Output Primitives: Points and Lines – Line Drawing Algorithms, Mid-Point Circle and Ellipse Algorithms	15	
II	Two Dimensional Geometric Transformations- Matrix Representations and Homogeneous Coordinates, Composite Transformations, Transformations between Coordinate Systems – Two Dimensional Clipping and Viewing: The viewing pipeline, Viewing coordinate reference Frame, Window to View-port Coordinate transformation, viewing functions, Cohen-Sutherland and Sutherland Hodgeman Polygon clipping algorithm.	15	
III	Graphics Structures – Hierarchical modeling – Graphical User Interfaces and Interactive Input Methods	15	
IV	3-D Object Representation: Polygon surfaces, Quadric surfaces, Splin representation, Hermite Curve, Bezier Curve and B-Spline Curve, Bezier and B-Spline surfaces - Three Dimensional Geometric Transformations: Three Dimensional Viewing, Clipping, Projections (Parallel and Perspective).	15	
V	Visible Surface Detection Methods: Classification, back-face Detection, Depth-buffer, scan-line and depth sorting– Computer animation.	15	
Reference	Text Books: <ol style="list-style-type: none"> 1. Donald Hearn and M.Pauline Baker, “<i>Computer Graphics C Version</i>”, Pearson Education 2003, Second Edition, ISBN 0-13-530924-7. 2. John F. Hughes, Andries Van Dam, Morgan Mc Guire, David F. Sklar, James D. Foley, Steven K. Feiner and Kurt Akeley , "Computer Graphics: Principles and Practice", 3rd Edition, AddisonWesley Professional, 2013. Reference Books: <ol style="list-style-type: none"> 1. Foley, Vandam, Feiner, Huges, “<i>Computer Graphics: Principles & Practice</i>”, Pearson Education, Second Edition 2003, ISBN: 0201121107, 9780201121100. 2. Donald Hearn and M. Pauline Baker, Warren Carithers, "Computer Graphics 		

	with Open GL", 4th Edition, Pearson Education, 2010.	
	Web References:	
	1. en.wikipedia.org/wiki/2D_computer_graphics	
	2. en.wikipedia.org/wiki/3D_computer_graphics	
	3. www.overdrivepc.com/computer_graphics_hearn_baker_solution_manual.pdf	
	4. www.edx.org/course/computer-graphics	
	5. www.cgmeetup.net/home/	
Course Outcomes	On completion of the course, students should be able to	
	CO1: design two dimensional graphics.	K3
	CO2: apply two dimensional transformations.	K3
	CO3: design three dimensional graphics.	K4
	CO4: apply three dimensional transformations.	K3
	CO5: apply clipping techniques to graphics.	K3, K4
	CO6: design animation sequences.	K1, K2

Mapping of Cos with PSOs & POs:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	S	S	S	S	S	S	S	M	W
CO2	S	S	S	S	S	S	S	S	S	M
CO3	S	S	M	S	S	M	S	S	S	S
CO4	S	S	S	M	S	S	M	S	S	S
CO5	S	S	M	S	S	M	S	S	S	S
CO6	S	S	S	M	S	S	M	S	S	S

Strongly Correlating(S) - 3 marks
 Moderately Correlating (M) - 2 marks
 Weakly Correlating (W) - 1 mark
 No Correlation (N) - 0 mark

Prepared by	Mrs.K.Deepa
Verified by	Mrs.K.Saraswathi

Programme : B.Sc Computer Science		SEM	V
Course Code	Title	Hours	Credit
	EC-III SERVICE ORIENTED ARCHITECTURE	5	5
Cognitive Level	K - 1 : Acquire K - 2 : Understand K - 3 : Apply K - 4 : Evaluate K - 5 : Analyze		
Learning Objectives	The Course aims to <ul style="list-style-type: none"> • study the concepts of software architecture, Service Oriented Architecture evolution, enterprise-wide SOA and applications. • learn about the design and technologies of SOA. • know related technologies and implementation basics of SOA. • obtain the knowledge of web services security and its related technologies. • cover the policies for transactions processing and specifications 		
UNIT	Content	Hours	
I	Software Architecture – Types of IT Architecture – SOA – Evolution – Key components – perspective of SOA – Enterprise-wide SOA – Architecture – Enterprise Applications – Solution Architecture for enterprise application	10	
II	Service-oriented Analysis and Design – Design of Activity, Data, Client and business process services – Technologies of SOA – SOAP – WSDL – JAX – WS – XML WS for.NET.	15	
III	SOA implementation and Governance – strategy – SOA development – SOA governance – trends in SOA – event-driven architecture – software as a service – SOA technologies.	15	
IV	Meta data management – XML security – XML signature – XML Encryption – SAML – XACML – XKMS – WS-Security – Security in web service framework – advanced messaging	20	
V	Transaction Processing –Overview-The Transaction Paradigm – Impact of web services on Transactions-Protocols and Coordination – Transaction Specifications.	15	
Reference	Text Books: <ol style="list-style-type: none"> 1. Shankar Kambhampaly, "<i>Service-Oriented Architecture for Enterprise Applications</i>", Wiley India Pvt Ltd, 2008. 2. Eric Newcomer, Greg Lomow, "<i>Understanding SOA with Web Services</i>", Pearson Education. 3. Mark O' Neill, et al., "<i>Web Services Security</i>", Tata McGraw-Hill Edition, 2003. Reference Books: <ol style="list-style-type: none"> 1. Ron Schmelzer et al. "XML and Web Services", Pearson Education, 2002. 2. Thomas Erl, "Service Oriented Architecture: Concepts, Technology, and Design", Pearson Education, 2005. 3. Frank P.Coyle, "XML, Web Services and the Data Revolution", 		

	Pearson Education, 2002	
	Web References:	
	1. http://snsce.snscourseware.org/notes.php?cw=CW_5869ea2881d33	
	2. http://studentsfocus.com/it6801-soa-notes-service-oriented-architecture-lecture-handwritten-notes-cse-7th-sem-anna-university/	
	3. http://www.professionalcipher.com/2017/07/service-oriented-architecture-soa-notes.html	
	4. https://www.tutorialspoint.com/amazon_web_services/	
Course Outcomes	On completion of the course, students should be able to	
	CO1: understand the software architecture, SOA evolution enterprise wide SOA and its applications.	K2
	CO2: analyze the design and technologies of SOA	K4
	CO3: identify the related technologies and implementation basics of SOA.	K1,K5
	CO4: understanding of the meta data management and web services security.	K2
	CO5: recognize the transaction processing and specifications	K4

Mapping of Cos with PSOs & POs:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	S	W	S	S	W	S	S	S	S
CO2	S	S	S	S	S	M	S	S	S	M
CO3	S	S	S	S	S	S	S	M	M	S
CO4	S	S	S	S	S	S	S	S	S	M
CO5	S	S	S	S	S	S	S	S	M	W

Strongly Correlating(S) - 3 marks
 Moderately Correlating (M) - 2 marks
 Weakly Correlating (W) - 1 mark
 No Correlation (N) - 0 mark

Prepared by	Mrs.K.Saraswathi
Verified by	Ms.P.Kalpana

Programme : B.Sc Computer Science		SEM	V
Course Code	Title	Hours	Credit
	NMEC II - OFFICE AUTOMATION LAB	2	2
Cognitive Level	K - 1 : Acquire K - 2 : Understand K - 3 : Apply K - 4 : Evaluate K - 5 : Analyze		
Learning Objectives	The Course aims to <ul style="list-style-type: none"> • introduce the preparation of documentation using word processor • inculcate the knowledge of using spreadsheets for computations • provide the knowledge of preparing presentations 		
	Content		
	WORD		
	1. i) Create a document, save it and edit the document as follows: <ol style="list-style-type: none"> a. Cut, Copy, Paste options. b. Find and Replace options. c. Undo and Redo options. ii) Format the document: <ol style="list-style-type: none"> a. Using Bold, Underline and Italic. b. Change Character style and size. c. Formatting paragraph: Center, Left aligns & Right align d. Changing paragraph and line spacing, Using Bullets and Numbering in Paragraphs. e. Creating Hanging Paragraphs 2. Enhance the documents using Header, Footer, Page Setup, Border, Page number, watermarking, Orientation and Print Preview. 3. Insert tables and pictures in a document as follows <ol style="list-style-type: none"> a. Creating Tables in a document, Selecting Rows & Column sort the record b. Insert a picture – edit size and add name of the picture above it. c. Also do basic text formatting like – bold, italic, underline, alignments etc in table., 4. Using mail merge, send an invitation /notice (by creating the invitation/notice) for the following situation (at least 5 addresses to be entered) (Any one of the following) <ol style="list-style-type: none"> a. For opening a new branch b. Inauguration function c. Informing about new scheme or offer 		
	SPREADSHEET		
	5. <ol style="list-style-type: none"> a. Create a worksheet, moving/ copying/ inserting/ deleting rows and columns (usage of cut, paste, commands, copying a single cell, copying a range of data, filling up a cell. Undo command, 		

	<p>inserting a row, column, deleting rows and columns).</p> <p>b. Formatting worksheets Bold, Italic, Font size changing, Auto fill, date format, Currency format.</p> <p>6. Open an excel and create fields as follows</p> <table border="1"> <tr> <td>S.No</td> <td>Name of the student</td> <td>M1</td> <td>M2</td> <td>M3</td> <td>M4</td> <td>M5</td> <td>Total</td> <td>Avg</td> <td>Result</td> <td>Grade</td> </tr> </table> <p>i. Enter S.No, Name, marks for 10 students ii. Find total and average using formula. iii. Find Result whether the student is pass or fail and also assign grade as per our university norms. iv. Insert a column chart showing the comparison of marks in different subjects of different students.</p> <p>7. i) Creating and running a macro. ii) Assigning button to a defined macro. iii) Editing a macro.</p> <p style="text-align: center;">PRESENTATION</p> <p>8. Create a presentation with apply background/Themes, apply custom animation on text, insert images/word art and animate the images with effects. 9. Create “My album” use photos, audio, and videos with necessary Transition Effects 10. Making an Organization Structure in Power Point Starting an organization chart, Entering names and Titles, Adding Members, Formatting the Boxes, Text and Lines, Rearranging the Org Chart, Finishing the Chart.</p>	S.No	Name of the student	M1	M2	M3	M4	M5	Total	Avg	Result	Grade	
S.No	Name of the student	M1	M2	M3	M4	M5	Total	Avg	Result	Grade			
Course Outcomes	On completion of the course, students should be able to												
	CO1: create documents, apply formatting, editing text and paragraphs	K1											
	CO2: create document with tables	K2											
	CO3: create a document with mail merge	K3											
	CO4: use spreadsheet for calculations and apply formatting	K3											
	CO5: apply macro concept	K5											
	CO6: prepare a presentation for a seminar	K4											

Mapping of Cos with PSOs & POs:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	W	S	S	S	M
CO3	S	S	S	S	S	S	S	M	M	S
CO4	S	S	S	S	S	M	S	S	S	S
CO5	S	S	S	S	S	S	S	S	M	S
CO6	S	S	S	S	S	S	S	S	M	S

Strongly Correlating(S)	-	3 marks
Moderately Correlating (M)	-	2 marks
Weakly Correlating (W)	-	1 mark
No Correlation (N)	-	0 mark

Prepared by	Mr.P.Kalpana
Verified by	Dr.M.Muralidharan

Programme : B.Sc Computer Science		SEM	V
Course Code	Title	Hours	Credit
	NMEC-II IMAGE EDITING TOOLS LAB	2	2
Cognitive Level	K - 1 : Acquire K - 2 : Understand K - 3 : Apply		
Learning Objectives	The Course aims to <ul style="list-style-type: none"> • learn the concepts of layer masking, image conversion and creating own backgrounds • provide various effects to the images • introduce various techniques involved in animation 		
	Content		
	Exercises using GIMP <ol style="list-style-type: none"> 1. Two Images Layer Masking 2. Compose old Images to New Images 3. Convert New Images into old Images 4. Wind Effect on an Image 5. Create own Background Using Various Tools 6. Color Management 7. Pattern Filling 8. Image Slicing with path Tool and Marquee Tool 9. Creating a Blazing Flame Text 10. A simple Animation 		
Course Outcomes	On completion of the course, students should be able to		
	CO1: apply various animation techniques		K1,K3
	CO2: apply various concepts of image editing using GIMP tool		K2,K3

Mapping of Cos with PSOs & POs:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	S	S	S	S	M	M	S	S	M
CO2	S	S	S	S	S	S	S	S	S	M

Strongly Correlating(S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark
No Correlation (N) - 0 mark

Prepared by	Mrs.D.Nandhini
Verified by	Mrs.K.Saraswathi

Programme : B.Sc Computer Science		SEM	VI
Course Code	Title	Hours	Credit
	CC - XIII COMPUTER NETWORKS	6	5
Cognitive Level	K - 1 : Acquire K - 2 : Understand K - 3 : Apply K - 4 : Evaluate K - 5 :Analyze		
Learning Objectives	The Course aims to <ul style="list-style-type: none"> • comprehend the basic types of networks, its classifications and properties • recognize how data is communicated through network. • acquire the design of the Data Link Layer. • conversant with Network Layer functionalities. • cognize the Transport Layer. • ability to know the Application Layer. 		
UNIT	Content	Hours	
I	Introduction: Uses of Computer Networks – Network Hardware – Network Software – The Reference Model. The Physical Layer: Concepts of Guided Transmission Media – Wireless Transmission – The Telephone System.	15	
II	Data Link Layer: Data Link Layer Design Issues – Error Detection and Correction – Elementary Data Link Protocols –Elementary Data Link Protocol. The Medium Access Control Sub layer : The Channel Allocation Problem – Wireless LANs – Bridges.	20	
III	Network Layer : Network Layer Design issues – Routing Algorithms – The Optimality Principle – Shortest Path Routing – Flooding – Distance Vector Routing – Link State Routing – Hierarchical Routing – Broadcast Routing – Multicast Routing – Congestion Control Algorithms	15	
IV	Transport Layer: The Transport Service – Elements of Transport protocols – A simple Transport protocol – The TCP Protocol – The TCP Segment Header – UDP.	15	
V	Application Layer :Network Security – Cryptography – Symmetric Key algorithm: DES - IDEA – Public Key algorithm: RSA - DNS – Concepts of Email, SNMP,WWW,FTP,MIME.	25	
Reference	Text Books: <ol style="list-style-type: none"> 1. Andrews S. Tannenbaum, “<i>Computer Networks</i>”, Prentice Hall of India, New Delhi, Fifth Edition, ISBN-13: 978-0132126953 Reference Books: <ol style="list-style-type: none"> 1. Behrouz A. Forouzan, “<i>Data Communication and Networking</i>”, Tata McGraw Hill, New Delhi 2013, Fifth Edition,ISBN: 0073376221. Web References: <ol style="list-style-type: none"> 1. http://iips.icci.edu.iq/images/exam/Computer-Networks---A-Tanenbaum---5th-edition.pdf 2. my.fit.edu/~vkepuska/ece4561/0132127067_ppt-125189/Chapter1-https://www.ce.yildiz.edu.tr/personal/gokhan/file/763/Chapter5- 		

	NetworkLayer.ppt 3. ant.comm.ccu.edu.tw/course/103_Computer_Networking/1_Lecture/ch2.ppt	
Course Outcomes	On completion of the course, students should be able to	
	CO1: comprehend the basic types of networks, its classifications and properties of OSI and TCP/IP reference models	K1
	CO2: recognize the guided and unguided media for communication	K2
	CO3: acquire the design of the Data Link Layer with Data Link layer Protocols.	K1
	CO4: create the shortest paths between two nodes using various routing algorithms.	K3
	CO5: recognize the Transport Layer with TCP/IP and UDP protocols.	K4
	CO6: ability to know the Application Layer using Protocols like SNMP, WWW, FTP, MIME and security	K5

Mapping of Cos with PSOs & POs:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	S	S	S	M	M	S	S	S	M
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	M	M	M	S	S	S	S
CO4	S	S	S	S	S	M	M	S	S	S
CO5	S	S	S	M	M	M	S	S	S	S
CO6	S	S	S	S	S	M	M	S	S	S

Strongly Correlating(S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark
No Correlation (N) - 0 mark

Prepared by	Mrs. V.Priya
Verified by	Dr.K.Mani

Programme : B.Sc Computer Science		SEM	VI
Course Code	Title	Hours	Credit
	CC - XIV SOFTWARE ENGINEERING	6	5
Cognitive Level	K - 1 : Acquire K - 2 : Understand K - 3 : Apply K - 4 : Evaluate K - 5 : Analyze		
Learning Objectives	The Course aims to <ul style="list-style-type: none"> provide the basic concepts, principal, and techniques of Software Engineering. introduce the phases of Software Development Life Cycle. inculcate the formal process that are employed for software projects in designing, developing, testing and deploying. comprehend how to verify and validate, implement, apply and maintain software system. learn how to develop the software projects using modern engineering techniques and tools. 		
UNIT	Content	Hours	
I	Introduction to Software Engineering: Definitions-Size Factors-Quality and Productivity Factors-Managerial Issues-Planning a Software Product: Defining the Problem-Developing the Solution Strategy-planning the development process-Planning the Organization Structure	15	
II	Software Analysis: Software cost factors-Software Cost Estimation Techniques-Staffing level Estimation-Estimating Software Maintenance Costs-The Software requirements Specification-Formal Specification Technique	15	
III	Software Design: Fundamental Design Concepts-Modules and Modularization Criteria-Design Notations-Design Techniques - Design Guide lines.	20	
IV	Implementation: Structured coding techniques-Coding Style - Standards and guidelines-Documentation Guidelines	20	
V	Testing: Quality Assurance - Walkthroughs and Inspections-Static Analysis-Symbolic Execution- Unit testing and debugging - System Testing - Formal Verification Maintenance: Enhancing Maintainability during development – Managerial aspects of Software Maintenance-Source Code Metrics.	20	
Reference	Text Books: <ol style="list-style-type: none"> Richard Fairley, “<i>Software Engineering Concepts</i>”, Tata McGraw-Hill, 2nd Edition. ISBN 0-07-463121-7 Reference Books: <ol style="list-style-type: none"> Roger S. Pressman, “<i>Software Engineering – A Practitioner’s Approach</i>”, 6th Ed., McGraw Hill International, 2005. Ian Sommerville, “<i>Software Engineering</i>”, Addison Wesley, Singapore, 2002 K.K. Agarwal & Yogesh Singh, “<i>Software Engineering</i>”, New Age 		

	International Publishers, Revised Second Edition, 2005.	
	Web References: 1. http://www/tutorialspoint/software engineering.	
Course Outcomes	On completion of the course, students should be able to	
	CO1: demonstrate the ability to develop a high quality software system while working in a project group	K3
	CO2: design architectural design for different environment	K1,K2
	CO3: produce efficient, reliable, robust and cost effective software solution	K4
	CO4: expose the realities involved in developing software products for clients	K5
	CO5: design, build and maintain large software systems	K3

Mapping of Cos with PSOs & POs:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	W	M	S	S	W	W
CO4	M	S	S	S	S	S	S	S	M	M
CO5	S	S	S	S	S	S	S	W	M	S

Strongly Correlating(S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark
No Correlation (N) - 0 mark

Prepared by	Mrs. P.Isabella
Verified by	Mrs.V.Priya

Programme : B.Sc Computer Science		SEM	VI
Course Code	Title	Hours	Credit
	EC-IV WEB TECHNOLOGY	5	5
Cognitive Level	K - 1 : Acquire K - 2 : Understand K - 3 : Apply K - 4 : Evaluate K - 5 : Analyze		
Learning Objectives	The Course aims to <ul style="list-style-type: none"> • introduces the basic concepts of HTML and style sheet • learn how client side script works with JavaScript • learn the server side programming concepts using PHP • incorporate MySQL concepts • inculcate the knowledge of interacting with database with PHP 		
UNIT	Content	Hours	
I	HTML: Basic HTML, The Document body, Text, Hyperlinks, Adding more formatting, Lists, Tables, Using colors and images, Images, Multimedia objects, Frames, Forms-towards interactivity, Cascading Style Sheets: Introduction, Using styles: Simple examples, Defining your own styles, Properties and values in styles	15	
II	Client Side Scripting : JavaScript: JavaScript—The basics, Variables, String manipulation, Mathematical functions, Statements, Operators, Arrays, Functions- Data and objects in java script, Regular expressions, Exception Handling, Built in objects, Events. Dynamic HTML with Java Script: Data validation, Opening a new window, Messages and Confirmations, The status bar, writing to a different frame, Rollover buttons, Moving images, multiple pages in a single download, A text-only menu system, Floating logos	15	
III	Server Side Scripting: PHP: evolution of PHP – structure and syntax of PHP and integrating the same with HTML – comments – variables – data types – operators – control structures – passing information between pages – Strings – Arrays and Functions.	15	
IV	MySQL Databases: SQL tutorial(DDL, DML, DCL) - MySQL introduction – data types in MySQL – Pattern Matching – GroupBy – IS NULL – DISTINCT Optimization – Max and Min function – Using auto increment	15	
V	Integration of Apache, MySQL, PHP to design dynamic web pages: MySQL functions in PHP – Connecting and disconnecting from MySQL – Using tables – form design – editing the database – Validation – Handling and avoiding errors	15	
Reference	Text Books: <ol style="list-style-type: none"> 1. Timothy Boronczyk, Michael, Elizabeth Naramore, Jason Gerner, Yann Le Scouarnec, Jeremy Stolz,, Michael K. Glass “Beginning PHP6, Apache, MySQL® Web Development”, Wiley Publishing, 		

	<p>2009 Edition.ISBN-13: 978-8126521227.</p> <p>2. Chris Bates, “Web Programming Building Internet Applications”, Third Edition, Wiley, 2007, ISBN-10: 0470017759.</p> <p>Reference Books:</p> <ol style="list-style-type: none"> 1. Robin Nixon,“Learning PHP, MySQL &JavaScript With jQuery, CSS & HTML5” 2. O’Reilly Media, Fourth edition,December 2014, ISBN:978-1-491-91866-1. 3. <u>David R. Brooks</u>, “An Introduction to HTML and JavaScript for Scientists and Engineers”,Springer-Verlag London Limited 2007, ISBN-13: 978-1-84628-656. 4. Michael K Glass, Yann Le Scouarnec, Elizabeth Naramore, Gary Mailer, Jeremy Stolz, Jason Gerner, “Begining PHP, Apache, MySQL Web Development”, Wiley dreamtech press, 2004 edition. ISBN: 9780764557446 <p>Web References:</p> <ol style="list-style-type: none"> 1. php.net/manual/en/intro-what-is.php 2. https://teamtreehouse.com/tracks/beginning-php 3. https://www.mysql.com/ 4. https://www.w3schools.com/Php 5. https://www.w3schools.com/js/ 	
Course Outcomes	On completion of the course, students should be able to	
	CO1: design a static web page using HTML	K3
	CO2: validate the HTML form data using JavaScript	K4
	CO3: develop server side scripts using PHP	K2
	CO4: communicate with MySQL database from PHP	K1,K5

Mapping of Cos with PSOs & POs:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	S	S	S	M	S	S	S	S	S
CO2	S	M	M	S	S	S	M	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	M	S	S	S	S	S
CO5	S	S	S	S	M	S	S	S	S	S

- Strongly Correlating(S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark
No Correlation (N) - 0 mark

Prepared by	Ms.P.Kalpna
Verified by	Mrs.V.Priya

Programme : B.Sc Computer Science		SEM	VI
Course Code	Title	Hours	Credit
	EC-V RUBY ON RAIL	5	5
Cognitive Level	K - 1 : Acquire K - 2 : Understand K - 3 : Apply K - 4 : Evaluate K - 5 : Analyze		
Learning Objectives	The Course aims to <ul style="list-style-type: none"> • provide and insight view of Ruby on rails language and its features • introduce the OOPs concepts using Ruby • inculcate the functional programming aspects with Ruby • familiarize the concepts of Regular expression, files and directives • incorporate the concepts of Networking and Security issues 		
UNIT	Content	Hours	
I	Introduction – Structure and Execution ruby programs – data types and objectives – expressions and operators	20	
II	Statement and control structures – loops – blocks – exception handling – methods – Procs, Lambdas & closures – functional programming	15	
III	Classes and modules – defining the class – method – object creation – modules – reflection and meta programming – types – classes and modules – methods – hooks – alias chaining	15	
IV	Ruby – Platform – Strings – Regular expression – collection – files and directories – Input output - networking – threads and concurrency	10	
V	Ruby environment invoking ruby interpreter – top-level environment – calling the wires – security – applications of ruby languages.	15	
Reference	Text Books: <ol style="list-style-type: none"> 1. David Flanagan & Yukihiro Matsumoto, “The Ruby Programming Language”, O’Reilly, 2008. ISBN 9780596516178. Reference Books: <ol style="list-style-type: none"> 1. Michael Hartl, "Ruby on Rails Tutorial: Learn Web Development with Rails", Addison -Wesley Professional Ruby series Web References: <ol style="list-style-type: none"> 1. https://rubyonrails.org/ 2. https://en.wikipedia.org/wiki/Ruby_on_Rails 3. https://www.youtube.com/watch?v=pPy0GQJLZUM 4. https://www.codecademy.com/learn/learn-rails 5. https://www.tutorialspoint.com/ruby-on-rails/ruby-on-rails-tutorial.pdf 		
Course Outcomes	On completion of the course, students should be able to		
	CO1: understand the structure of Ruby programs and various data types, expression and operators		K2
	CO2: use the control structures to solve simple and complex		K1

	problems	
	CO3: demonstrates OOP concepts	K3
	CO4: develop networking applications	K4
	CO5: solve the concurrency issues and understand the concept of security	K5

Mapping of Cos with PSOs & POs:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	S	S	S	M	S	S	S	S	S
CO2	S	M	M	S	S	S	M	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	M	S	S	S	S	S
CO5	S	S	S	S	M	S	S	S	S	S

Strongly Correlating(S) - 3 marks
 Moderately Correlating (M) - 2 marks
 Weakly Correlating (W) - 1 mark
 No Correlation (N) - 0 mark

Prepared by	Mr.P.Velmurugan
Verified by	Mr.R.Mahendran

Programme : B.Sc Computer Science		SEM	VI
Course Code	Title	Hours	Credit
	EC-VI MOBILE APPLICATION DEVELOPMENT	5	5
Cognitive Level	K - 1 : Acquire K - 2 : Understand K - 3 : Apply K - 4 : Evaluate K - 5 : Analyze		
Learning Objectives	The Course aims to <ul style="list-style-type: none"> • provide thorough introduction to Android. • learn the basic concepts of Android Development tools and Life cycle • impart knowledge of user interfaces • have an exposure to databases and content providers • understand the principles of graphics, messaging, sound , video and publishing the application 		
UNIT	Content	Hours	
I	Android Introduction: An Open Platform for Mobile Development – Understanding the android software stock– android development tools – what makes an android application? - Installation of JDK and Android Studio – creating your first android application – Running and debugging applications	15	
II	Building Android Applications: Exploring android project files –Editing project resources - Designing typical android application – Using the application context – working with activities - working with intents – working with dialogs – Logging application information	15	
III	Application framework: Implementing an animated Splash Screen-Implementing Main Menu Screen – Developing the help and scores screen – Building forms to collect user input – Using dialogs to collect user input – Adding Application Logic.	15	
IV	Enhancing Application with Powerful Android features: Working with Images and the Camera - Adding Support for Location-Based Services - Adding Basic Network Support - Adding Additional Network Features - Adding Social Features - Creating a Home Screen App Widget.	15	
V	Databases and Publishing the Application: Databases: Introducing android database – introducing SQLite – content values and cursors- working with SQLite database - Publishing the Application: Getting Ready to Publish-Publishing on the Android Market.	15	
Reference	Text Books: <ol style="list-style-type: none"> 1. Lauren Darcey, Shane Conder, “<i>SAMS Teach Yourself Android Application Development in 24 Hours</i>”, Second Edition.ISBN-13: 978-0-672-33569-3 ISBN-10: 0-672-33569-7 (Unit I to IV) 2. Reto Meier, “<i>Professional Android 4 Application Development</i> “, WROX Publication- Wiley – India, 2012 (Unit I and V) Reference Books:		

	1. Pradeep Kothari & Kogent Learning Solutions Inc, “ <i>Android Application Development Black Book</i> ”, Dreamtech Press, Edition 2014, ISBN:978-93-5119-409-5 Web References: 1. https://developer.android.com/guide/ 2. https://studytotnight.com/android	
Course Outcomes	On completion of the course, students should be able to	
	CO1: understand the architecture of Android software stock.	K2
	CO2: get the exposure of different types of project resources	K1
	CO3: create their own application.	K3
	CO4: enhance the application with LBS, Network features, etc.	K5
	CO5: generate the APK and Market it in	K4

Mapping of Cos with PSOs & POs:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	M
CO3	S	S	S	S	S	M	S	S	S	S
CO4	S	S	M	S	W	M	S	S	S	S
CO5	S	S	M	S	W	M	S	S	S	S

Strongly Correlating(S) - 3 marks
 Moderately Correlating (M) - 2 marks
 Weakly Correlating (W) - 1 mark
 No Correlation (N) - 0 mark

Prepared by	Mr.P.Velmurugan
Verified by	Mr.R.Mahendran

Programme : B.Sc Computer Science		SEM	VI
Course Code	Title	Hours	Credit
	CC - XV - APPLICATION DEVELOPMENT LAB	6	4
Cognitive Level	K - 1 : Acquire K - 2 : Understand K - 3 : Apply K - 4 : Evaluate		
Learning Objectives	The Course aims to <ul style="list-style-type: none"> provide simple problem solving with different software packages listed on the electives introduce practical exposure to developing simple applications provide exposure to software development with different software packages 		
	Content		
	Guidelines: <ul style="list-style-type: none"> The students shall be provided with the list of applications to be developed during the lab sessions. The detailed guidelines and assessment pattern shall be provided by the course teacher. The choice of software will be based on the electives 		
Course Outcomes	On completion of the course, students should be able to		
	CO1: develop applications using two software packages	K1-K3	
	CO2: solve simple and complex problems by the software's chosen	K4	

Mapping of Cos with PSOs & POs:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S

Strongly Correlating(S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark
No Correlation (N) - 0 mark

Prepared by	Dr.M.Muralidharan
Verified by	Dr.S.Murugan

Programme : B.Sc Computer Science		SEM	
Course Code	Title	Hours	Credit
	EC- VII .NET PROGRAMMING	5	5
Cognitive Level	K - 1 : Acquire K - 2 : Understand K - 3 : Apply K - 4 : Evaluate K - 5 : Analyze		
Learning Objectives	The Course aims to <ul style="list-style-type: none"> • introduce the .NET architecture and its applications • learn the features of VB.NET • provide the knowledge about C#.NET • introduce the concepts in ASP.NET and ADO.NET programming • develop window and web-based applications in .NET platform 		
UNIT	Content	Hours	
I	The .NET Architecture: The vision and goals of .NET- The building blocks of .NET- An Overview of .NET Framework: The .NET Evolution- Design goals of the .NET framework – The .NET framework architecture- An Overview of .NET application.	10	
II	VB.Net: Fundamentals – Data types – Variables – Constants- Statements- Control Structures. –Date & Time –Strings - Arrays– Collections–Functions-Subs- Classes and Objects	15	
III	C#.NET: Fundamentals - Features of C# – classes and Objects – Inheritance and Polymorphism – Operator Overloading – Structures-Interfaces – Arrays – Indexers and Collections – Strings and Regular Expressions – Handling Exceptions – Delegates and Events.	20	
IV	ASP.NET: Overview of ASP.NET framework – Overview of CLR – Class Library – Overview of Asp.NET controls – Understanding of HTML Controls – Study of Standard Controls – Validation Controls – Rich Controls – Adding Controls to forms – Master page – Navigation Controls – Themes – Handling events using various Tools – Simple web services Programs.	15	
V	ADO.NET Fundamentals: Component Object Model – SQL Server – SQL Connected Mode – Disconnected Mode – Data Set – Data Reader – Identity - Data Access Control – Grid View Control – Other Controls.	15	
Reference	Text Books: <ol style="list-style-type: none"> 1. Stephen C. Perry, Atul Khate, Joseph Mayo, “ Essentials of .Net and Related Technologies: With a focus on C#, XML, Asp.NET and ADO.NET” ,First Edition, Pearson Education., 2009. 2. Kevin Hoffman & Jeff Gabriel, “Professional .NET Framework” Shorff Publishers and Distributors Pvt. Ltd 3. Dave Mercer, “ASP.NET – A Beginners Guide”, Tata McGraw Hill Publications Pvt. Ltd. 4. Matt Telles, Kogent Solutions Inc.Telles, “C# 2005” 		

	<p><i>Programming, Black book</i>", Dreamtech press, 2007.</p> <p>5. Schildt, Herbert, "<i>C#: The Complete Reference</i>", Second Edition, McGraw-Hill, 2008.</p> <p>Reference Books:</p> <ol style="list-style-type: none"> 1. Dave Grundgeiger, "Programming Visual Basic .NET", O'Reilly First Edition January 2002. 2. Dino Esposite, "Programming Microsoft ASP.NET 4", Microsoft press, Washington, 2011 <p>Web References:</p> <ol style="list-style-type: none"> 1. https://en.wikipedia.org/wiki/Visual_Basic_.NET 2. https://www.tutorialspoint.com/vb.net/ 3. https://www.w3schools.com/asp/ado_intro.asp 	
Course Outcomes	On completion of the course, students should be able to	
	CO1: understand the .NET framework	K2
	CO2: understand the basics of VB.NET programming	K1
	CO3: design and develop distributed problems	K3
	CO4: develop web applications using ASP.NET	K4
	CO5: interact with databases using ADO.NET	K5

Mapping of Cos with PSOs & POs:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	M	M	M	S	S	M	W
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	M

Strongly Correlating(S) - 3 marks
 Moderately Correlating (M) - 2 marks
 Weakly Correlating (W) - 1 mark
 No Correlation (N) - 0 mark

Prepared by	Mr.C.Yogaraj
Verified by	Ms.P.Kalpana

Programme : B.Sc Computer Science		SEM	VI
Course Code	Title	Hours	Credit
	EC-VIII FUNCTIONAL PROGRAMMING USING HASKELL	5	5
Cognitive Level	K - 1 : Acquire K - 2 : Understand K - 3 : Apply K - 4 : Evaluate K - 5 : Analyze		
Learning Objectives	The Course aims to <ul style="list-style-type: none"> learn the syntax and semantics of the Haskell programming language incorporate the JSON processing using Haskell introduce the concept of Type classes and I/O familiarize the file processing techniques understand the various data structures and Monad class 		
UNIT	Content	Hours	
I	Getting Started – Lists – Strings and Characters –Type System – Function Application – Writing Simple functions – Understanding evaluations – Defining new Data types – Algebraic data types – Pattern matching	15	
II	Functional Programming – Infix functions – Working with Lists – Think about loops – Lamda functions – Writing a Library – Working with JSON data - Anatomy of Haskell module – Pointing JSON Data.	15	
III	Using Type Classes – Built in Type Class – Type Classes at work – I/O – Classic I/O –Working with files – Lazy I/O – I/O Monad – Buffering.	15	
IV	File processing – Regular Expressions – Pattern matching – Writing Lazy Function – I/O case study – Find – Naïve finding system – Predicates	20	
V	Data Structures – Association Lists – maps – Monads – Monad type class using new monad – State Monad.	10	
Reference	Text Books: <ol style="list-style-type: none"> <i>Real World Haskell</i>, O'Reilly, ISBN:0596514980 9780596514983 Reference Books: <ol style="list-style-type: none"> <i>"Real World Haskell"</i>, published by O'Reilly, First edition, released in Nov 2008. <i>"Programming in Haskell"</i>, Second Edition, Kindle Edition by Graham Hutton, ISBN-13: 978-1316626221 ISBN-10: 1316626229 <i>"The Craft of Functional Programming"</i>, Third Edition by Simon Thompson. Web References: <ol style="list-style-type: none"> https://www.tutorialspoint.com/haskell https://www.haskell.org. 		
Course	On completion of the course, students should be able to		

Outcomes	CO1: use a strongly functional programming language	K1
	CO2: analyze the basic functional programming and use JSON data	K5
	CO3: identify various built in functions	K4
	CO4: formulate various concept in pattern matching	K3
	CO5: identify and analyze data structures	K2

Mapping of Cos with PSOs & POs:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	S	S	S	S	M	S	S	S	S
CO2	S	S	S	M	M	M	S	S	M	W
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	M	S	S	S	W	S
CO5	S	S	W	S	M	S	S	S	S	M

Strongly Correlating(S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark
No Correlation (N) - 0 mark

Prepared by	Mr.R.Mahendran
Verified by	Mrs.K.Saraswathi

Programme : B.Sc Computer Science		SEM	VI
Course Code	Title	Hours	Credit
	EC- IX R PROGRAMMING	5	5
Cognitive Level	K - 1 : Acquire K - 2 : Understand K - 3 : Apply K - 4 : Evaluate K - 5 :Analyze		
Learning Objectives	The Course aims to <ul style="list-style-type: none"> • learn the fundamental concepts of ‘R’ using RGui and RStudio • understand the special data structures of R language viz., Character Vector, Array, Matrix, Data Frame and List • provide knowledge for various control structures and functions • study the data analytics using graphical tools • understand the concept of packages 		
UNIT	Content	Hours	
I	Introduction: History of R- Benefits of Using R - Working with code Editor: RGui and RStudio - Starting your First R Session - Sourcing a script - Navigating the workspace- Vectors: Creating vectors - Discovering the properties of vector- combing vectors-repeating vector - Getting values in and out of vectors- working with logical vectors - Math with Vector functions - working with numbers, infinity and missing values	15	
II	Using character vector for text data - Manipulating text - Factoring in Factors - Working with more dimensions: Adding a second dimension - Using the indices - Naming matrix rows and columns - Calculating with matrices - Adding more dimensions: Creating an array - Combining different types of values in Data Frame - Manipulating values in a Data Frame- List: Creating a list - Extracting elements from lists - Changing elements in lists	15	
III	Control Structures: Conditional control structures: if statement - if..else statement - switch statement - Loops: for, while and repeat loops - break and next statement. Functions: The Function Keyword - Arguments - Return Values-Functions as Arguments - Anonymous Functions-Properties of Functions - Argument Order and Named Arguments. Computing basic statistics: mean, median, mode, correlation and covariance	15	
IV	Getting data into and out of R: Getting data into R: Entering data in the R text editor - Using clipboard to copy and paste - Reading data in CSV files and excel files- Working with other data types - Getting your data out of R - Working with Files and Folders. Packages: Finding packages, installing packages, loading packages, updating package and unloading packages.	15	
V	Introduction to Graphical Analysis: Box-Whiskers plots - Scatter plots - Pairs plots - Line charts - Pie charts - Cleveland dot charts - Bar charts: single category bar chats and multiple category bar	15	

	charts. Creating Faceted Graphics with Lattices: Creating lattice plot - changing plot option.	
Reference	<p>Text Books:</p> <ol style="list-style-type: none"> 1. Andrie devries and JorisMeys , "R programming for Dummies", Wiley Publications, ISBN:978-81-265-5201-6. (Chapters: 1,2,3,4,5,7,12,17,20) 2. Dr.Mark Gardener, "Beginning R- The Statistical Programming Language", Wiley Publications, ISBN: 978-81-265-4120-1. (Chapters : 7) 3. Paul Teetor, "R Cook book",O'Relly Publications, First edition, 2011, ISBN: 978-0-596-80915-7(Chapter 2: 2.6,2.11) 4. Joseph Adler, "R in Nutshell A Desktop Quick Reference",ISBN:978-0-596-80170-0(Chapter :9) <p>Reference Books:</p> <ol style="list-style-type: none"> 1. Roger D. Peng, "R programming for Data Science", Leanopub, 2015 <p>Web References:</p> <ol style="list-style-type: none"> 1. https://www.statmethods.net/r-tutorial/index.html 2. https://www.cyclismo.org/tutorial/R/ 3. https://www.youtube.com/watch?v=eDrhZb2onWY 4. https://www.datamentor.io/r-programming/ 	
Course Outcomes	On completion of the course, students should be able to	
	CO1: understand the basics of R programming	K3
	CO2: work with vectors, matrices and data frames	K2
	CO3: acquire the knowledge of various control structures	K1
	CO4: parse data files using built-in functions	K3
	CO5: apply the various statistical functions and produce high quality graphics	K5

Mapping of Cos with PSOs & POs:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	M	M	M	S	S	M	W
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	M

Strongly Correlating(S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark
No Correlation (N) - 0 mark

Prepared by	Ms.P.Kalpana
Verified by	Mrs.K.P.Lakshmi

Programme : B.Sc Computer Science		SEM	VI
Course Code	Title	Hours	Credit
	Technical Skill Development	2	-
	Content		
	The students will be given training in the following areas 1. Problem solving assignment 2. Debugging 3. Objective type questions in the core courses 4. Interview related questions		

Programme : B.Sc Computer Science		SEM	VI
Course Code	Title	Hours	Credit
	Comprehensive Course	-	4*
	Content		
	The students will be evaluated using technical objective type questions from the core courses learnt during their study period		

***Additional Credit Course**

Prepared by	Dr.M.Muralidharan
Verified by	Dr.S.Murugan

**NEHRU MEMORIAL COLLEGE [AUTONOMOUS],
 PUTHANAMPATTI—621007
 POST GRADUATE DEPARTMENT OF COMPUTER SCIENCE
 B.Sc COMPUTER SCIENCE
 Comparison Table**

S.No.	2015-2016	2019-2020
1	CC - I Programming in C	CC- I Problem solving using Python
2	CC - II a Software Lab - I (Data Analytic) CC - II b Software Lab - II (C)	CC- II Problem Solving Lab
3	CC - III Object Oriented Programming using C++	CC- III Programming in C and Data Structures
4	CC - IV Data Structures and Algorithms	CC-IV Data Structures Lab
5	CC - V a Software Lab - III (C++ and Data Structure CC - V b Software Lab - IV (RDBMS)	CC- V Object oriented programming using C++
6	CC - VI Database System	CC- VI OOPS Lab
7	CC - VII Computer System Architecture	CC- VII Database Systems
8	CC - VIII Principles of Operating System	CC - VIII RDBMS Lab
9	CC - IX Programming in JAVA	CC- IX Programming in JAVA
10	CC - X Software Lab - V (Java and Application Development)	CC- X Principles of Operating System
11	CC - XI Microprocessor and Microcontroller	CC- XI Computer System Architecture
12	CC - XII Computer Networks	CC - XII Java and System Administration Lab
13	CC - XIII Web Technology	CC- XIII Computer Networks

14	CC - XIV Software Lab - VI (Web Technology and Hardware)	CC- XIV Software Engineering
15		CC-XV Application Development Lab

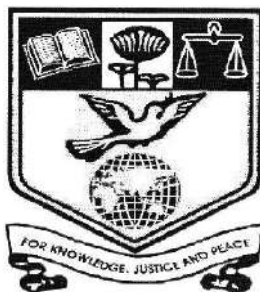
Comparison Table for Elective, SKBC and NMEC

<p>Elective Course - 1 Principles of Computer Graphics Software Engineering XML and Web Services</p> <p>Elective Course - 2 Multimedia and Animation Techniques Rapid Application Development Using Python UML Programming</p> <p>NMEC- 1 Internet and Web Design BPO and Health Care Desktop Publishing</p> <p>SKBC - 1 Image Editing and Manipulation</p> <p>SKBC- 2 Image Editing Lab</p>	<p>List of Elective Courses</p> <ol style="list-style-type: none"> 1. XML and WML 2. Principles of Computer Graphics 3. Service Oriented Architecture 4. Web Technology 5. Ruby on Rail 6. Mobile Application Development 7. .NET programming 8. Functional programming using Haskell 9. R programming <p>NMEC - I Internet and Web Design BPO and Health Care</p> <p>NMEC – II Office Automation Lab Image Editing Tools Lab</p> <p>SKBC - 1 Data Analytics</p> <p>SKBC- 2 Image Editing</p>
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Curriculum Framework and Syllabus for
Master of Science (M.Sc) in Computer Science Programme

For the students admitted from the academic year 2019-2020

(BASED ON CHOICE BASED CREDIT SYSTEM (CBCS))



2019-2020

Board of Studies Meeting was held on 21.9.2018 and
approved by academic council on 10.04.2019

POST GRADUATE AND RESEARCH DEPARTMENT OF COMPUTER SCIENCE

NEHRU MEMORIAL COLLEGE

[Nationally Accredited with 'A' Grade by NAAC]

An autonomous College affiliated to Bharathidasan University

Puthanampatti—621 007

M.Sc. Computer Science

VISION

Contribute to the society through excellence in scientific technology and make use of knowledge based education, potential of computer science with deep passion for knowledge, culture and values.

MISSION

- To achieve distinguished academic positions in computer science through innovative teaching and learning process.
- To motivate students for acquiring necessary skills to face the challenges of the IT industry.

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

The Post Graduates of MSc Program will be able to

PEO1: Use the competence in the analysis of computer problems and finding solutions of those problems

PEO2: Utilizing the domain knowledge to help the society in the transformation process of digital world

PEO3: Applying their acquired knowledge and skills towards professional achievements in their carrier

PROGRAMME OUTCOME (PO)

At the end of the MSc programme the students will be able to

PO1: Scientific Knowledge

Apply the knowledge of computing fundamentals, principles of mathematical logic and domain knowledge to solve complex problems.

PO2: Problem Analysis

Identify, formulate and analyze complex problems using appropriate methods and finding solutions to problems.

PO3: Conduct investigations of complex problems

Design and develop algorithms by providing solutions to complex problems.

PO4: Modern tool usage

Ability to improve divulging knowledge in various domains and to solve real life problem using various advanced software tools.

PO5: Individual and team work:

Function effectively as an individual and as a leader in diverse domain.

PO6: Lifelong learning

Recognize the need for an independent and lifelong learning in the technological change.



PROGRAMME SPECIFIC OUTCOME (PSO)

PSO1: Apply knowledge of computing to develop quality program for real life problems

PSO2: Empower the use of software development tools and modern computing platforms.

PSO3: Ability to design dynamic website using open source technologies.

PSO4: Apply appropriate techniques and strategies to develop solutions to complex problems.

PROGRAM STRUCTURE

- **Program Duration** : 2 Years
- **System Followed** : Semester
- **Medium of Instruction** : English
- **Credit System :**
Total number of credits: 90
- **Eligibility criteria for admission to the program:**
B.Sc (Computer Science)
- **Mandatory attendance to appear for examination:**
Attendance: 75%

CREDIT DISTRIBUTION

S.NO	CATEGORY OF COURSES	CREDITS	% OF CREDITS TO TOTAL CREDITS
1	Basic Science	5	5.6
2	Core Courses	43	47.7
3	Core Practicals	12	13.3
4	Elective Courses	16	17.8
4	Open Elective Course	4	4.4
5	Project	10	11.1
	Total	90	100

PROGRAM CORE, ELECTIVE, OPEN ELECTIVE AND PRATICAL COURSES

SEMESTER	NUMBER OF CORE COURSES	CREDITS	NUMBER OF ELECTIVE COURSES	CREDITS	NUMBER OF OPEN ELECTIVE COURSES	CREDITS	NUMBER OF PRACTICALS /PROJECTS	CREDITS
1	4	20					1	4
2	3	12	1	4	1	4	1	4
3	4	16	1	4			1	4
4			2	8			1	10
	11	48	4	16	1	4	4	22

Total Credits: 90

AVERAGE PERCENTAGE OF THE COURSES HAVING FOCUS ON SKILLS, EMPLOYABILITY, KNOWLEDGE

Courses	Employability	Skill based	Knowledge based	
CC-I Graph and Automata Theory			Y	
CC-II Design and Analysis of Algorithm			Y	
CC-III Data Base System	Y			
CC-IV Open Source Technologies	Y			
CC-V Open Source Technologies Lab	Y			
CC-VI Programming in Java and J2EE	Y			
CC-VII Soft Computing			Y	
CC-VIII Datamining and Data Warehousing			Y	
CC-IX Lab-II-Java And J2EE Lab	Y			
CC-X AI and Machine Learning		Y		
CC-XI Principles of Compiler Design			Y	
CC-XII-Internet of Things		Y		
CC-XIII Rapid Application Development using Python		Y		
CC-XIV Lab-III-Machine Learning		Y		
CEC-I- Digital Image Processing			Y	
OEC - Functional Programming using Haskell	Y			
CEC-II- Cloud Computing			Y	
CEC-III-Big Data Analytics			Y	
CEC-IV- Software Project Management			Y	
Total	6	4	9	
Percentage	32	21	47	100

INTERNAL AND EXTERNAL ASSESSMENT

Theory

Internal: 25marks

Marks Distribution:	Seminar	= 5 Marks
	Assignment	= 5 Marks
	CIA Test I	= 7.5 Marks
	CIA Test II	= 7.5 Marks
	Total	= 25 Marks

External: 75 marks

Question Paper Pattern for Internal and External Assessment:

Section A: 10 Questions x 2 Marks = 20 Marks

(Two Questions from each unit)

Section B: 5 Questions x 5 Marks = 25 Marks

(Internal Choice and one question from each unit)

Section C: 3 Questions x 10 Marks = 30 Marks

(Answer any three out of 5 questions and one question from each unit)

Practical

Internal: 40 marks

Marks Distribution:	Test1	= 15 Marks
	Test2	=15 Marks
	Observation	=10 Marks
	Total	= 40 Marks

External: 60 marks

Marks Distribution:	Practical	= 50 Marks
	Record	= 10 Marks
	Total	= 60 Marks

Project: 100 marks

Marks Distribution:	Internal (2 reviews)	: 25 Marks
	Report Evaluation	: 30 Marks
	Viva Voce	: 20 Marks
	Total	: 75 Marks

NEHRU MEMORIAL COLLEGE [AUTONOMOUS]						
MASTER OF SCIENCE[COMPUTER SCIENCE] FROM 2019-2020						
CODE	TITLE	HRS	CREDIT	CIA	EE	TOTAL
SEMESTER - I						
CC-I	Graph and Automata Theory	6	5	25	75	100
CC-II	Design and Analysis of Algorithms	6	5	25	75	100
CC-III	Advanced Data Base System	6	5	25	75	100
CC-IV	Open Source Technologies	6	5	25	75	100
CC-V	Lab - I – Open Source Technologies	6	4	40	60	100
SEMESTER - II						
CC-VI	Programming in JAVA and J2EE	4	4	25	75	100
CC-VII	Soft Computing	5	4	25	75	100
CC-VIII	Data Mining and Data Ware Housing	5	4	25	75	100
CC-IX	Lab-II- Java & J2EE	6	4	40	60	100
CEC-I	Principles of Wireless and Mobile Network					
	Digital Image Processing	6	4	25	75	100
	Advanced Operating System					
OEC	R Programming					
	Web Technology	4	4	25	75	100
	Functional Programming using Haskell					
SEMESTER – III						
CC-X	AI and Machine Learning	5	4	25	75	100
CC-XI	Principles of Compiler Design	5	4	25	75	100
CC-XII	Internet of Things	4	4	25	75	100
CC-XIII	Rapid Application Development Using Python	4	4	25	75	100
CC-XIV	Lab - III –Machine Learning	6	4	40	60	100
CEC-II	Cloud Computing					
	Service Oriented Architecture	6	4	25	75	100
	Graphics and Human Computer Interaction					

SEMESTER - IV						
	Big Data Analytics					
CEC-III	Network Security	6	4	25	75	100
	Web Application Architecture					
	Software Project Management					
CEC-IV	Software Forensics	6	4	25	75	100
	Software Testing					
CC-XV	PROJECT	18	10	25	75	100
	TOTAL	120	90			2000

Course Code & Title	CC-I GRAPH AND AUTOMATA THEORY		
MSc	Semester : I	Credits : 5	Hrs: 6
Cognitive Level	K1 – Remember K2 – Understand K4 – Analyze		
Learning Objectives	This Course aims to <ul style="list-style-type: none"> ▪ understand basic concepts of graph theory. ▪ know the applications of graphs in other disciplines. ▪ learn the basics of automata theory and understand finite state automata, regular expressions ▪ learn Context free grammars and various normal forms ▪ impart knowledge in push down automata. 		

UNIT – I

Graph Path and Circuits: Introduction- Applications of Graphs- Finite and Infinite Graphs- Incidents and Degree- Isolated vertex, pendant vertex and null graph. Paths and Circuits isomorphism Sub Graphs- Walks, Path and Circuits- Connected & Disconnected Graphs, Euler's graphs-Operations on Graphs- Hamiltonian Paths & Circuits. **(18 hrs)**

UNIT – II

Trees and Fundamental Circuit, Matrix Representation of Graph- Trees and fundamental circuits- Properties of Trees Distance and Centers in a Tree- Rooted Binary Trees, Spanning trees, Matrix representation of Graphs- Incidence Matrix- Sub Matrix of A_{9G}- Circuit Matrix- Fundamental matrix- Adjacency Matrix. **(18 hrs)**

UNIT – III

Introduction: Strings, alphabets and languages – Graphs and Trees- Inductive proofs – Set notation – Relations. Finite Automata and regular expressions: Finite State Systems- Basic definitions - Non-Deterministic Finite Automata - Finite Automata with epsilon moves-Regular Expressions Applications of Finite Automata. **(20 hrs)**

UNIT – IV

Context Free Grammars: Motivation and Introduction - Context- Free Grammars – Derivation-Trees – Simplification of Context free grammar - Chomsky Normal Form - Greibach Normal Form. **(18 hrs)**

UNIT – V

The Pumping Lemma for CFL's – Closure properties of CFL's. Push Down Automata: Definitions – Pushdown automata and context free languages. **(16 hrs)**

Books for study:

1. Narsing Deo, “*Graph Theory with applications to Engineering and Computer Science*”, Proentice- Hall of India Limited, New Delhi, 2016.
2. John E.Hopcroft& Jeffery D.Ullman, “*Introduction to Automata Theory, languages and Computation*”, Narosa Publishing House, New Delhi, 1997, ISBN 81-85015-96-1.

Books for Reference:

1. F. Harary, “*Graph Theory*”. Addison- Wesley, Reading Mass., 1990
2. Motwani R and J .D. Ullman, “*Introduction to Automata Theory, Languages and Computation*”, Pearson Education Asia, 2nd Edition.
3. Peter linz, “*An Introduction to formal language and automata*”, Fifth edition, Narosa publication.

Web Reference:

1. www.edutechlearners.com
2. www.britannica.com
3. www.sanfounry.com

Course Outcomes:

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

- | | |
|-----------------------------------------------------------------------------------------------------------------------------------------|-----------|
| CO1: understand different types of graphs with applications. | K2 |
| CO2: know strong background of graph theory which has diverse applications in many areas of computer science, engineering, etc., | K2 |
| CO3: mastering in regular languages and finite automata, push down automata | K1 |
| CO4: mastering in context free languages. | K1 |
| CO5: think analytically and develop the problem solving skills in theory of computer science | K4 |

Mapping of Cos with PSOs & Pos:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	S	W	S	M	S	S	N	N	S
CO2	S	S	W	S	M	S	S	N	N	S
CO3	S	S	W	S	M	S	S	N	N	S
CO4	S	S	W	S	M	S	S	N	N	S
CO5	S	S	M	S	M	S	S	N	N	S

S-Strongly Correlating
W-Weakly Correlating

M-Moderately Correlating
N-No Correlation

Prepared by	Mrs.P.Nirmala
Verified by	Dr.S.Murugan

Course Code & Title	CC-II DESIGN AND ANALYSIS OF ALGORITHMS		
MSc	Semester : I	Credits : 5	Hrs: 6
Cognitive Level	K1 – Remember K3 – Apply K4 –Analyze		
Learning Objectives	This Course aims to <ul style="list-style-type: none"> ▪ know the fundamentals of algorithms. ▪ study the different algorithm design techniques. ▪ conversant greedy functionalities. ▪ Learn operations of dynamic programming ▪ apply different algorithm techniques to solve the problems. 		

UNIT-I

Introduction - Basic steps in the complete development of an algorithm-Top-down structured programming and program correctness –structured programming- The knight’s tour problem. (18hrs)

UNIT-II

Algorithm-Definition-Algorithm specifications-Recursive algorithm-Performance analysis-Divide and conquer method-Binary Search-Finding maximum and minimum-Merge sort-Quick sort. (20hrs)

UNIT-III

Greedy method-Knapsak problem-Minimum cost spanning trees-Prim’s algorithm-Kruskal’s algorithm-Single-Source shortest paths. (16hrs)

UNIT -IV

Dynamic programming-All-Pairs shortest paths-Optimal binary search tree. Depth-first-search-Breadth first search-Connected components. (19hrs)

UNIT –V

Backtracking- 8 -queens problem-Sum of subsets problem-Branch and Bound-Travelling sales man problem. (17hrs)

Books for Study:

1. S.E Good man, S.T.Hedetimini. *“Introduction to the Design and analysis of algorithms”* Tata McGraw-Hill Edition-2002.(Unit –I)
2. Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran. *“Fundamentals of computer algorithms”* Universities press (India) Ltd-2014. Second edition (Unit II, III, IV and V)

Reference Book:

1. A.V. Aho, J.D.Ullman and J.E.Hoscraft.”*The Design and Analysis of algorithms”*. Pearson edition.

Course Outcomes:

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

- CO1:** define the various steps in algorithm. **K1**
- CO2:** apply various techniques to real life problem. **K3**
- CO3:** analyze complexity of the algorithm. **K4**

Mapping of Cos with PSOs & Pos:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	S	S	S	N	S	S	S	N	S
CO2	S	S	M	S	N	S	S	M	N	S
CO3	S	S	S	M	N	S	S	S	N	S

S-Strongly Correlating
W-Weakly Correlating

M-Moderately Correlating
N-No Correlation

Prepared by	Dr.S.Murugan
Verified by	Dr.K.Mani

Course Code & Title	CC-III DATABASE SYSTEMS		
MSc	Semester : I	Credits : 5	Hrs: 6
Cognitive Level	K2 – Understand K6– Create		
Learning Objectives	This Course aims to <ul style="list-style-type: none"> ▪ understand various data models. ▪ design ER diagram. ▪ develop and refine the conceptual data models, entities, attributes. ▪ apply normalization techniques. ▪ learn database system architecture. 		

UNIT - I

Introduction: Data base system verses file system – View of data – Data Models – Database Languages – Database users and Administrators – Database system structure. **Entity:** Basic concepts – Constraints – Keys – Design Issues – ER Diagram – Weak entity Relationship Model: Sets – Design of an ER Database schema – Reduction of an ER schema to tables. **Relational Model:** Structure – Relational Algebra – Extended Relational Algebra – Algebraic operations – Modification. **(15 hrs)**

UNIT- II

SQL: Structure of SQL -Set operations – Aggregate functions – Null values – Nested sub queries – Views – Complex queries – Joined Relations – Embedded SQL - Dynamic SQL – QBE – Domain Constraints – Referential Integrity – Assertions – Triggers **(10 hrs)**

UNIT - III

Database Design: Relational – First normal form – Functional dependencies – Decomposition – Boyce-codd normal form – Third Normal Form – Fourth normal form - More normal form. **(10 hrs)**

UNIT - IV

Transactions concepts: Transaction state – concurrent execution – serializability – recoverability – testing for serializability. **Concurrent control:** Lock based protocols – timestamp based protocols – validation based protocols – Deadlock Handling. **(15 hrs)**

UNIT - V

Data base system architecture: Centralized and client server architecture – server system architecture – parallel systems – Distributed systems - Network types. **Distributed database:** Distributed data storage - distributed transactions – commit protocols – distributed query processing. **(10 hrs)**

Books for Study:

1. Henry F.Korth and Abraham Silberschatz, “*Database System concepts*”, 4th Edition, McGraw Hill publication, 2002,(unit I,II,IV,V) ISBN: 0-07-120413-X.
2. C.J.Date, “ *An Introduction to Database system*”,7thedition, Addison Wesley publication,year2002,(Chapter10.2,10.3,11.3,11.3,11.5,12.2,12.3,12.4,12.7)ISBN:81-7808-231-4

Books for Reference:

1. Bepin C.Desai, “*An Introduction to Data base system*”, Galotia publications Private limited.
2. Ivan Bayross, “*SQL and PL/SQL*”, BPB Publications, New Delhi.

Web Reference:

1. https://en.wikibooks.org/wiki/Introduction_to_Computer...Systems/Database
2. <https://www.c-sharpcorner.com/UploadFile/.../types-of-database-management-systems/>

Course Outcomes:

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

- CO1:** understand the fundamentals of database system. **K2**
CO2: design and create tables in database and develop queries. **K6**
CO3: design a database based on a data models using normalization. **K6**
CO4: understand the transaction concepts **K2**
CO5:explain database system architecture, distributed database **K2**

Mapping of Cos with PSOs & Pos:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	S	S	M	N	M	S	M	N	S
CO2	S	S	S	M	N	S	S	S	W	S
CO3	S	S	M	M	N	M	S	M	W	M
CO4	S	S	M	M	N	S	S	M	W	S
CO5	S	S	M	S	N	S	S	S	W	S

S-Strongly Correlating
W-Weakly Correlating

M-Moderately Correlating
N-No Correlation

Prepared by	Dr.D.Jayachitra
Verified by	Mrs.V.Priya

Course Code & Title	CC-IV OPEN SOURCE TECHNOLOGIES		
MSc	Semester : I	Credits : 5	Hrs: 6
Cognitive Level	K3 – Apply K6 – Create		
Learning Objectives	This Course aims to <ul style="list-style-type: none"> ▪ knowledge in fundamental commands of Unix and Linux ▪ develop shell scripts ▪ develop perl scripts ▪ introduce advanced concept of PHP ▪ work with various open source tools MySQL,PHP,etc 		

UNIT-I

Introduction to UNIX/LINUX operating system: History of UNIX- salient features of UNIX – UNIX architecture-LINUX and GNU-basic LINUX commands: man,date,cal,echo,printf,bc,script,bc,passwd,uniq-Introduction to text editor-vi.

File System: types of files-file system hierarchy-file directories-file related commands: pwd,cd,mkdir,rmdir-path names-ls command-handling ordinary files:cat,cp,rm,mv more,less,file,od,wc,emp,comm,diff-basic attributes. (20 hrs)

UNIT-II

Shell Programming: different types shells and their functions-introduction to shell script-shell variable-shell keywords-positional parameters-command line arguments-control structures: if-then-fi, if-then-elif-fi, nested if, case-esac, while, until and for loop.Process basics: ps command-mechanism of process creation- internal and external commands. Filters: simple filter:pr, head, tail, cut, paste, find sort and tr-filters using regular expression:grep and egrep.System Administrations: root-administrator privileges-user management-startup and shutdown-disk usage-device files-back up files:tar, cpio (18 hrs)

UNIT-III

Perl Overview: Perl Components – Perl Parsing Rules: The Execution Process – Syntax and Parsing Rules – Perl Coding Styles - Perl Variables and Data: Basic Naming Rules – Scalar Variables – Literals – Arrays – Hashes – Lists. Control Structures: Code Blocks – Conditional Statements - Loops. (18 hrs)

UNIT-IV:

Class and Object: Introduction to OOPS- Declaring a class- Objects - new keyword- constructor and Destructor Access method and properties using \$this variable -public ,private, protected properties and methods-Static properties and method-Class constant-Inheritance & code reusability-Polymorphism-Parent & self :keyword Instance of operator Abstract method and class Interface Final-Exception Handling-Understanding Exception Handling(Try, catch, throw)
(20 hrs)

UNIT V:

\$affected_rows-autocommit-begin_transaction-change_user-character_set_name-close-commit-\$connect_error - constructdebug- dump_debug _ info-\$error-\$error_list-field_count-get_charset-\$client_info - \$client_version - get_connection_stats-\$host_info-protocol_version-\$server_info-\$server_version -getwarnings - \$info-init-\$insert_id-kill-more_results-multi_query-next_result-referesh-release_savepoint-rollback-savepoint-select_db.
(14 hrs)

Book for Study:

1. Sumitabha Das,"*UNIX concepts and applications*", Tata McGraw Hill, Fourth edition, 2009.[Chapters 1,2,3,4,5,6,7,8,9,10.1-10.6,14,15.1-15.3,17]
2. Yashavant Kanetkar, "*UNIX shell programming*" BPB publications, 1996 [chapters 9,10,11]
3. Martin C Brown, "The Complete Reference – Perl", Tata McGraw Hill Publishing Company Limited, New Delhi. Second Edition (For Unit III)

Book for Reference:

1. Neil Matthew Richard Stones, "*Beginning LINUX*" ,Wiley Dreamtech", 4th edition, 2014.

Web Reference:

1. <http://php.net/manual/en/mysqli.close.php>
2. https://www.w3schools.com/php/func_mysqli_affected_rows.asp

Course Outcomes:

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

- CO1:** develop applications in different platforms. **K6**
CO2: create interactive web pages using Perl and PHP. **K6**
CO3: develop simple web applications. **K6**
CO4: select suitable platform for real life problem. **K4**

Mapping of Cos with PSOs & Pos:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	M	M	S	N	S	S	M	S	M
CO2	S	M	S	S	N	M	M	S	S	S
CO3	M	W	S	S	N	M	S	W	S	M
CO4	S	S	M	S	N	S	S	M	S	S

S-Strongly Correlating
W-Weakly Correlating

M-Moderately Correlating
N-No Correlation

Prepared by	Dr.D.Jayachitra
Verified by	Dr.M.Muralidharan

Course Code & Title	CC-V LAB-I- OPEN SOURCE TECHNOLOGIES		
MSc	Semester : I	Credits : 4	Hrs: 6
Cognitive Level	K2 – Understand K6 – Create		
Learning Objectives	This Course aims to <ul style="list-style-type: none"> ▪ familiar with Unix Commands, shell scripts ▪ design dynamic web pages. 		

CYCLE – I

- Basic UNIX commands
- Filters in UNIX

Simple Shell scripts using

- Control Structure
- Loops
- File and directory permissions
- Pattern matching

CYCLE –II

UI Design

UI Design with PHP & MySQL

Interactive pages using WAMP

Course Outcomes:

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

- | | |
|-----------------------------------------------------------|-----------|
| CO1: understand UNIX commands. | K2 |
| CO2: create interactive web pages. | K6 |
| CO3: develop simple applications in PHP and MySQL. | K6 |

Mapping of Cos with PSOs & Pos:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	S	W	S	N	S	S	S	S	S
CO2	S	S	W	S	N	S	S	M	S	M
CO3	S	S	W	S	N	S	S	S	S	S

S-Strongly Correlating

M-Moderately Correlating

W-Weakly Correlating

N-No Correlation

Prepared by	Mrs.K.PonvelAzhaguLakshmi
Verified by	Dr.M.Muralidharan

Course Code & Title	CC-VI PROGRAMMING IN JAVA AND J2EE		
MSc	Semester : II	Credits : 4	Hrs:4
Cognitive Level	K 1 – Remember K 6 – Create		
Learning Objectives	This Course aims to <ul style="list-style-type: none"> ▪ develop basic socket programming and TCP/IP protocols ▪ understand distributed environment and its architecture ▪ apply the concepts of RMI to develop distributed applications ▪ create web based distributed applications using Java Servlets ▪ design web based distributed applications using Java Server Pages 		

UNIT I

Networking Basics - Socket Programming - Proxy server - TCP/IP Sockets - Net address-datagrams. **(12 hrs)**

UNIT – II

Distributed Hardware Architecture: Evolution of Personal Computer – PC to PC Communication – Local Area Network – File Server Architecture – Client-Server Architecture – Database Server Architecture – Corporate Network – Intranet – Wide Area Network – Internet. Distributed Software Architecture: Mainframe – File Server - Client-Server Architecture: Single–two tier–three tier–N-tier Architecture–Distributed Application. **(13 hrs)**

UNIT – III

Distributed Computing using RMI: Introduction - RMI Architecture – Developing Applications with RMI –RMI with Database Connectivity.

Java Servlets: Servlet Life Cycle – Generic and HTTP Servlet – Servlet with Database Connectivity- Session Tracking: Hidden Form Fields – URL Rewriting – The Cookie Class – The Session Tracking class. **(11 hrs)**

UNIT – IV

Java Server Pages: JSP Basic Concepts – JSP Elements – Expressions – Scriptlets – Request and Response Objects – JSP with Database Connectivity - Session Tracking: Hidden Form Fields – URL Rewriting – The Cookie Class – The Session Tracking class. **(14 hrs)**

UNIT - V

J2EE Platform: J2EE Architecture – Containers – J2EE Technologies: Component – Service – Communication Technologies – Developing J2EE Application. EJB Architecture and Design: Introduction to EJB – The EJB Container and its Services – Working with EJB – Session Bean and Business Logic – Entity Bean and Persistence. (10 hrs)

Books for Study:

1. Herbert Schildt, "*The Complete Reference Java*", Tata McGraw Hill Publishing Company Limited, 9th Edition, 2014, ISBN: 9780070636774
2. Ivan Bayross, "*Web Enabled Commercial Applications Development using Java 2*", Edition 2000, BPB Publications, ISBN 10: 8176563560 ISBN 13: 9788176563567
3. Jason Hunter with William Crawford, "*Java Servlet Programming*", Shroff Publishers & Distributors Pvt. Ltd, ISBN 1-56592-391-XE
4. Phil Hanna, "*JSP 2.0 The Complete Reference*", Tata McGraw Hill Publishing Company Limited, ISBN-10: 0072224371; ISBN-13: 978-0072224375.
5. James Holmes, "*Strut: The Complete Reference*", Second Edition, Tata McGraw Hill Publishing Company Limited, ISBN: 9780070658455.
6. Subrahmanyam Allamaraju, "*Professional Java Server Programming – J2EE Edition Volume 1*", Shroff Publishers & Distributors Pvt. Ltd, ISBN 0-13-015592-6.

Reference Book:

1. Parsian, "*Java Metadata, MYSQL and Oracle Recipes: A Problem-Solution Approach*", Apress Publicaton, 2006.

Web Reference:

1. <http://Docs.oracle.com/javase/tutorials/java/index.html>
2. <http://javabeginnerstutorial.com/core-java>
3. <http://www.w3schools.in/java-tutorial/>
4. <http://www.j2eebrain.com>
5. <http://www.tutorialspoint.com>

Course Outcomes:

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

CO1: design socket programming and TCP/IP protocol **K6**

CO2: identify distributed hardware and software architecture and distributed environment **K1**

CO3: identify RMI architecture and Java Servlets, apply the same to develop applications **K1**

CO4: develop real time web based applications using JSP **K6**

CO5: build applications in J2EE server using Java Servlets and Java Server Pages **K6**

Mapping of Cos with PSOs & Pos:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	S	M	S	N	S	S	S	S	S
CO2	S	S	S	M	N	S	S	M	S	S
CO3	S	M	S	S	N	S	S	M	M	S
CO4	S	S	S	M	N	S	S	M	S	S
CO5	S	S	S	S	N	S	S	W	M	S

S-Strongly Correlating
W-Weakly Correlating

M-Moderately Correlating
N-No Correlation

Prepared by	Dr.K.Sridevi
Verified by	Dr.M.Muralidharan

Course Code & Title	CC-VII SOFT COMPUTING		
MSc	Semester : II	Credits : 4	Hrs:5
Cognitive Level	K1 – Apply K6 – Create		
Learning Objectives	This Course aims to <ul style="list-style-type: none"> ▪ impart knowledge in Fuzzy Set Theory ▪ learn Optimization, ▪ impart knowledge in Neural Networks ▪ understand Neuro Fuzzy Modeling ▪ understand the application of Computational Intelligence 		

UNIT- I

Fuzzy Set Theory:

Introduction to Neuro – Fuzzy and Soft Computing – Fuzzy Sets – Basic Definition and Terminology – Set – Theoretic Operations – Member Function Formulation and Parameterization – Fuzzy Rules and Fuzzy Reasoning – Extension Principle and Fuzzy Relations – Fuzzy If Then Rules – Fuzzy Reasoning – Fuzzy Inference Systems– Mamdani Fuzzy Models – Sugeno Fuzzy Models – Tsukamoto Fuzzy Models – Input Space Partitioning and Fuzzy Modeling.

(15hrs)

UNIT- II

Optimization:

Derivative based Optimization – Descent Methods – The Method of Steepest Descent – Classical Newton’s Method – Step Size Determination – Derivative Free Optimization Genetic Algorithms – Simulated Annealing – Random Search – Downhill Simplex Search.

(15 hrs)

UNIT -III

Neural Networks:

Supervised Learning Neural Networks – Perceptrons – Adaline Backpropagation Multilayer perceptrons – Radial Basis Function Networks – Unsupervised Learning and Other Neural Networks – Competitive Learning Networks – Kohonen Self – Organizing Networks – Learning Vector Quantization – Hebbian Learning.

(15 hrs)

UNIT- IV

Neuro Fuzzy Modeling:

Adaptive Neuro – Fuzzy Inference Systems – Architecture – Hybrid Learning Algorithm – Learning Methods that Cross fertilize ANFIS and RBFN – Coactive Neuro Fuzzy Modeling – Framework – Neuron Functions for Adaptive Networks – Neuro Fuzzy Spectrum

(15 hrs)

UNIT -V

Application of Computational Intelligence:

Printed Character Recognition – Inverse Kinematics Problems – Automobile Fuel Efficiency Prediction – Soft Computing for Color Recipe Prediction.

(15 hrs)

Book for Study:

1. J.S.R. Jang, C.T. Sun and E. Mizutani, “*Neuro Fuzzy and Soft Computing*”, PHI, Pearson Education, 2004.

Reference Books:

1. Timothy J. Ross, “*Fuzzy Logic with Engineering Application*”, McGraw Hill, 1977.
2. Davis E. Goldberg, “*Genetic Algorithms Search, Optimization and Machine Learning*”, Addison Wesley, 1989.
3. S. Rajasekaran and G.A.V. Pai, “*Neural Networks, Fuzzy Logic and Genetic Algorithms*”, PHI, 2003. Emereo PTV Limited, July 2008.
4. Ahmar, Abbas, “*Grid Computing - A Practical Guide to technology and Applications*”, Charles River media, 2003.

Course Outcomes:

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

- CO1:** apply fuzzy set theory to real life problem **K3**
CO2: develop Neural Networks and Nero Fuzzy Model **K6**
CO3: apply Computational Intelligence **K3**

Mapping of Cos with PSOs & Pos:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	S	M	M	N	S	S	S	N	S
CO2	S	W	S	W	N	S	M	M	N	S
CO3	S	S	M	M	N	S	S	S	N	S

S-Strongly Correlating

M-Moderately Correlating

W-Weakly Correlating

N-No Correlation

Prepared by	Dr.S.Murugan
Verified by	Dr.M.Muralidharan

Course Code & Title	CC-VIII DATA MINING & DATA WARE HOUSING		
MSc	Semester : II	Credits : 4	Hrs:5
Cognitive Level	K1 – Remember K2 – Understand K3 – Apply K4 – Analyze		
Learning Objectives	This Course aims to <ul style="list-style-type: none"> ▪ introduce the basic concepts of data mining and preprocessing techniques ▪ imbibe the knowledge on Association Rule Mining ▪ elaborate the importance of classification and prediction technique through various methods ▪ introduce the concepts and importance of basic clustering techniques ▪ introduce the concepts of warehousing, architecture and multidimensional data model 		

UNIT – I

DATA MINING & DATA PREPROCESSING: Introduction to KDD process – Knowledge Discovery from Databases - Data Preprocessing: An Overview – Data Cleaning – Data Integration – Data Reduction –Data Transformation and Data Discretization. **(10 hrs)**

Self Study : Data Discretization.

UNIT – II

ASSOCIATION RULE MINING: Mining Frequent Patterns: Basic concepts - Frequent Itemset Mining Methods: Apriori Algorithm: Finding Frequent Itemsets using Candidate Generation-Generating Association Rules from Frequent Itemsets- A Pattern-Growth Approach for Mining Frequent Itemset. **(15 hrs)**

UNIT – III

CLASSIFICATION: Basic Concepts - Decision Tree Induction -Bayes Classification Methods- Rule-based Classification - Model Evaluation and Selection- Techniques to improve Classification Accuracy. **(15 hrs)**

Self Study: Techniques to improve Classification Accuracy.

UNIT – IV

CLUSTERING: Cluster Analysis - Partitioning Methods: k-means and k-medoids – Hierarchical methods: Agglomerative and Divisive Hierarchical Clustering: BIRCH – Density-

Based Methods: DBSCAN – Grid-Based Methods: STING - Evaluation of Clustering.
Self Study: Evaluation of Clustering. (15 hrs)

UNIT – V

DATA WAREHOUSE: Data Warehousing - Operational Database Systems vs. Data Warehouses - Data Warehouse Multitier Architecture - Data Warehouse Models: Enterprise Warehouse, Data Mart and Virtual Warehouse - Multidimensional Data Model: Data Cube, Stars, Snowflakes, and Fact Constellations – Online Analytical Processing: Introduction - OLAP Operations. (20 hrs)

Book for Study:

1. Jiawei Han and Micheline Kamber, “*Data Mining Concepts and Techniques*” , Third Edition, Elsevier, Reprinted 2011.

Books for Reference:

1. K.P. Soman, Shyam Diwakar and V. Ajay, “*Insight into Data mining Theory and Practice*”, Easter Economy Edition, Prentice Hall of India, 20012.
2. G. K. Gupta, “*Introduction to Data Mining with Case Studies*”, Easter Economy edition, Prentice Hall of India, 2012.
3. A Pang-Ning Tan, Michael Steinbach and Vipin Kumar, “*Introduction to Data Mining*”, Pearson Education, 2017

Web Reference:

1. https://www.tutorialspoint.com/data_mining/
2. <https://www.hackerearth.com/blog/machine-learning/beginners-tutorial-apriori-algorithm-data-mining-r-implementation/>
3. <https://t4tutorials.com/apriori-algorithm-in-data-mining-with-examples/>
4. <https://data-flair.training/blogs/classification-algorithms/>
5. <https://www.youtube.com/watch?v=9v4Wnz27c20>
6. <https://www.youtube.com/watch?v=E24Wxj7UmaA>
7. <https://www.slideshare.net/2cdude/data-warehousing-3292359>

Course Outcome:

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

- | | |
|---------------------------------------------------------------------------------------------|----|
| CO1: preprocess the data using various preprocessing techniques | K1 |
| CO2: generate association rules using Apriori and FP-growth algorithms | K6 |
| CO3: predict the class label of a given tuple using the classification techniques | K3 |
| CO4: group the data using the basic clustering techniques | K4 |
| CO5: summarize the concepts of warehouse, its architecture and multidimensional data models | K2 |

Mapping of Cos with PSOs & Pos:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	S	S	S	N	S	S	S	N	S
CO2	S	S	W	S	N	S	S	M	N	S
CO3	M	S	M	S	N	S	S	S	N	S
CO4	M	S	W	S	N	S	S	M	N	S
CO5	S	S	M	S	N	S	S	S	N	S

S-Strongly Correlating

M-Moderately Correlating

W-Weakly Correlating

N-No Correlation

Prepared by	Miss.P.Kalpana
Verified by	Dr.M.Muralidharan

Course Code & Title	CC-IX LAB II- JAVA & J2EE		
MSc	Semester : II	Credits : 4	Hrs:6
Cognitive Level	K 3 – Apply K 4 – Analyze K 6 – Create		
Learning Objectives	This Course aims to <ul style="list-style-type: none"> ▪ develop network programs using TCP/IP and UDP ▪ develop distributed applications using RMI ▪ create web based distributed applications using Java Servlets ▪ design web based distributed applications using Java Server Page 		

Socket Programming

- i. Communication between server and client using TCP/IP
- ii. Communication between server and client using UDP

Distributed applications using RMI

- i. Simple RMI application
- ii. RMI application with a server and more than one clients
- iii. RMI application with Database Connectivity

Implementing Servlet

- I.Simple Servlet
- ii.Servlet with JDBC
- iii.Servlet Session Tracking

Implementing Java Server Pages(JSP)

- i. Simple JSP
- ii.JSP with JDBC
- iii JSP with Session Tracking

Enterprise Java Beans

- i. Session Bean
- ii. Entity Bean

Course Outcomes:

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

CO1: write code on socket programming using TCP/IP and UDP **K3**

CO2: design various real time applications using RMI **K4**

CO3: develop various real time web based distributed applications using Java servlets,JSP **K6**

Mapping of Cos with PSOs & Pos:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	S	M	S	N	S	S	S	S	S
CO2	S	M	S	S	N	S	S	M	M	S
CO3	S	S	M	S	N	S	S	M	S	S

S-Strongly Correlating

M-Moderately Correlating

W-Weakly Correlating

N-No Correlation

Prepared by	Dr.K.Sridevi
Verified by	Dr.K.Mani

Course Code & Title	CEC-I PRINCIPLES OF WIRELESS AND MOBILE NETWORK		
MSc	Semester : II	Credits : 4	Hrs:6
Cognitive Level	K2 – Understand K3 – Apply K4– Analyze		
Learning Objectives	This Course aims to <ul style="list-style-type: none"> • comprehend the basic concepts of Personal Communication services (PCS) principle and fundamentals. • introduce the Operations Mobility Management and handoff management. • conversant with Broadband and Adhoc networks functionalities. • acquire the knowledge in design of the Wireless WANS. • cognize the Wireless Geolocation System 		

UNIT- I

Network Planning: Introduction – wireless network Topologies – Cellular Topology – Cell Fundamentals – Signal-to-Interference Radio Calculation-Network Planning for CDMA Systems. (18 hrs)

UNIT- II

Wireless Network Operation: Introduction – Mobility Management – Radio Resources and Power Management – Security in Wireless Networks (18 hrs)

UNIT- III

Wireless WANS: what is GSM – Mechanisms to Support a Mobile Environment – Communication in Infrastructure – CDMA – IMT-2000 – GPRS and Higher Data rates – short Message service in GSM – Mobile Application Protocols (15 hrs)

UNIT- IV

Local Broadband and Adhoc networks: IEEE 802.11 – PHY layer – MAC Sublayer -Wireless ATM – HIPERLAN – HYPERLAN-2 - IEEE 802.15 WPAN–HomeRF–Bluetooth–Interference between Bluetooth and 802.11. (20 hrs)

UNIT- V

Wireless Geolocation System: What is wireless Geolocation – Wireless geolocation System Architecture – Technologies for Wireless Geolocation – Geolocation standards for E-911 Services – Performance Measures for geolocation Systems. (19 hrs)

Book for Study:

1. Kaveh Palavan, Prashant Krishnamoorthy , *Principles of Wireless Networks*, Eastern Economy Edition,2002,ISBN- 81-203-2380-7 (Chapter 5,6,7,8,9,11,12,13,14 only),ISBN: 978-0-470-69708-5

Books for Reference:

1. Jochen Schiller, *Mobile Communications*, Second Edition, Pearson Education, Ltd., 2010 ISBN81-2. 297-0350-5.
2. T.S. Rappaport, *Wireless Communications: Principles and Practice*, Second Edition, Prentice Hall, 2002,ISBN: 9780130422323 .

Web Reference:

1. www.ccs.neu.edu/home/rraj/Courses/G250/S05/Lectures/BluetoothMobileIP.ppt
2. www.chu.edu.tw/~lhyan/wc/gsm.pdf
3. www.hit.bme.hu/~mihaly/mobil.hir/gsmbase.pdf
4. http://www.cs.fsu.edu/~zzhang/CIS5930_Spring_2009_files/OSMR_chest_snd.py

Course Outcomes:

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

- CO1:** understand the basic concepts of Personal Communication Services (PCS) by wireless network fundamentals and topology. **K2**
- CO2:** exposed to the required Operations Mobility Management and handoff management for various wireless management and radio resources and security. **K3**
K4
- CO3:** design of the wireless WAN for GSM ,GPRS and CDMA. **K4**
- CO4:** conversant with Broadband and Adhoc networks functionalities by IEEE wireless projects. **K4**
- CO5:** apply cognize the Wireless Geolocation System by E-911 **K3**

Mapping of Cos with PSOs & Pos:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	S	S	S	N	S	S	S	S	S
CO2	S	S	S	S	N	S	S	M	M	S
CO3	S	S	M	S	N	S	S	S	S	S
CO4	S	S	W	S	N	S	S	M	M	S
CO5	S	S	M	S	N	S	S	S	S	S

S-Strongly Correlating
W-Weakly Correlating

M-Moderately Correlating
N-No Correlation

Prepared by	Mrs.V.Priya
Verified by	Dr.K.Mani

Course Code & Title	CEC-I DIGITAL IMAGE PROCESSING		
MSc	Semester : II	Credits : 4	Hrs:6
Cognitive Level	K 2 – Understand K 3 – Apply K 4 – Analyze		
Learning Objectives	This Course aims to <ul style="list-style-type: none"> ▪ learn the fundamentals of digital image. ▪ understand the basics of image enhancement. ▪ imbibe the knowledge on image restoration. ▪ introduce the concepts of image compression. ▪ impart the knowledge in segmentation. 		

UNIT -I

Digital Image Fundamentals:

Introduction – Origin – Steps in Digital Image Processing – Components – Elements of Visual Perception – Image Sensing and Acquisition – Image Sampling and Quantization – Relationships between pixels color models. (20 hrs)

UNIT- II

Intensity Transformation and Spatial Filtering:

Background-Basic intensity transformation functions – Histogram processing – Fundamentals of Spatial Filtering– Smoothing and Sharpening; Spatial Filtering – Frequency Domain: Preliminary concepts-DPI of one variable-Extension to function of two variable-Basics of filtering – Smoothing and Sharpening frequency domain filters – Ideal, Butterworth and Gaussian filters. (15 hrs)

UNIT- III

Image Restoration:

Noise models – Mean Filters – Order Statistics – Adaptive filters – Band reject Filters – Band pass Filters – Notch Filters – Optimum Notch Filtering – Inverse Filtering – Wiener filtering Color Image Processing-Color models-Pseudo Color Image Processing-Basics of Full Color Image Processing-Color Transformation (18 hrs)

UNIT- IV

Wavelets and Image Compression:

Wavelets – Background- Multire solution expansions –Wavelet Transforms in one dimension-The fast Wavelet Transform-Image Compression-Fundamentals- Basic Compression Methods – Digital Image water making. (18 hrs)

UNIT- V

Image Segmentation:

Fundamentals – Point, Line, and Edge detection – Thresholding –Region – Based segmentation – Segmentation using Morphological Watersheds – The use of Motion in segmentation.

(19 hrs)

Book for Study:

1. Rafael C. Gonzales, Richard E. Woods, “*Digital Image Processing*”, Third Edition, Pearson Education, 2010.

Books for Reference:

1. Rafael C. Gonzalez, Richard E. Woods, Steven L. Eddins, “*Digital Image Processing Using MATLAB*”, Third Edition Tata McGraw Hill Pvt. Ltd., 2011.
2. Anil Jain K. “*Fundamentals of Digital Image Processing*”, PHI Learning Pvt. Ltd., 2011.
3. Willliam K Pratt, “*Digital Image Processing*”, John Willey, 2002

Course Outcomes:

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

- CO1:** describe digital image fundamentals and image enhancement **K2**
CO2: apply knowledge on image restoration **K3**
CO3: use image compression techniques to real life models **K4**
CO4: apply knowledge on image segmentation **K3**

Mapping of Cos with PSOs & Pos:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	M	M	M	N	S	M	M	N	S
CO2	S	M	S	S	N	S	M	S	N	S
CO3	M	W	S	M	N	S	S	M	N	S
CO4	M	M	S	S	N	S	M	S	N	S

S-Strongly Correlating
W-Weakly Correlating

M-Moderately Correlating
N-No Correlation

Prepared by	Dr.S.Murugan
Verified by	Dr.K.Mani

Course Code & Title	CEC-I ADVANCED OPERATING SYSTEM		
MSc	Semester : II	Credits : 4	Hrs:6
Cognitive Level	K1 – Remember K2 – Understand K3 – Apply		
Learning Objectives	This Course aims to <ul style="list-style-type: none"> ▪ fundamentals of operating systems, process description and control. ▪ gain knowledge on concurrency ,mutual exclusion and deadlock ▪ introduce the memory management techniques and scheduling. ▪ understand the concepts of I/O management ▪ gain knowledge of distributed processing 		

UNIT- I

Operating Systems Overview: Operating Systems objectives and functions– The evolution of OS – Process Description and Control: Process states – process description – process control. **(18 hrs)**

UNIT- II

Concurrency: Mutual Exclusion and Synchronization: Principles of concurrency – Mutual Exclusion: Software support – Hardware support – Semaphores – Monitors – Message Passing – Reader/Writer problem. Deadlock and Starvation: Principles of deadlock – Deadlock prevention – avoidance – detection – Dining Philosophers problem. **(20 hrs)**

UNIT- III

Memory Management: Requirements – Memory partitioning – Paging – Segmentation – Virtual Memory: Hardware and Control structures – OS software – Scheduling: Types of scheduling – Scheduling algorithms. **(17 hrs)**

UNIT- IV

I/O Management and Disk Scheduling: I/O devices – Organization of I/O function – OS design issues – I/O buffering – Disk scheduling – Disk cache – File Management: Overview- File organization – directories – sharing – Record blocking – Secondary storage management. **(12 hrs)**

UNIT- V

Distributed Processing, Client/Server & Clusters: Client/Server computing – Distributed message passing – Embedded OS: Embedded systems- Characteristics of embedded OS – iOS and Android: Apple iOS developers – iOS architecture and SDK framework. **(13 hrs)**

Books for Study:

1. William Stallings, “*Operating Systems, Internals & Design Principles*”, 8th Edition, Prentice Hall, 2010

- Neil Smyth, “*iPhone iOS 4 Development Essentials – Xcode*”, 4th Edition, Payload Media, 2011.

Reference Books:

- Mukesh Singhal and Niranjana G. Shivaratri, “*Advanced Concepts in Operating Systems – Distributed, Database, and Multiprocessor Operating Systems*”, Tata McGraw-Hill, 2001., ISBN 007057572X, 9780070575721.
- Abraham Silberschatz; Peter Baer Galvin; Greg Gagne, “*Operating System Concepts*”, 9th Edition, John Wiley & Sons, 2004.

Web Reference:

- www.geeksforgeeks.org
- www.tutorialspoint.com
- www.studytonight.com
- www.ebookfrenzy.com/pdf_previews/iPhoneiOS6EssentialsPreview.pdf

Course Outcomes:

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

- CO1:** identify the services provided by operating systems **K1**
- CO2:** solve problems involving process description and control. **K2**
- CO3:** resolve Mutual exclusion, Deadlock detection **K2**
- CO4:** apply the memory management techniques **K3**
- CO5:** manage I/O devices, disk scheduling and file sharing. **K1**

Mapping of Cos with PSOs & Pos:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	M	M	M	N	W	M	M	N	S
CO2	S	M	S	M	N	S	M	S	N	S
CO3	M	W	S	M	N	M	S	M	N	S
CO4	W	S	M	S	N	W	S	M	N	S
CO5	M	S	M	S	N	S	S	S	N	M

S-Strongly Correlating
W-Weakly Correlating

M-Moderately Correlating
N-No Correlation

Prepared by	Dr.K.Sridevi
Verified by	Ms.P.Kalpana

Course Code & Title	OEC-I R PROGRAMMING		
MSc	Semester : II	Credits : 4	Hrs:4
Cognitive Level	K1-Remember K3 -Apply		
Learning Objectives	This Course aims to <ul style="list-style-type: none"> ▪ Familiarize the R environment and its fundamentals ▪ introduce the concept of objects and descriptive statistics ▪ Inculcate knowledge in data distribution ▪ Provide data analysis using graphical tools ▪ Provide understanding for regression concepts 		

UNIT- I

Introduction to R: getting the Hang of R - Running a R Script - Finding your way with R - Command Packages - Becoming Familiar with R: some simple math - Reading and Getting data into R - viewing named objects - types of data items - the structure of data items - Examining data structure - working with history commands - saving your work in R **(12 hrs)**

UNIT - II

Working with objects: Manipulating objects - viewing objects within objects - constructing data objects - forms of data objects: Testing and converting. Data: Descriptive Statistics and tabulation- Summary commands - Summarizing samples- summary tables. **(13 hrs)**

UNIT - III

Data: Distribution - Looking at the distribution of data - Simple Hypothesis testing : Using the student's t-test - The Wilcoxon U-test - Paired t- and U-tests - Correlation and Covariance - Test for association. **(11 hrs)**

UNIT -IV

Introduction to graphical analysis: Box whiskers plots - scatter plots - pairs plots - line charts - pie charts – clevel and dot charts- bar charts - copy graphics to other applications **(14 hrs)**

UNIT - V

More about graphics: Adding elements to existing plots - Matrix plot - Multiple plots in one window - Exporting graphs- Regression: Simple Linear regression - Multiple Regression.(10 hrs)

Text Book:

1. Mark Gardener, "*Beginning R The statistical programming language*", John Wiley & Sons Inc, 2012, ISBN:978-1-118-16430-3

Reference Books:

1. Norman Matloff, "*The art of R programming*", William Pollock , 2011, ISBN-10: 1-59327-384-3
2. Roger D. Peng, "*R Programming for Data Science*", Leanpub, 2015

Course Outcomes:

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

CO1: use R for statistical programming, computation, graphics, and modeling **K3**

CO2: use R programming for research and scientific applications **K3**

CO3: apply statistical tests for various research problems using R. **K3**

CO4: identify and fit some basic types of statistical models **K1**

Mapping of Cos with PSOs & Pos:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	M	M	M	N	W	M	M	W	S
CO2	M	M	S	W	N	M	M	S	W	S
CO3	M	W	S	M	N	M	S	M	W	S
CO4	S	S	M	S	N	W	S	M	W	S
CO5	S	S	M	M	N	M	S	S	W	S

S-Strongly Correlating

M-Moderately Correlating

W-Weakly Correlating

N-No Correlation

Prepared by	Ms.P.Kalpana
Verified by	Dr.K.Mani

Course Code & Title	OEC-I WEB TECHNOLOGY		
MSc	Semester : II	Credits : 4	Hrs:4
Cognitive Level	K1 – Understand K3 – Apply K6 -- Create		
Learning Objectives	This Course aims to <ul style="list-style-type: none"> ▪ introduce the concepts of web browsers and network related protocols ▪ understand the basic HTML tags ▪ design the frameset and forms using various HTML tags. ▪ introduce java script ▪ study AMP technologies 		

UNIT-I

Web Medium: Core web technologies – Web browsers – Markup Languages – Style Sheet technologies –client side, server side – network and related protocols – Introduction to static, dynamic and active web pages. (13 hrs)

UNIT-II

Introduction to HTML – History – Structure of HTML Document – Basic Tags – Images – List – Ordered List and Unordered List –Table Handling. (12 hrs)

UNIT-III

Frameset Definition – Nested frameset – Introduction to Forms – Actions attribute – Method Attribute – ENC type attribute – Prop down List ,Check boxes , Radio Buttons ,Text field ,Text area, Password and Hidden files, Submit and Reset button–Designing sample forms. (14 hrs)

UNIT-IV

Client Side Scripting: Overview of Java Script – languages constructs – classes and objects – properties and methods – events – functions and parameters – event handling. (11 hrs)

UNIT-V

Introduction to AMP: Introduction to the integrated usage of Apache, MySQL, PHP technologies for designing a web page - Overview of PHP – Structure and syntax – Using PHP and MySQL – Creating interactive web page using AMP technologies. (10 hrs)

Books for Study:

1. Thomas A Powell, “*Web Design – The Complete Reference*”, Tata McGraw- Hill, Second Edition, 2010, ISBN: 0072224429
2. Achyut S Godbole, Atul Kahate, “*Web Technologies – TCP/IP to Internet Application Architectures*”,TataMcGraw-Hill,2003.,ISBN: 9780070472983.

3. Michael K Glass, Yann Le Scouarnec, Elizabeth Naramore, Gary Mailer, Jeremy Stolz, Jason Gerner, “ *Beginning PHP, Apache , MySQL Web Development*”, Wiley dreamtech press, 2016 edition, ISBN 978-0-7645-5744-6 .
4. Andi Gutmans, Stig Saether Bakken, Derick Rathens, “*PHP 5 Power Programming*”, Prentice Hall, 2005.,C.Xavier, “*World Wide Web Design with HTML*”, Tata McGraw-Hill, 2004.,, ISBN: 0-07-041186-7

Books for Reference:

1. Cristian Darie, Bogdan Brinzarea, Filip Cherecheș-Toșa, Mihai Bucica, “*Building Responsive Web Applications PHP*”, Packet Publishing

Web Reference:

1. <https://www.w3schools.com/php/>
2. <https://www.tutorialspoint.com/>

Course Outcomes:

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

- CO1:** identify web browsers and network protocols **K1**
CO2: design a web pages using HTML tags **K3**
CO3: create a dynamic webpage using PHP and MySQL **K6**

Mapping of Cos with PSOs & Pos:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	M	M	M	N	S	S	M	S	S
CO2	M	S	S	M	N	S	M	S	S	S
CO3	S	W	S	M	N	S	S	M	S	S

S-Strongly Correlating M-Moderately Correlating
W-Weakly Correlating N-No Correlation

Prepared By	Dr.D.Jayachitra
Verified By	Ms.P.Kalpana

Course Code & Title	OEC- FUNCTIONAL PROGRAMMING USING HASKELL		
MSc	Semester : II	Credits : 4	Hrs:4
Cognitive Level	K2 – Remember K3 – Apply K4 – Analyze K6– Create		
Learning Objectives	This Course aims to <ul style="list-style-type: none"> ▪ learn the syntax and semantics of the Haskell programming language ▪ learn business logic and data analysis, fast prototyping and enhancing ▪ study existing software environments. ▪ understand file processing. ▪ acquire the knowledge on various file operation and pattern matching. 		

UNIT I

Getting Started – Lists – Strings and Characters – Type System – Function Application – Writing Simple functions – Understanding evaluations – Defining new Data types – Algebraic data types – Pattern matching. **(14 hrs)**

UNIT – II

Functional Programming – Infix functions – Working with Lists – Think about loops – Lambda functions – Writing a Library – Working with JSON data- Anatomy of Haskell module – Pointing JSON Data. **(13 hrs)**

UNIT – III

Using Type Classes – Built in Type Class – Type Classes at work – I/O – Classic I/O – Working with files – Lazy I/O – I/O Monad – Buffering. **(12 hrs)**

UNIT – IV

File processing – Regular Expressions – Pattern matching – Writing Lazy Function – I/O case study – Find – Naïve finding system – Predicates. **(11 hrs)**

UNIT – V

Data Structures – Association Lists – maps – Monads – Monad type class using new monad – State Monad. **(10 hrs)**

Book for Study:

1. O'Reilly, "*Real World Haskell*", First edition, released in Nov 2008.

Books for Reference:

1. Graham Hutton, "*Programming in Haskell*", Second Edition, Kindle Edition, ISBN-13: 978-1316626221 ISBN-10: 1316626229
2. Simon Thompson. "*The Craft of Functional Programming*", Third Edition.

Web Reference:

1. <https://www.tutorialspoint.com/haskell>
2. <https://www.haskell.org>.

Course Outcomes:

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

- CO1:** understand the simple functions K2
- CO2:** develop functional programming in integrated deployment K6
- CO3:** write haskell program using various built in functions K6
- CO4:** apply various concept in pattern matching K3
- CO5:** analyze concept of data structure K4

Mapping of Cos with PSOs & Pos:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	M	M	M	N	W	M	M	W	S
CO2	M	M	S	W	N	M	M	S	W	S
CO3	M	W	S	M	N	M	S	M	W	S
CO4	S	S	M	S	N	W	S	M	W	S
CO5	S	S	M	M	N	M	S	S	W	S

S-Strongly Correlating
W-Weakly Correlating

M-Moderately Correlating
N-No Correlation

Prepared by	Dr.M.Muralidharan
Verified by	Dr.S.Murugan

Course Code & Title	CC-X -AI AND MACHINE LEARNING		
MSc	Semester : III	Credits : 4	Hrs:5
Cognitive Level	K1 – Remember K2 – Understand		
Learning Objectives	This Course aims to <ul style="list-style-type: none"> ▪ study the concepts of Artificial Intelligence ▪ impart knowledge representation ▪ understand the basics of machine learning ▪ describe Neural Networks and Genetic Algorithms ▪ illustrate Bayesian and Computational learning 		

UNIT - I

Introduction to AI and Production Systems: Introduction to AI-Problem formulation, Problem Definition –Production systems, Control strategies, Search strategies. Problem characteristics, Production system characteristics- Specialized production system-Problem solving methods – Problem graphs, Matching, Indexing and Heuristic functions –Hill Climbing –Depth first and Breath first, Constraints satisfaction – Related algorithms, Measure of performance and analysis of search algorithms. (15 hrs)

UNIT-II

Representation of knowledge: Game playing- Knowledge representation, Knowledge representation using Predicate logic, Introduction to predicate calculus, Resolution, Use of predicate calculus, Knowledge representation using other logic- Structured representation of knowledge. (10 hrs)

UNIT –III

Introduction : Learning Problems – Perspectives and Issues – Concept Learning – Version Spaces and Candidate Eliminations – Inductive bias – Decision Tree learning – Representation – Algorithm – Heuristic Space Search. (15 hrs)

UNIT – IV

Neural Networks And Genetic Algorithms: Neural Network Representation – Problems – Perceptrons – Multilayer Networks and Back Propagation Algorithms – Advanced Topics – Genetic Algorithms – Hypothesis Space Search – Genetic Programming – Models of Evaluation and Learning. (15 hrs)

UNIT -V

Bayesian and Computational Learning : Bayes Theorem – Concept Learning – Maximum Likelihood – Minimum Description Length Principle – Bayes Optimal Classifier – Gibbs Algorithm – Naïve Bayes Classifier – Bayesian Belief Network –EM Algorithm – Probability Learning – Sample Complexity – Finite and Infinite Hypothesis Spaces – Mistake Bound Model. (20hrs)

Book for Study:

1. Kevin Night and Elaine Rich, Nair B “ *Artificial Intelligence(SIE)*”, Mc Graw Hill-2008(Unit I,II)
2. Tom M. Mitchell, “**Machine Learning**”, First Edition, McGraw Hill Education (India) Private Limited, (1 May 2013) ISBN-10: 1259096955 , ISBN-13: 978-1259096952

Books for Reference:

1. Ethem Alpaydin, “*Introduction to Machine Learning (Adaptive Computation and Machine Learning)*”, The MIT Press 2004
2. T. Hastie, R. Tibshirani, J. H. Friedman, “*The Elements of Statistical Learning*”, Springer; 1 edition, 2001
3. Deepak Khemani” *Artificial Intelligence*”, Tata Mc Graw Hill-2013

Web Reference:

1. <https://www.cs.ubbcluj.ro/~gabis/ml/ml-books/McGrawHill%20-20Machine%20Learning%20-Tom%20Mitchell.pdf>
2. https://www.python-course.eu/machine_learning.php

Course Outcomes:

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

- | | |
|----------------------------------------------------------------------------------|----|
| CO1: solve the real life problems using AI techniques. | K1 |
| CO2: identify appropriate AI methods to develop knowledge based solution. | K2 |
| CO3: identify problems, through the concept of learning methods. | K1 |
| CO4: apply various neural networks algorithms to real life problems. | K2 |
| CO5: apply genetic algorithms for research problems. | K1 |

Mapping of Cos with PSOs & Pos:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	S	M	M	N	S	M	M	N	M
CO2	M	S	S	M	N	M	M	S	N	S
CO3	S	W	S	M	N	M	S	M	N	M
CO4	S	S	M	S	N	W	S	M	N	S
CO5	S	M	M	M	N	S	S	S	N	S

S-Strongly Correlating

M-Moderately Correlating

W-Weakly Correlating

N-No Correlation

Prepared by	Dr.M.Muralidharan
Verified by	Dr.K.Sridevi

Course Code & Title	CC-XI PRINCIPLES OF COMPILER DESIGN		
MSc	Semester : III	Credits : 4	Hrs:5
Cognitive Level	K1 – Remember K2 – Understand K5 – Evaluate K6 – Create		
Learning Objectives	This Course aims to <ul style="list-style-type: none"> ▪ classify various translators and its functions ▪ summarize various phases of a compiler ▪ develop thorough knowledge in Parsers ▪ organize syntax based translations ▪ generate the optimized object code 		

UNIT-I

Introduction to compilers – compilers and translators – assembly language – macros – structure of compiler – **compiler writing tools** – bootstrapping. Lexical analysis – role of lexical analyzer – regular expression – finite automata – implementation of lexical analyzer – context free grammars – derivation and parse trees. **Self Study:Compiler Writing tools, implementation of simple lexical analyser in C** (15 hrs)

UNIT-II:

Parsers – shift reduce parsing – operator precedence parsing – top down parsing – predictive parsers – simple precedence parser – LR parsers – constructing SLR parsing tables – constructing canonical LR parsing table – constructing LALR parsing tables – using ambiguous grammars. (15 hrs)

Unit-III:

Syntax directed translation schemes – implementation of syntax directed translation schemes – intermediate code– postfix notation – parse trees and syntax trees – three address code, uadruples and tuples – translation of assignment statements – Boolean expression – postfix translation. (15 hrs)

UNIT-IV

Symbol table – the contents of a symbol table – data structures for symbol tables –representing scope information – Errors – lexical phase errors – syntactic phase errors– Semantic errors (15 hrs)

UNIT-V

Code optimization – principle sources of optimization – loop optimization – machine dependent optimization – DAG representation in basic blocks. Code generation –problems in code generation – a simple code generator – register allocations and assignment – Code generation from DAG's – Peep hole optimization. (15 hrs)

Book for Study:

1. A.V.Aho and J D Ullman, “*The Principles of Compiler Design*” ,Narosa Publishing House, 1998, ISBN: 81-85015-61-9.(Chapters: 1, 3, 4, 5, 6, 7, 9, 10, 11, 12, 15)

Books for Reference:

1. Alfred Aho, Ravi Sethi, Jeffy D. Ullman, “*Compilers – Principles, Techniques and Tools*”, Pearson Education Asia, 2002
2. Dick Grune, Kes van Reeuwijk, Henri E.bal, Cerial J H Jacobs, Koen Langendoen, “*Modern Compiler Design*”, Second edition

Web Reference:

1. www.nptel.ac.in/courses/106108052/
2. www.nptel.ac.in/downloads
3. www.tutorialspoint.com/compiler_design/
4. www.geeksforgeeks.org/compiler-design-tutorials

Course Outcomes:

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

- CO1:** understand various types of translators and its functions **K1**
- CO2:** identify phases of compiler **K2**
- CO3:** design lexical analyzer and identify the similarities and differences among different parsing techniques **K6**
- CO4:** formulate the different representation of intermediate code **K6**
- CO5:** evaluate the optimized code to generate code. **K5**

Mapping of Cos with PSOs & Pos:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	M	M	M	N	W	M	M	N	M
CO2	M	M	S	M	N	M	M	S	N	S
CO3	M	W	S	M	N	M	S	M	N	M
CO4	W	S	M	S	N	W	S	M	N	S
CO5	S	S	S	S	N	N	M	S	N	S

S-Strongly Correlating
W-Weakly Correlating

M-Moderately Correlating
N-No Correlation

Prepared by	Dr.K.Sridevi
Verified by	Mrs.K.PonvelAzhagu Lakshmi

Course Code & Title	CC-XII IOT-INTERNET OF THINGS		
MSc	Semester : III	Credits : 4	Hrs:4
Cognitive Level	K4 – Analyze K6 – Create		
Learning Objectives	This Course aims to <ul style="list-style-type: none"> ▪ understand the fundamentals of Internet of Things ▪ provide a Complete Knowledge about the Internet of Things ▪ provide Scalable Integration Framework for Heterogeneous Smart Objects. ▪ understand Federated Cloud Service Management ▪ apply the concept of Internet of Things in the real world scenario 		

UNIT- I

Introduction - Putting the Internet of Things forward to the Next Level - Internet of Things Strategic Research and Innovation Agenda : Internet of Things Vision - Internet of Things Strategic Research and Innovation Directions - IoT Smart X Applications. **(13 hrs)**

UNIT- II

Internet of Things and Related Future Internet Technologies - Network and Communications - Processes - Data Management - Security, Privacy and Trust - Device Level Energy Issues - IoT Related Standardization - IoT Protocols Convergence. **(12 hrs)**

UNIT- III

Scalable Integration Framework for Heterogeneous Smart Objects, Applications and Services : IPV6 Potential - IoT6 - IPV6 vsIoT - Adapting IPV6 to IoT Requirements - IoT6 Architecture - DigCovery - IoT6 Integration with the Cloud and EPICS – Enabling Heterogeneous Integration - IoT6 Smart Office Use Case - Scalability Perceptive. **(14 hrs)**

UNIT- IV

Insights on Federated Cloud Service Management and the IoT : Federated Cloud Service Management - Federated Management Service Life Cycle - Self Management Life Cycle - Self Organising Cloud Architecture - Horizontal Platform. **(11 hrs)**

UNIT- V:

Internet of Things Applications :OpenIoT - iCORE - Compose. **(10 hrs)**

Book for Study:

1. Vidiu Vermesan and Peter Friess, “*Internet of Things - From Research Innovation to Market Deployment*” River Publishers, 2014.

Book for Reference:

1. McEwen and Hakim Cassimally, John Wiley and Sons ”*Designing the Internet of Things*” Ltd, 2014.

Web Reference:

1. https://www.tutorialspoint.com/internet_of_things/
2. <https://www.codeproject.com/Learn/IoT/>

Course Outcomes:

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

- CO1:** design a portable IoT using Arduino equivalent boards and relevant protocols **K6**
CO2: develop web services to access/control IoT devices **K6**
CO3: deploy an IoT application and connect to the cloud **K6**
CO4: analyze applications of IoT in real time applications. **K4**

Mapping of Cos with PSOs & Pos:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	M	M	S	N	W	S	M	N	S
CO2	S	M	S	W	N	M	M	S	N	S
CO3	S	W	S	S	N	M	S	M	N	S
CO4	S	S	M	S	N	W	S	M	N	S

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N-No Correlation

Prepared by	Dr.K.Sridevi
Verified by	Dr.S.Murugan

Course Code & Title	CC-XIII-RAPID APPLICATION DEVELOPMENT USING PYTHON		
MSc	Semester : III	Credits : 4	Hrs:4
Cognitive Level	K1 – Remember K3 – Apply K6 – Create		
Learning Objectives	This Course aims to <ul style="list-style-type: none"> ▪ introduce the basic concepts of Python ▪ gain knowledge on sequencing structures ▪ understand the concepts of files and exceptions ▪ analyze OOP’s concepts ▪ classify NumPy module and its functionalities 		

UNIT-I

Using python: Installing python- The python Interpreter – Interactive mode – IDLE programming environment – Basics of Python Language: comment – variables Strings and String literals - Getting input and Displaying output (input, raw_input& print)- Operators and Expressions – Control Flow Statements: Decision structures and loop control structures. **(12 hrs)**

UNIT-II

Data Structures: List, Tuples, Dictionaries, Set and Strings – Functions – Modules **(13 hrs)**

UNIT-III

File Handling – Errors and Exception Handling – Python Standard Library. **(11 hrs)**

UNIT-IV

Regular Expression - Object Oriented Programming: Objects and Classes – Inheritance . **(14 hrs)**

UNIT-V

NumPy: NumPy on windows- Beginning with NumPy fundamentals- Getting Familiar with commonly used functions – correlation- polynomials- working with matrices and ufuncs – NumPy modules. **(10 hrs)**

Books for Study:

1. Tony Gaddis, “*Starting out with python*”, 2nd edition, Addison Wesley, Pearson
2. Michael Dawson, “*Python programming for the absolute beginner*”, Premier press, 2003
3. Ivan Idris, “*NumPy Beginner’s Guide*”, Third Edition,Packet Publishing, 2015

Books for Reference:

1. Guido van Rossum, “ *Python Tutorial – Release 2.3.3*” 2003, Python Software Foundation Ltd.
2. Jennifer Campbell, Paul Gries, Jason Montojo and Greg Wilson, “*Practical programing, An Introduction to computer science using Python*”,2011

Web Reference:

1. https://github.com/beginners_python_cheat_sheet_pcc_all.pdf
2. <https://docs.python.org>
3. www.tutorialspoint.com

Course Outcomes:

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

CO1: install of python and its fundamentals	K1
CO2: apply various data structures	K3
CO3: compile the functions of files and exceptions	K6
CO4: develop OOP based programs	K6
CO5: using NumPy functions for developing applications	K6

Mapping of Cos with PSOs & Pos:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	M	M	M	N	W	M	M	W	S
CO2	M	M	S	M	N	M	M	S	W	S
CO3	M	W	S	M	N	M	S	M	W	S
CO4	W	S	M	S	N	W	S	M	W	S
CO5	M	S	M	M	M	S	M	S	W	S

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N-No Correlation

Prepared by	Mrs.K.PonvelAzhagu Lakshmi
Verified by	Dr.M.Muralidharan

Course Code & Title	CC-II CLOUD COMPUTING		
MSc	Semester : III	Credits : 4	Hrs:6
Cognitive Level	K1 – Remember K3 – Apply		
Learning Objectives	This Course aims to <ul style="list-style-type: none"> ▪ recognise various types of clouds service and deployment models ▪ acquire knowledge in cloud computing architecture ▪ analyze basic cloud collaborating applications ▪ identify advanced cloud collaborating applications ▪ learn Cloud security and its importance to real time applications 		

UNIT- I :

Introduction to Cloud Computing: Roots of Cloud Computing - Layers and Types of Cloud – Features of a cloud-Infrastructure Management-Cloud Services-Challenges and Risks. Migrating into a Cloud: Approaches –Seven Step Model. Introduction-Broad Integration as a Service-Integration Methodologies- SaaS. **(18 hrs)**

UNIT- II:

The Anatomy of Cloud Infrastructure- Distributed Management of Virtual Infrastructures- Scheduling Techniques for Advance Reservation of Capacity- RVWS Design – Cluster as a Service: The Logical Design – Cloud Storage : from LANs TO WANs- Technologies for Data Security in Cloud Computing . **(18 hrs)**

UNIT -III:

Collaborating on Project Management: Understanding Project Management - Exploring Project Management Applications - Collaborating on Word Processing: How Web-Based Word Processing Works - Exploring Web-Based Word Processors - Collaborating on Spreadsheets: How Web-Based Spreadsheets Work - Exploring Web-Based Spreadsheets - Collaborating on Databases: Understanding Database Management - Exploring Web-Based Databases - Collaborating on Presentations: Preparing Presentations Online - Evaluating Web-Based Presentation Applications. **(19 hrs)**

UNIT- IV

Storing and Sharing Files and other online contents: Understanding Cloud Storage - Evaluating Online File-Storage and Sharing Services - Exploring Online Bookmarking Services— Sharing Digital Photographs: Exploring Online Photo- Editing Applications - Exploring Photo-Sharing Communities - Controlling it all with web based Desktops: Understanding Web-Based Desktops - Evaluating Web Based Desktops - Collaborating via web based Communication Tools: Evaluating Web Mail Services - Evaluating Instant Messaging Services - Evaluating Web Conferencing Tools. **(17 hrs)**

UNIT- V

Grid and Cloud- HPC in the Cloud: Performance related Issues –Data Security in the Cloud- The Current State of Data Security in the Cloud- Homo Sapiens and Digital Information- Risk-Identity- The Cloud, Digital Identity and Data Security – Content Level Security: Pros and Cons- Legal Issues in Cloud Computing–Data Privacy and Security Issues-Cloud Contracting models.

(18hrs)

Books for Study:

1. Rajkumar Buyya, James Broberg, and Andrzej Goscinski. “*Cloud Computing Principles and Paradigms*” 2015 .(UNIT I, II, V), ISBN: 978-0-470-88799-8
2. Michael Miller” *Cloud Computing: Web Based Applications that change the way You work and collaborate online*, Pearson Education, 2009 edition.(UNIT III,IV) ISBN: 9788131725337

Book for Reference:

1. George Reese” *Cloud Application Architectures*” Shroff/O'Reilly,2009,ISBN: 8184047142

Web Reference:

1. <http://chettinadtech.ac.in/storage/13-01-21/13-01-21-08-33-12-1373-mahendra.pdf>

Course Outcomes:

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

- CO1:** apply the various types of clouds service and deployment models **K3**
CO2: describe cloud computing architecture **K1**
CO3: identify the basic cloud collaborating applications **K1**
CO4: apply cloud security to real time applications **K3**

Mapping of Cos with PSOs & Pos:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	S	M	M	N	S	S	M	N	S
CO2	S	M	S	W	N	S	M	S	N	S
CO3	S	M	S	M	N	S	S	M	N	S
CO4	S	S	M	S	N	S	S	M	N	S

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N-No Correlation

Prepared by	Dr.D.Jayachitra
Verified by	Mrs.V.Priya

Course Code & Title	CEC-II SERVICE ORIENTED ARCHITECTURE		
MSc	Semester : III	Credits : 4	Hrs:6
Cognitive Level	K2 – Understand K3 – Apply K4 – Analyze		
Learning Objectives	This Course aims to <ul style="list-style-type: none"> ▪ study the concepts of software architecture and service oriented architecture ▪ learn the benefits of SOA. ▪ know related technologies and implementation basics of SOA ▪ obtain the knowledge of web services security and its related technologies. ▪ cover the policies for transactions processing and the usage of SOA in mobiles. 		

UNIT-I

Software Architecture – Types of IT Architecture – SOA – Evolution – Key components – Perspective of SOA – Enterprise-wide SOA – Architecture – Enterprise Applications – Solution Architecture for enterprise application – Software platforms for enterprise Applications – Patterns for SOA – SOA programming models **(15 hrs)**

UNIT-II

Service-oriented Analysis and Design – Design of Activity, Data, Client and Business process services – Technologies of SOA – SOAP – WSDL – JAX – WS – XML WS for .NET – Service integration with ESB – Scenario – Business case for SOA – Stakeholder objectives – Benefits of SOA – Cost Savings **(18 hrs)**

UNIT-III

SOA implementation and Governance – Strategy – SOA development – SOA governance – trends in SOA – Event-driven architecture – Software as a service – SOA technologies – Proof-of-concept – Process orchestration – SOA best practices **(18 hrs)**

UNIT-IV

Meta data management – XML security – XML signature – XML Encryption – SAML – XACML – XKMS – WS-Security – Security in web service framework – advanced messaging **(20 hrs)**

UNIT-V

Transaction processing – Paradigm – Protocols and Coordination – Transaction specifications –

Books for Study:

1. Shankar Kambhampaly, “*Service –Oriented Architecture of Enterprise Applications*”, Wiley India Pvt Ltd, 2008.
2. Eric Newcomer, Greg Lomow, “*Understanding SOA with Web Services*”, Pearson Education.
3. Mark O’ Neill, et al., “*Web Services Security*”, Tata McGraw-Hill Edition, 2003

Web Reference:

1. http://snsce.snscourseware.org/notes.php?cw=CW_5869ea2881d33
2. <http://studentsfocus.com/it6801-soa-notes-service-oriented-architecture-lecture-handwritten-notes-cse-7th-sem-anna-university/>
3. <http://www.professionalcipher.com/2017/07/service-oriented-architecture-soa-notes.html>

Course Outcomes:

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

CO1: understand the software architecture, enterprise wide SOA, SOA patterns and SOA programming models.	K2
CO2: critique the benefits of SOA	K2
CO3: implement the SOA.	K3
CO4: demonstrate the meta data management and web services security.	K3
CO5: analyze the transaction processing and web services security.	K4

Mapping of Cos with PSOs & Pos:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	M	M	M	N	W	M	M	N	S
CO2	M	M	S	M	N	M	M	S	N	S
CO3	M	W	S	M	N	M	S	M	N	S
CO4	W	S	M	S	N	W	S	M	N	S
CO5	S	M	S	M	S	M	S	S	N	S

S-Strongly Correlating
W-Weakly Correlating

M-Moderately Correlating
N-No Correlation

Prepared by	Mrs.K.Saraswathi
Verified by	Mrs.K.PonvelAzhagu Lakshmi

Course Code & Title	CEC-II GRAPHICS AND HUMAN COMPUTER INTERACTION		
MSc	Semester : III	Credits : 4	Hrs:6
Cognitive Level	K1 – Remember K2 – Understand K6 – Create		
Learning Objectives	This Course aims to <ul style="list-style-type: none"> ▪ study the graphics techniques and algorithms. ▪ develop their creativity using Output Primitives. ▪ learn the computer animation. ▪ know the design technologies for individual persons with disabilities. ▪ learn the guidelines for user interface. 		

UNIT-I

Output Primitives: Introduction - Line - Curve and Ellipse Drawing Algorithms –Attributes – Two-Dimensional Geometric Transformations. **(15 hrs)**

UNIT-II

Two-Dimensional Clipping and Viewing-Three-Dimensional Concepts – Three Dimensional Object Representations – Three-Dimensional Geometric and Modeling Transformations. **(18 hrs)**

UNIT-III

Three-Dimensional Viewing–Color models and Color Applications–Computer Animation. Self-study: Color models and Color Applications, computer animation. **(18 hrs)**

UNIT IV

The interaction: Introduction - Models of interaction - Frameworks and HCI - Ergonomics - Interaction Styles - Elements of WIMP interface - Interactivity – The Context of the interaction - Paradigm: Introduction - Paradigms for interaction. **(20 hrs)**

UNIT V

Interaction Design basics: Introduction - what is design? - User focus - Scenarios - Navigation design - Screen design and layout - Interaction and prototyping - HCI in the software process: Introduction - The software lifecycle - Usability engineering - Interactive design and prototyping - Design rationale. **(19 hrs)**

Books for Study:

1. Donald Hearn and M.Pauline Baker, “*Computer Graphics C Version*”, Pearson Education, 2013.(UNIT I : Chapters 1 to 6; UNIT 2: Chapter 9 – 12, 15, 16), ISBN 0-13-530924-7.
2. Alan Dix, “*Human-computer Interaction*”, Pearson Education - 2008.,ISBN:013046109.

Book for Reference:

1. Foley, Vandam, Feiner, Huges, “ *Computer Graphics: Principles &Practice*”,Pearson Education, second edition 2011, ISBN-13: 978-0321399526 ISBN-10: 0321399528

Course Outcomes:

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

- CO1:** design effective dialog for HCI. **K6**
CO2: design effective HCI for individual persons with disabilities. **K6**
CO3: assess the importance of user feedback. **K2**
CO4: explain the HCI implications for designing Web sites. **K1**
CO5: develop meaningful user interface. **K6**

Mapping of Cos with PSOs & Pos:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	M	S	M	N	S	S	M	W	S
CO2	M	M	S	M	N	M	M	S	W	S
CO3	M	W	S	M	N	M	S	M	W	S
CO4	W	S	S	S	N	S	S	M	W	S
CO5	S	M	S	M	N	S	S	S	W	S

S-Strongly Correlating
W-Weakly Correlating

M-Moderately Correlating
N-No Correlation

Prepared by	Mrs.K.Deepa
Verified by	Mrs.K.PonvelAzhagu Lakshmi

Course Code & Title	CEC-III BIG DATA ANALYTICS		
MSc	Semester : IV	Credits : 4	Hrs:6
Cognitive Level	K 2 – Understand K 3 – Apply K 4 – Analyze K 6 – Create		
Learning Objectives	This Course aims to <ul style="list-style-type: none"> ▪ illustrate the evolution and foundations of Big data ▪ classify the methods of streams ▪ learn Hadoop, map reduce and its environment ▪ justify features and working of map reduces. ▪ build Hadoop cluster and extend the framework of Big Data analytics 		

UNIT-I

The Fundamentals of Big Data: The Evolution of Data Management-Understanding the Waves of Managing Data-Defining Big Data-Big Data Management Architecture-Traditional and advanced analytics. **Big Data Types:** Defining Structured Data-Defining Unstructured Data. **Technology Foundations of Bigdata:** Big data Stack (technology Components) – Big data Analytics- Big data Applications. **Virtualization and Distributed Computing:** Understanding the basics of virtualization- importance of virtualization to Big Data. (18 hrs)

UNIT -II

Mining Data Streams : Introduction To Streams Concepts – Stream Data Model and Architecture - Stream Computing - Sampling Data in a Stream – Filtering Streams – Counting Distinct Elements in a Stream – Estimating Moments – Counting Oneness in a Window – Decaying Window. **Self Study: Real time Analytics Platform (RTAP) Applications.** (20 hrs)

UNIT- III

Hadoop: History of Hadoop- Components of Hadoop –Map Reduce: Analyzing the Data with Hadoop- Scaling Out- Hadoop Streaming- The Hadoop Distributed File System :Design of HDFS-HDFS Concepts-The command Line Interface- Java interfaces. **Self Study: Installation of Hadoop , Hadoop eco system tools** (16 hrs)

UNIT- IV

Map Reduce:Developing Map Reduce application: Setting up the development environment-Writing a unit test with MRTUnit- Running Locally on Test Data. How Map Reduce Works: Anatomy of a Map Reduce Job run-Shuffle and Sort – Map Reduce Types and Formats- Map Reduce Features: Counters-Sorting-Joins. **Self Study: Developing MR programs and execution** (21 hrs)

UNIT -V

Hadoop Environment: Setting up a Hadoop Cluster - Cluster specification - Cluster Setup and Installation - Hadoop Configuration-Security - Administering Hadoop: HDFS - Monitoring-Maintenance.

FRAMEWORKS: Pig: Installing and Running Pig- Data processing operators in Pig – Hive: Installing Hive- Hive services –Hive Client- HiveQL – Querying Data in Hive. **Self Study: Basics of Pig & Hive** (15 hrs)

Books for Study:

1. Judith Hurwitz, Alan Nugent, Dr.Fern Halper and Marcia Kaufman, "**Big data for dummies**", John Wiley & Sons, Inc 2017.ISBN: 978-1-118-50422-2. UNIT I: Chapters 1,2,4 & 5
2. AnandRajaraman and Jeffrey David Ullman, "**Mining of Massive Datasets**", Cambridge University Press, 2012.UNIT-II:Chapter 4(4.1-4.7)
3. Tom White "**Hadoop: The Definitive Guide**" Fourth Edition, O'reilly Media, 2015.UNIT III: Chapter I,II, III UNIT IV:VI,VII, VIII, IX UNIT V: Chapters 10,11,16&17

Books for Reference:

1. Michael Berthold, David J. Hand, "**Intelligent Data Analysis**", Springer, 2007.
2. Alan Gates, "**Programming Pig**", O'reilly Media, Second Edition 2018
3. Jason Ruthberglen,Dean Wampler & Edward Capriolo, "**Programming Hive**", O'reilly Media, Fifth Edition 2018

Web Reference:

1. <https://youtu.be/TG48mumSlaw>: Flajolet Martin Algorithm
2. <https://youtu.be/JZDNBfnYwe4>: AMS algorithm
3. <https://pig.apache.org/docs/latest/start.html>
4. Hadoop.adache.org

Course Outcomes:

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

CO1: analyze evolution and technologies requirement of big data	K4
CO2: predict mining data from data sets	K3
CO3: outline Components of Hadoop and Mapreduce functions and its environment	K3
CO4: explain different working principles of Mapreduce	K2
CO5: formulate Hadoop cluster and select appropriate tool	K6

Mapping of Cos with PSOs & Pos:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	M	S	M	N	W	M	M	N	S
CO2	M	M	S	S	N	M	M	S	N	S
CO3	M	W	S	M	N	M	S	M	N	S
CO4	W	S	M	S	N	W	S	M	N	S
CO5	S	S	M	M	S	M	S	M	N	M

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N-No Correlation

Prepared by	Mrs.K.PonvelAzhagu Lakshmi
Verified by	Dr.M.Muralidharan

Course Code & Title	CEC-III NETWORK SECURITY		
MSc	Semester : IV	Credits : 4	Hrs:6
Cognitive Level	K 1 – Remember K 2 – Understand		
Learning Objectives	This Course aims to <ul style="list-style-type: none"> ▪ provide network security concepts and major issues ▪ understand basics of Cryptography and Network Security. ▪ impart network security applications ▪ understand various protocols for network security to protect against the threats in the networks. ▪ learn authentication and kerberos 		

UNIT -I

Introduction: Network Security Overview: Defining Trust – Weakness and Vulnerability – Responsibilities for network security. Understanding Vulnerability- The need for Security: Risk and Vulnerability – TCP / IP Suite weakness- Buffer overflows – Spoofing Techniques. Understanding Defenses: Digital IDs – Intrusion Detection System – PC Card based solutions – Physical Security. (16 hrs)

UNIT - II

Applications & System Security: Network Security Applications : Transport Level Security - Wireless Network Security - Electronic mail security - IP security. System Security : Intruders - Malicious Software . (18 hrs)

UNIT - III

Cryptography : Concepts and Techniques - Symmetric key algorithms and AES – Asymmetric key algorithms, Digital Signatures and RSA – Digital Certificates and Public key Infrastructure (PKI). (20 hrs)

UNIT - IV

Internet Security Protocols: Introduction – Basic concepts – SSL – TLS – SHTTP – TSP – SET – SSL Vs SET – 3D Secure Protocol – Electronic Money – Email Security – WAP security – Security in GSM – Security in 3G. (18 hrs)

UNIT - V

Authentication and Kerberos : Introduction – Authentication Basics – Passwords – Authentication Tools – Certificate based authentication – Biometric Authentication – Kerberos – KDC – Firewalls and Virtual Private Network : Firewalls – IP Security – VPN. (18 hrs)

Books for Study:

1. Gert DeLaet, Gert Schauwers, "*Network Security Fundamentals*" Published Sep 8, 2005 by Cisco Press.
2. William Stallings "*Network Security Essentials Applications and Standards*" ,4th Edition - Published by Prentice Hall.
3. Atul Kahate , "*Cryptography and Network Security*" Published by Tata McGraw Hill

Book for Reference:

1. Bruce Schneier, "*Applied Cryptography Protocols, Algorithms*", John Wiley & Sons Inc 2005, Second Edition,
2. Richard E. Smith "*Internet Cryptography*" , Addison – Wesley Professional Aug 2014.
3. Behrouz A. Forouzan, "*Cryptography and Network Security*", Tata McGraw-Hill Publishing Company Limited. 2007
4. William Stallings "*Cryptography and Network Security*", Pearson Prentice Hall, Third Edition, 2009

Web Reference:

1. <http://www.williamstallings.com/Security2e.html>
2. PDF : [http://index-of.es/Hack/Network%20Security%20Essentials %204th %20 Edition pdf](http://index-of.es/Hack/Network%20Security%20Essentials%204th%20Edition.pdf)

Course Outcomes:

After studying this course, Students should be able to:

- | | |
|----------------------------------------------------------------------------------------------------|-----------|
| CO1: identify major issues in network security | K1 |
| CO2: identify and classify different types of attacks | K1 |
| CO3: explain vulnerability, threats and attack | K2 |
| CO4: compare symmetric and asymmetric encryption systems and their vulnerability to attack. | K2 |

Mapping of Cos with PSOs & Pos:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	M	M	S	N	W	M	M	N	S
CO2	S	S	S	M	N	M	M	S	N	S
CO3	M	S	S	M	N	M	S	M	N	S
CO4	S	S	M	S	N	W	S	M	N	S

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M-Moderately Correlating

W-Weakly Correlating

N-No Correlation

Prepared by	Mr.C.Yogaraj
Verified by	Mrs.V.Priya

Course Code & Title	CEC-III WEB APPLICATION ARCHITECTURE		
MSc	Semester : IV	Credits : 4	Hrs:6
Cognitive Level	K1 – Remember K3 – Apply K6 – Create		
Learning Objectives	This Course aims to <ul style="list-style-type: none"> ▪ acquire knowledge in web application architecture. ▪ introduce a bird side view of Rails and Ruby ▪ provide the idea to develop dynamic database driven web sites using HTML, CSS. ▪ enrich the web application with the help of Client side scripting languages. ▪ introduce Ajax 		

UNIT -I

Introduction to Web Application – Application Architectures – Design Patterns – Development environment **(18 hrs)**

UNIT- II

Rails overview – First Rails App – Version Control – Git on rails – Relational Databases – Databases in rails – The active record design pattern **(20 hrs)**

UNIT- III

Ruby: Classes and Inheritance – Objects and variables - Strings, Regular Expressions and Symbols - Expressions and Control Structures - Collections, Blocks and Iterators **(16 hrs)**

UNIT- IV

Middleware Technologies- HTTP introduction – MVC Design Pattern – Rails controllers – Request and Response handling **(21 hrs)**

UNIT- V:

Presentation and User Interface: HTML structure-tags-forms – Dynamic content – CSS – introduction to javascript –Introduction to jQuery – introduction to Ajax. **(15 hrs)**

Books for Study:

1. David Flanagan & Yukihiro Matsumoto, “*The Ruby Programming Language*”, O’Reilly.,ISBN-13: 978-0596516178 ISBN-10: 0596516177.

Books for Reference:

1. Michel Hartl, “*Ruby on Rails Tutorial (Learn Web Development with Rails)*”, Addison-Wesley Professional,, ISBN-978-0134077703

Web Reference:

1. <http://railstutorial.org>
2. <http://guides.rubyonrails.org>

Course Outcomes:

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

CO1: analyze the architecture of web applications **K3**

CO2: design web pages using HTML and CSS **K6**

CO3: identify appropriate programming languages to develop the application logic in both client and server. **K1**

Mapping of Cos with PSOs & Pos:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	M	M	M	N	W	S	M	S	S
CO2	M	M	S	S	N	M	M	S	S	S
CO3	M	W	S	M	N	M	S	M	M	S

S-Strongly Correlating
W-Weakly Correlating

M-Moderately Correlating
N-No Correlation

Prepared by	Dr.S.Murugan
Verified by	Dr.K.Mani

Course Code & Title	CEC-IV SOFTWARE PROJECT MANAGEMENT		
MSc	Semester : IV	Credits : 4	Hrs:6
Cognitive Level	K 1 – Remember K 2 – Understand K 5 – Evaluate		
Learning Objectives	This Course aims to <ul style="list-style-type: none"> ▪ study the importance and evolution of software project management ▪ understand the framework and software architecture ▪ study the importance and evolution of software project management ▪ know the process planning and process automation ▪ learn risk management concepts 		

UNIT-I

Software Management Renaissance: Conventional Software Management – Evolution of Software Economics - Improving Software Economics - The Old Way and the New. **(18 hrs)**

UNIT-II

A Software Management Project Management Process Framework: Life-Cycle Phases - Artifacts of the Process - Model-Based Software Architectures - Work Flows of the Process - Check Points of the Process. **(18 hrs)**

UNIT-III

Software Management Disciplines: Iterative Process Planning – Project Organizations and Responsibilities - Process Automation. **(16 hrs)**

UNIT-IV

Software Management Disciplines: Project Control and Process Instrumentation - Tailoring the Process. **(17 hrs)**

UNIT-V

Risk Management: Introduction - Risk - Categories of risk - A framework for dealing with risk - Risk Identification - Risk assessment - Risk planning - Risk management - Evaluating risks to schedule - Applying the PERT technique - Monte Carlo simulation - Critical chain concepts. **(19 hrs)**

Books for Study:

1. Walker Royce, “*Software Project Management*”, Pearson Education.,ISBN:0-201-309580.
2. Bob Hughes & Mike Cotterell, “*Software project Management*”, McGraw Hill Publications, ISBN-13 978-0-07—712279-9.Fourth edition-2008
3. Joel Henry, “*Software Project Management*”, Pearson education, ISBN9780321223425.
4. Roger S. Pressman, “*Software Engineering*”, TMH Publications, ISBN-13: 978-0078022128. ISBN-10:0078022126, Fourth edition,1998

Web Reference:

1. <https://www.cornerstoneondemand.com/online-reference-guide-project-management>

Course Outcomes:

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

- CO1:** explain conventional software project management and software economica **K2**
CO2: evaluate project management framework **K5**
CO3: describe process planning, project organization and process automation **K1**
CO4: identify various risk management policies **K1**

Mapping of Cos with PSOs & Pos:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	M	M	M	N	W	M	M	N	S
CO2	M	M	S	M	N	M	M	S	N	S
CO3	M	W	S	M	N	M	S	M	N	S
CO4	W	S	M	S	N	W	S	M	N	S

S-Strongly Correlating
W-Weakly Correlating

M-Moderately Correlating
N-No Correlation

Prepared by	Dr.S.Murugan
Verified by	Dr.M.Muralidharan

Course Code & Title	CEC-IV SOFTWARE FORENSICS		
MSc	Semester : IV	Credits : 4	Hrs:6
Cognitive Level	K1 – Remember K3 – Apply K4 – Analyze		
Learning Objectives	This Course aims to <ul style="list-style-type: none"> ▪ study the fundamentals of software forensics. ▪ learn types of computer forensics ▪ learn about data recovery methods. ▪ provide electronic evidence. ▪ identify the threats in computer forensics. 		

UNIT- I

Ethical Hacking - Foundation for Ethical Hacking-Ethical Hacking in Motion-Hacking Network Hosts-Hacking Operating Systems-Hacking Applications. **(20 hrs)**

UNIT- II

Types of Computer Forensics - Computer Forensics Fundamentals – Types of Computer Forensics Technology – Types of Vendor and Computer Forensics Services. **(16 hrs)**

UNIT -III

Data Recovery - Data Recovery – Evidence Collection and Data Seizure – Duplication and Preservation of Digital Evidence – Computer Image Verification and Authentication. **(21 hrs)**

UNIT- IV

Electronic Evidence - Discover of Electronic Evidence –Identification of Data – Reconstructing Past Events – Networks. **(15 hrs)**

UNIT- V

Threats - Fighting against Macro Threats – Information Warfare Arsenal – Tactics of the Military – Tactics of Terrorist and Rogues –Tactics of Private Companies. **(18 hrs)**

Books for Study:

1. John R. Vacca, *“Computer Forensics”*, Firewall Media, 2004.
2. Kevin Beaver, *“Hacking For Dummies”*, John Wiley & Sons, 2012.

Reference Books:

1. Chad Steel, *“Windows Forensics”*, Wiley India, 2006.

2. Majid Yar, *“Cybercrime and Society”*, Sage Publications, 2006.
3. Robert M Slade, *“Software Forensics”*, Tata McGrawHill, 2004.

Web Reference:

1. <https://www.tutorialspoint.com/forensics>

Course Outcomes:

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

- CO1:** identify hackers and normal users. **K1**
CO2: apply the principles of computer forensics for security **K3**
CO3: manage threats and the tactics **K4**

Mapping of Cos with PSOs & Pos:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	S	M	S	N	S	S	M	N	S
CO2	S	S	W	S	N	S	S	S	N	S
CO3	S	S	S	S	N	S	S	M	N	S

S-Strongly Correlating M-Moderately Correlating
W-Weakly Correlating N-No Correlation

Prepared by	Dr.S.Murugan
Verified by	Dr.D.Jayachitra

Course Code & Title	CEC-IV SOFTWARE TESTING		
MSc	Semester : IV	Credits : 4	Hrs:6
Cognitive Level	K2 – Understand K6 – Create		
Learning Objectives	This Course aims to <ul style="list-style-type: none"> ▪ introduce the basic concepts of testing and its types ▪ study the software testing process and its methodology. ▪ Learn integration testing and its types ▪ Learn regression testing and its types ▪ acquire knowledge in architecture for automation 		

UNIT-I

Principles of Testing: Context of Testing in Producing Software – Principles of Testing – Dijkstra’s Doctrine – A Test in Time –Test the Tests First- The Pesticide Paradox –The Ends of Pendulum – Men in Black – Automation Syndrome. **Software Development Le Cycle Models** Phases of Software Project – Quality, Quality Assurance and Quality Control – Testing, Verification and Validation – Process model to Represent Different Phases –Life cycle models –Comparison of Various Life Cycle Models. (Chapters 1,2) **(18 hrs)**

UNIT-II

White Box Testing: Classification of White Box Testing – Static testing – Static Testing by Humans – Methods of Static Testing - Static Analysis Tools – Code Review Checklist - Structural Testing – Unit/Code testing – Code Coverage Testing – Code Complexity Testing – Challenges in White Box Testing. **Black Box Testing** Need for Black Box Testing – Techniques for Effective Black box testing - Requirements Based Testing – Positive and Negative Testing – Boundary Value Analysis – Decision Tables – Equivalence Partitioning – State Based or Graph Based Testing – Compatibility Testing – User Documentation Testing – Domain Testing. (Chapters 3,4) **(18 hrs)**

UNIT-III

Integration Testing: Integration Testing - Integration Testing as a Type of Testing – Top- Down Integration – Bottom-Up Integration – Bi-directional Integration – System Integration – Choosing Integration Method – Integration Testing as a Phase of Testing – Scenario Testing – Defect Bash . **System And Acceptance Testing** System Testing Overview – Need for System Testing - Functional Versus Non-functional System Testing –Design/ Architecture Verification – Business Vertical Testing- Deployment Testing – Beta Testing – Certification, Standards and Testing for Compliance – Non Functional Testing – Setting up the Configuration – Scalability Testing – Reliability testing – Stress Testing – Interoperability Testing – Acceptance Testing –

Acceptance Criteria – Selecting Test Cases for Acceptance Testing – Executing Acceptance Tests. (Chapters 5,6) (19 hrs)

UNIT-IV

Performance Testing: Introduction – Factors governing Performance Testing – Methodology for Performance Testing – Collecting Requirements – Writing Test Cases – Automating Performance Test Cases – Executing Performance Test Cases – Analyzing the Performance Test Results – Performance Tuning – Performance Benchmarking – Capacity Planning – Tools for Performance Testing. **Regression Testing** Need for Regression Testing - Types of Regression Testing – Regression Testing Phase- Method for Conducting Regression Testing- Performing an Initial Smoke or Sanity Test – Understanding the criteria for selecting the test cases – Classifying Test Cases – Methodology for Selecting the Test Cases – Resetting the Test Cases for Regression Testing – Results of Regression Testing – Best practices in Regression Testing. (Chapters 7,8) (20 hrs)

UNIT-V

S/W Test Automation: Introduction – Terms Used in Automation -Skills Needed for Automation- Scope of Automation- Design and Architecture for Automation-Generic Requirements for Test Tool/Framework-Process Model for Automation –Selecting a Test Tool-Criteria for Selecting a Test Tool –Steps for Tool Selection and Deployment-Automation for Extreme Programming Model- Challenges in Automation. (Chapter 16) (15 hrs)

Book for Study:

1. Srinivasan Desikan and Gopalswamy Ramesh, “*Software Testing: Principles and Practices*”, Pearson Education Publication,ISBN:9788177581218.

Books for Reference:

1. Ron Patton, “*Software Testing*”, 2nd Edition, Pearson education , 2004, ISBN: 0672327988; ISBN-13: 978067232798
2. Ren Rajani, Pradeep Oak, “*Software testing – effective methods tools, techniques*” TMH, 2004,ISBN 9780070583528.

Course Outcomes:

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

- CO1:** describe the testing process and its methodology **K2**
CO2: identify and apply the various types of testing in real time problem **K2**
CO3: design test cases **K5**
CO4: design architecture for automation using tools. **K5**

Mapping of Cos with PSOs & Pos:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	S	S	S	N	W	S	S	W	S
CO2	S	S	S	S	N	M	S	S	W	S
CO3	S	S	M	S	N	M	S	S	W	M
CO4	S	M	W	S	N	W	S	S	W	S

S-Strongly Correlating
W-Weakly Correlating

M-Moderately Correlating
N-No Correlation

Prepared by	Dr.D.Jayachitra
Verified by	Mrs.V.Priya

**CURRICULUM FRAMEWORK AND SYLLABUS FOR
MASTER OF PHILOSOPHY (M.PHIL) IN COMPUTER SCIENCE**

For the students admitted from the Academic Year 2019-2020 onwards
BASED ON CHOICE BASED CREDIT SYSTEM (CBCS) AND OUTCOME BASED EDUCATION (OBE)



2019-2020

Submitted to Academic Council



POST GRADUATE AND RESEARCH DEPARTMENT OF COMPUTER SCIENCE

NEHRU MEMORIAL COLLEGE

[Nationally Accredited with 'A' Grade by NAAC]

An Autonomous College affiliated to Bharathidasan University

Puthanampatti—621 007

[Board of Studies meeting was held on 21.09.2018 and approved by academic
council on 10.04.2019]

M.Phil Computer Science

VISION

Provide quality research in Computer Science and to be recognized as an international research programme

MISSION

To excel in research and innovation that discovers new knowledge and enables to develop new methodologies and models

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

The scholars of M.Phil Computer Science programme will be able to

PEO1: understand the principles and methodologies of research

PEO2: identify the critical and relevant research problems in Computer Science

PEO3: undertake the research for professional carriers to meet the needs of the society

PEO4: apply the acquired knowledge for implementation of their research

PEO5: motivate and inspire the students to pursue their doctoral programmes

PROGRAMME OUTCOME (PO)

PO1: Scientific Knowledge

Apply the knowledge, methods and techniques to solve real world research problems

PO2: Problem Analysis

Analyze the research problems and interpret the data relevant to the research

PO3: Design and Development of Solution

Design the appropriate methods or techniques to solve the research problems

PO4: Conduct investigations of complex problems

Ability to design algorithms using research based knowledge and methods

PO5: Modern tool usage

Develop a model and implement the methodology using the available research tools

PO6: Life long learning

Extend life long learning in the field of research in order to undertake and solve the various challenging research problems

PROGRAMME SPECIFIC OUTCOME (PSO)

PSO1: Understand the concepts, techniques and methods of research methodology

PSO2: Apply the techniques and algorithms to develop solutions to research problems

PSO3: Design techniques or methods to solve the complex problems in the field of research

PSO4: Implement and test the solutions developed for the research problems

Programme Structure

a. Programme Duration:

Full Time: One year

Part Time: Two years

b. System followed: Semester

c. Medium of Instruction: English

d. Credit System:

Total number of credits: 24

e. Eligibility criteria for admission to the programme:

M.Sc. Computer Science

Master of Computer Application

M.Sc. Information Technology

M.Phil - Internal and External Assessment

Internal Assessment – 25 Marks

CIA Test (Mid and End Semester)	-	10 Marks
CIA Test I – for first two and half units		
CIA Test II – for remaining two and half units		
Attendance	-	05 Marks
Seminar	-	05 Marks
Assignment	-	05 Marks
Total	-	25 Marks

External Assessment – 75 Marks

Question Paper Pattern for CIA Test and External Assessment:

Section A: 10 Questions x 2 Marks = 20 Marks

(Two Questions from each unit)

Section B: 5 Questions x 5 Marks = 25 Marks

(Internal Choice and one question from each unit)

Section C: 3 Questions x 10 Marks = 30 Marks

(Answer any three out of 5 questions and one question from each unit)

POST GRADUATE AND RESEARCH DEPARTMENT OF COMPUTER SCIENCE

M.Phil PROGRAMME IN COMPUTER SCIENCE [CBCS]

[For the candidates admitted from 2019-2020]

Sem	Course	Title	Credit	Marks		Tot
				CIA	SE	
I	Core Course I	Research Methodology	4	25	75	100
	Core Course II	Advanced Topics in Computer Science	4	25	75	100
	Core Course III	Teaching and Learning Skills	4	25	75	100
	Core Course IV	Paper on Topic of Research	4	25	75	100
II		Dissertation & Viva Voce (150 + 50)	8	-	200	200
		Total	24			600

Core Course IV - Paper on Topic of Research

- a. Big Data Technology and Analytics
- b. Wireless Communication and Networks
- c. Cloud Computing
- d. Web Mining
- e. Data Mining and Warehousing
- f. Cryptography and Network Security
- g. Machine Learning
- h. Social Network Analytics

Course Code & Title	CC-I Research Methodology	
M.Phil	Semester I	Credit 4
Cognitive Level	K1 – Recall K2 – Understand K3 – Apply K4 – Analyze K5 – Evaluate K6 – Create	
Learning Objectives	This Course aims to <ul style="list-style-type: none"> • classify and analyze various types of algorithms • learn the various probability distributions and statistical tests • study the mathematical logics and optimization algorithms • know thesis writing • prepare research articles for journal publications 	

Unit-I Analysis of Algorithm

Algorithm specification – Performance Analysis – Randomized Algorithm –General Methods - Divide and Conquer method – Greedy method – Dynamic Programming -Basic Traversal and Search Techniques –Backtracking –Branch and Bound –NP hard and NP Complete problems.

Unit-II Probability and Analysis of Experiments

Introduction to Probability –Probability Distribution: Binomial –Poisson –Uniform – Exponential and Normal –Analysis of Variance (ANOVA) – Nonparametric Tests: One Sample Test -Two Sample Test - Basic Multivariate Analysis: Correlation Analysis.

Unit-III Mathematical Logic

Propositions - evaluation - precedence rules -tautologies - reasoning using equivalence transformation - laws of equivalence - substitution rules - a natural deduction system. Deductive proofs - inference rules - proofs - sub proofs- The predicate calculus – statement functions, variables , quantifiers, Predicate formulae – Theory of Inference – Formulae involving more than one quantifier.

Unit-IV Evolutionary Optimization Algorithms

Genetic Algorithm-Mathematical Models of Genetic Algorithm-Genetic Programming-Evolutionary Programming-Simulated Annealing-Ant Colony Optimization-Particle Swarm Optimization- Biogeography based Optimization.

Unit-V Thesis Writing

Introduction to Research – Defining the research problem – Research Ethics - Research Design – Planning the Thesis – Writing Journal Articles – Publication of papers - Writing the Thesis – Referencing.

Books for Study:

1. Ellis Horowitz, Sartaj Sahni, S.Rajasekaran, “ Computer Algorithms/C++”, Second Edition, Universities Press(India) Private Ltd,2008,ISBN-10: 092930642,ISBN-13: 978-0929306421
2. R.Pannerselvam, “Research Methodology”, Prentice Hall of India , second Edition, New Delhi,2013, ISBN-30:978-812034 -9469
3. David Gries, "The Science of Programming", Narosa Publishing House, New Delhi, 1993,ISBN-10: 038790641X,ISBN-13: 978-0387906416
4. Dan Simon, “Evolutionary Optimization Algorithms”, Wiley, Black wheel ,2013,ISBN-B:978-0470-937419.
5. Jonathan Anderson, Millicent.Poole, “Assignment & Thesis Writing “, 4th Edition ,Wiley India Pvt Ltd.,2011, ISBN-30:978-81265-3075.

Books for Reference:

1. Nikalaus Wirth , “Algorithms and Data Structures”, Mc Graw–Hill International Edition, 1985.
2. Kothari C.R , “Research Methodology – Methods and Techniques”, New Age International, New Delhi, 2011.
3. R.Ganesan, “Research Methodology for Engineers”, MJP Publishers, 2011.
4. J. P Tremblay, R. Manohar, “Discrete Mathematical Structures with Applications to Computer Science “, McGraw – Hill International Edition, 1987.
5. Zobel Justin, “Writing for Computer Science”, Springer Publications, 2004.

Course Outcomes:

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

CO1: identify and understand the performance of the algorithms **-K1,K2**

CO2: apply different statistical test to research problems **-K3**

CO3: analyze the research problems using mathematical tools **-K4**

CO4: develop new algorithms and compare with existing **-K5, K6**

CO5: write thesis and research articles **-K6**

Mapping of COs with POs & PSOs:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	S	M	M	M	S	S	M	M	M
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	M	S	S	S	S	S	S
CO4	S	S	S	S	M	S	S	S	S	S
CO5	S	S	S	M	M	S	S	S	S	S

Strongly Correlating(S)

Moderately Correlating (M)

Weakly Correlating (W)

Prepared by	Dr.S.Murugan & Dr.K.Mani
Verified by	Dr.M.Muralidharan

Course Code & Title	CC-II Advanced Topics in Computer Science	
M.Phil	Semester I	Credit 4
Cognitive Level	K1 – Recall K2 – Understand K3 – Apply K4 – Analyze K5 – Evaluate	
Learning Objectives	This Course aims to <ul style="list-style-type: none"> • learn evolution of big data, need for big data and big data analytics • know the characteristics of cloud computing, technologies, platform, storage and various cloud services • gain knowledge in soft computing through Artificial Intelligence, Fuzzy Sets and Neural Networks • study the concept of machine learning and its algorithms • attain the knowledge on IoT 	

Unit-I Bigdata

Classification of Digital Data - Characteristics of Data - Evolution of Big Data - Definition of Big Data - Challenges with Big Data - What is Big Data – Need of Big Data – Consumer or producer of Big data – business Intelligence - Data Warehouse Environment- Hadoop Environment - Big Data Analytics : Big Data Analytics - Classification of Analytics - Greatest Challenges that Prevent Businesses from Capitalizing on Big Data - Challenges in Big Data – Importance of Big Data Analytics - Technologies in Big data - Data Science - Basically Available Soft State Eventual Consistency (BASE) -Big data Analytics Tools

Unit-II Cloud Computing

Characteristics of cloud computing - cloud deployment Model - Cloud Service models - Cloud concept and technologies: virtualisation - load balancing - scalability and elasticity – deployment - replication – monitoring - identity and access management - Service level agreements - billing - Cloud services and platforms: classification of cloud services – computing - storage – database - application - Analytics - network and deployment services

Unit-III Soft Computing

Introduction - Software computing constituents of conventional AI – Fuzzy set theory: Fuzzy sets – Fuzzy rules and Fuzzy relationship – Neural Networks: Introduction – Architecture - Back propagation for feed forward networks – Perceptions

Unit-IV Machine Learning

Machine Learning: Examples of Machine Learning Applications: Classification-Regression- Unsupervised Learning - Reinforcement Learning- Supervised Learning: VC Dimension - PAC Learning - Noise - Learning Multiple Classes - Regression - Model Selection and Generalization - Dimensions of Supervised Machine Learning Algorithm - Bayesian Decision Theory: Classification - Losses and Risks - Discriminant Functions -Clustering: Mixture

Densities - k -Means Clustering - Expectation-Maximization Algorithm - Mixtures of Latent Variable Models - Supervised Learning after Clustering - Hierarchical Clustering

Unit-V Internet of Things

Putting the Internet of Things forward to the Next Level - Internet of Things Strategic Research and Innovation Agenda : Internet of Things Vision - Internet of Things Strategic Research and Innovation Directions - IoT Smart X Applications - Network and Communications - Processes - Data Management - Security, Privacy and Trust - IoT6 Architecture - DigCovery - IoT6 Integration with the Cloud and EPICS – Enabling Hetrogeneous Integration - IoT6 Smart Office Use Case - Scalability Perceptive

Books for Study:

1. Seema Acharya, SubhashiniChellappan, “Big Data and Analytics”, Wiley India Pvt. Ltd, New Delhi, First Edition, 2015, ISBN: 978-81-265-5478-2
2. ArshdeepBahga, VijayMadiseti, “Cloud Computing – A Hands on Approach”, University Press, 2015, ISBN - 978-8173719233
3. J.S.R Jang, C.T Sun and E.Mizutani, “Neuro – Fuzzy and Soft Computing – A computational Approach to Learning and Machine Intelligence”, PHI Learning Private Ltd., New Delhi,2012,ISBN-10: 9332549885,ISBN-13: 978-9332549883
4. Ethem Alpaydin, “Introduction to Machine Learning”,3rd Edition, Prentice Hall, New Delhi ,2015.Jason Bell,”Machine Learning for Big Data”,Wiley Publication,2014.
5. Vidiu Vermesan and Peter Fries, “Internet of Things - From Research Innovation to Market Deployment”, River Publishers, 2014.

Books for Reference:

1. Bill Franks, “Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics”, John Wiley & sons, 2012.
2. Arshdeep bahga , Vijay madiseti ,” Cloud computing A hands on approach”, Universities Press (India) private limited ,2013.
3. Prasant kumar pattnaik, Rajib Mall, “Fundamentals of mobile computing”, PHI Learning Pvt. Ltd. New delhi-2012.
4. Guandong Xu, Yanchun Zhang and Lin Li, “Web Mining and Social Networking: Techniques and Applications”, 2011 print, Springer Science, ISBN: 978-1-4419-7735-9 (Chapters 1,2,4,5 & 6)

Web Reference:

1. https://kkpatel7.files.wordpress.com/2015/04/alppaydin_machinelearning_2010.pdf
2. http://www.internet-of-things-research.eu/pdf/IERC_Cluster_Book_2014_Ch.3_SRIA_WEB.pdf

Course Outcomes:

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

- CO1:** apply various KDD process in bigdata **-K1, K2**
CO2: understand the basics of cloud computing and services **-K2**
CO3: apply neuro-fuzzy soft computing techniques to solve research problems **-K3**
CO4: understand and compare various machine learning algorithms **-K4**
CO5: identify IoT architecture and cloud service **-K2**

Mapping of COs with POs & PSOs:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	M	M	M	S	S	S	M	M	M
CO2	S	M	S	M	S	S	S	S	M	M
CO3	S	S	M	M	S	S	S	S	S	M
CO4	S	S	S	S	S	S	S	S	M	M
CO5	S	S	S	M	S	S	S	S	M	M

Strongly Correlating(S)

Moderately Correlating (M)

Weakly Correlating (W)

Prepared by	Dr.K.Mani, Dr.D.Jayachitra, Mrs.V.Priya & Ms.P.Kalpana
Verified by	Dr.S.Murugan

Course Code & Title	CC - III Teaching and Learning Skills	
M.Phil	Semester I	Credit 4
Cognitive Level	K2 – Understand K3 – Apply K4 – Analyze K 5 – Evaluate	
Learning Objectives	This Course aims to <ul style="list-style-type: none"> • acquaint the integration of ICT in teaching and learning • acquire the knowledge of communication skill with special reference to its elements, types, development and styles • attain the knowledge of Instructional Technology and its applications • appreciate and use e-learning resources available • develop different teaching skills for putting the content across to target audience 	

Unit I : Computer Application Skills

Information and Communication Technology (ICT): Definition, Meaning, Features, Trends – Integration of ICT in teaching and learning – ICT applications: Using word processors, Spread sheets, Power point slides in the classroom – ICT for Research: On-line journals, e-books, Courseware, Tutorials, Technical reports, Theses and Dissertations - ICT for Professional Development : Concept of professional development; institutional efforts for competency building; individual learning for professional development using professional networks, OERs, technology for action research, etc.

Unit II : Communications Skills

Communication: Definitions – Elements of Communication: Sender, Message, Channel, Receiver, Feedback and Noise – Types of Communication: Spoken and Written; Non-verbal communication – Intrapersonal, interpersonal, Group and Mass communication – Barriers to communication: Mechanical, Physical, Linguistic & Cultural – Skills of communication: Listening, Speaking, Reading and Writing – Methods of developing fluency in oral and written communication – Style, Diction and Vocabulary – Classroom communication and dynamics.

Unit III : Pedagogy

Instructional Technology: Definition, Objectives and Types – Difference between Teaching and Instruction – Lecture Technique: Steps, Planning of a Lecture, Delivery of a Lecture – Narration in tune with the nature of different disciplines – Lecture with power point presentation - Versatility of Lecture technique – Demonstration: Characteristics, Principles, planning Implementation and Evaluation – Teaching-learning Techniques: Team Teaching, Group discussion, Seminar, Workshop, Symposium and Panel Discussion.

Unit IV : E- Learning, Technology Integration and Academic Resources in India

Concept and types of e-learning (synchronous and asynchronous instructional delivery and means), m-learning (mobile apps); blended learning; flipped learning; E-learning tools (like LMS; software's for word processing, making presentations, online editing, etc.); subject specific tools for e-learning; awareness of e-learning standards- Concept of technology integration in teaching- learning processes; frameworks guiding technology integration (like TPACK; SAMR); Technology Integration Matrix- Academic Resources in India: MOOC, NMEICT; NPTEL; e-pathshala; SWAYAM, SWAYAM Prabha, National academic depository, National Digital Library; e-Sodh Sindhu; virtual labs; eYantra, Talk to a teacher, MOODLE, mobile apps, etc.

Unit V : Skills of Teaching and Technology based assessment

Teaching skills: Definition, Meaning and Nature- Types of Teaching Skills: Skill of Set Induction, Skill of Stimulus Variation, Skill of Explaining, Skill of Probing Questions, Skill of Black Board Writing and Skill of Closure – Integration of Teaching Skills – Evaluation of Teaching Skills- Technology for Assessment: Concept of assessment and paradigm shift in assessment; role of technology in assessment 'for' learning; tools for self & peer assessment (recording devices; e-rubrics, etc.); online assessment (open source software's; e-portfolio; quiz makers; e- rubrics; survey tools); technology for assessment of collaborative learning like blogs, discussion forums; learning analytics.

Books for Reference:

1. Bela Rani Sharma (2007), Curriculum Reforms and Teaching Methods, Sarup and sons, New Delhi
2. Brandon Hall , E-learning, A research note by Namahn, found in: [www.namahn.com/resources/ .../note-e-learning.pdf](http://www.namahn.com/resources/.../note-e-learning.pdf).
3. Don Skinner (2005), Teacher Training, Edinburgh University Press Ltd., Edinburgh
3. Information and Communication Technology in Education: A Curriculum for schools and programmed of Teacher Development, Jonathan Anderson and Tom Van Weert, UNESCO, 2002.
4. Jereb, E., & Šmitek, B. (2006). Applying multimedia instruction in elearning. *Innovations in Education & Teaching International*, 43(1), 15-27.
5. Kumar, K.L. (2008) Educational Technology, New Age International Publishers, New Delhi.
6. Learning Management system:
https://en.wikipedia.org/wiki/Learning_management_system
7. Mangal, S.K (2002) Essential of Teaching – Learning and Information Technology, Tandon Publications, Ludhiana.
8. Michael, D and William (2000), Integrating Technology into Teaching and Learning: Concepts and Applications, Prentice Hall, New york.
9. Pandey, S.K (2005) Teaching communication, Commonwealth Publishers, New Delhi.
10. Ram Babu, A abd Dandapani, S (2006), Microteaching (Vol.1 & 2), Neelkamal Publications, Hyderabad.
11. Singh, V.K and Sudarshan K.N. (1996), Computer Education, Discovery Publishing Company, New York.
12. Sharma, R.A., (2006) Fundamentals of Educational Technology, Surya Publications, Meerut

13. Vanaja, M and Rajasekar, S (2006), Computer Education, Neelkamal Publications, Hyderabad.

Course Outcomes:

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

- CO1:** use instructional technology effectively in a classroom **-K2**
- CO2:** mastering over communication process **-K3**
- CO3:** apply lecture techniques and evaluation **-K3**
- CO4:** understand and use e-learning tools **-K4**
- CO5:** evaluate the methods to be applied **-K5**

Mapping of COs with POs & PSOs:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	S	M	M	W	S	S	M	M	M
CO2	S	M	S	S	S	S	S	S	S	S
CO3	S	S	M	M	S	W	S	S	M	M
CO4	S	S	M	S	S	M	S	S	M	S
CO5	S	S	S	M	M	M	S	S	M	M

Strongly Correlating(S)

Moderately Correlating (M)

Weakly Correlating (W)

Course Code & Title	CC – IV a Big Data Technology and Analytics	
M.Phil	Semester I	Credit 4
Cognitive Level	K1 – Recall K2 – Understand K3 – Apply K4 – Analyze K5 – Evaluate K6 – Create	
Learning Objectives	This Course aims to <ul style="list-style-type: none"> • understand the basics of Big Data • obtain the knowledge of Big Data mining • state the importance of context in Big Data, Text categorization and Multi-label Big Data mining • acquire skill on High Dimensional Data clustering for Big Data • study Machine Learning and Incremental Learning with Big Data 	

Unit - I

Introduction to Big Data: Introduction - Definition for Big Data - Mining Unstructured data: Challenges and Modern Techniques - Unstructured Data Mining Applications- Context Building - Building Application and Dealing with Big data - Big data and Learning - Analytics and Big Data - Text Analytics and Big Data - Understanding Text Analytics - Business Intelligence products to handle Big Data - Unstructured Data Mining and Classification Methods - Big Data and Machine Learning Trends. **Data Mining and Modelling:** Introduction - Data Models - stages of Data Mining - Data Mining and knowledge Recovery - Aspects of Data Mining - Data Mining Approaches - Crawling the web and Information Retrieval.

Unit - II

Big Data Mining - Application Perspective: Introduction - Big Data Mining - Data Mining with Big Data - **Long Live the Kind of Big Data - The Context:** Introduction to context - context and unstructured Big Data - Use of Contextually enabled data - context issue in Big Data with unstructured Big Data- Context Types - Context in User Data - Contextual Analytics - Advantages of Contextual Analytics - Using Apache-Hadoop for Context Aware Recommendation System.

Unit - III

Big Data, Text Categorization and Topic Modelling: Introduction - Corpus representation - Context based Learning - Gate JAPE Rules - Topic Modelling - Situation Modelling - Big Data and Text Classification. **Multi-label Big Data Mining:** Introduction - Phases in Multi-label Unstructured Text Mining - Graph based model- Graph representation - Text Operation using Graph Model

Unit -IV

Distributed High Dimensional Data Clustering for Big Data: Introduction - Applications of Distributed subspace clustering - High Dimensional Data Clustering - Dimensionality reduction - subspace clustering - Distributed Systems - Types of Distributed Databases - Types of Transmission of Data - Distributed Clustering - Text data Clustering - Data Representation for Clustering Text Data - Text Clustering System - Subspace clustering in Text Data - Big data Clustering

Unit - V

Machine Learning and Incremental Learning with Big Data: Introduction - Machine Learning: Concepts - Big Data and Machine Learning - Incremental Learning - Incremental Learning for Knowledge Building - Incremental Techniques to Handle Big Data - Applications.

Books for Study:

1. Parag Kulkarni, Sarang Joshi and Meta S. Brown, "BIG DATA ANALYTICS ", PHI Learning Private Limited, New Delhi, 2016

Books for Reference:

1. Judith Hurwitz, Alan Nugent, Dr. Fern Halper and Marcia Kaufman, " Big Data for Dummies", A Wiley Brand, 2013, ISBN:978-1-118-50422-2.
2. Paul C. Zikopoulos, Chris Eaton, Dirk deRoos, Thomas Deutsch, George Lapis, "Understanding Big Data", Tata McGraw Hill publishing Limited, ISBN:978-0-07-179053-6.

Course Outcomes:

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

CO1: identify the need for big data analytics	-K1, K2
CO2: apply and evaluate techniques for mining big data	-K3, K5
CO3: analyze the research problems using bigdata	-K4
CO4: build distributed data cluster	-K6
CO5: understand big data with machine learning algorithms	-K2

Mapping of COs with POs & PSOs:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	S	M	M	W	S	S	M	M	M
CO2	S	S	S	S	M	S	S	S	S	S
CO3	S	S	M	M	S	S	S	M	M	M
CO4	S	S	M	S	S	S	S	M	M	S
CO5	S	S	S	M	M	S	S	M	M	M

Strongly Correlating(S)

Moderately Correlating (M)

Weakly Correlating (W)

Prepared by	Ms.P.Kalpana
Verified by	Dr.D.Jayachitra

Course Code & Title	CC – IV b Wireless Communication and Networks	
M.Phil	Semester I	Credit 4
Cognitive Level	K1 – Recall K2 – Understand K3 – Apply K6 – Create	
Learning Objectives	This Course aims to <ul style="list-style-type: none"> • understand the basics of global cellular network • study wireless communication technology and networking • obtain the knowledge of wireless networking • define and describe cordless system and wireless local loop • gain the skill on wireless LAN 	

Unit-I Introduction

The Cellular Revolution – The Global Cellular Network – Broadband – The Trouble with wireless – Technical Background:- Transmission Fundamentals: Signals for Conveying Information – Analog and Digital Data Transmission – Channel Capacity – Transmission Media – Multiplexing .

Unit-II Wireless Communication Technology

Antennas and Propagation: Antennas – Propagation Modes – Line-of-Sight Transmission – Fading in the Mobile Environment – Signal Encoding Techniques: Signal Encoding Criteria – Digital Data, Analog Signals – Analog Data, Analog Signals – Analog Data , Digital Signals.

Spread Spectrum:The Concept of Spread Spectrum – Frequency Hopping Spread Spectrum – Direct Sequence Spread Spectrum – Code-Division Multiple Access – Generation of Spreading Sequences – **Coding and Error Control:** Error Detection - Block Error Correction Codes – Convolutional Codes – Automatic Repeat Request

Unit-III Wireless Networking

Satellite Communications: Satellite Parameters and Configurations – Capacity Allocation-Frequency Division – Capacity Allocation-Time Division

Cellular Wireless Networks: Principles of Cellular Networks – First Generation Analog – Second Generation TDMA – Second Generation CDMA – Third Generation Systems

Unit-IV Cordless System and Wireless Local Loop

Coreless Systems – Wireless Local loop – IEEE 802.16 fixed Broadband Wireless Access Standard - **Mobile IP and Wireless Access Protocol:** Mobile IP – Wireless Application Protocol

Unit-V Wireless LAN

Wireless LAN Technology- Infrared LANs – Spread Spectrum LANs – Narrowband Microwave LANs – IEEE 802.11 Wireless LAN Standard: IEEE 802 Protocol Architecture – IEEE 802.11 Architecture and Services - IEEE 802.11 Medium Access Control - IEEE 802.11 Physical Layer

Bluetooth:

Radio Specification – Baseband Specification – Link Manager Specification – Logical Link Control and Adaptation Protocol.

Books for Study:

1. William Stallings , Wireless Communications and Networks ,second Edition,Pearson Education,2004
2. Kaveh Pahlavan, Prashant Krishnamurthy ,Principles of Wireless Networks –Printice – Hill of India Private Ltd. New Delhi. 2004

Books for Reference:

1. Jon W.Mark,Wei-hna Zhuang, “Wireless Communications and Networking”, Second Edition, , John Wiley & Sons Inc 2002.
2. Theodore S.Rappaport “Wireless Communications Principles & Practices” Prentice Hall, Jan 2002.

Course Outcomes:

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

- CO1:** identify and understand cellular network and wireless communication **-K1,K2**
CO2: apply wireless communication technologies to research problems **-K3**
CO3: understand satellite communications and cellular wireless network **-K2**
CO4: learn cordless system **-K2**
CO5: design and modify WLAN protocols **-K6**

Mapping of COs with POs & PSOs:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	S	M	M	W	S	S	M	M	M
CO2	S	S	S	S	W	S	S	S	S	S
CO3	S	S	M	S	W	M	S	S	M	M
CO4	S	S	M	S	M	W	S	S	M	M
CO5	S	S	S	S	M	M	S	S	S	S

Strongly Correlating(S)

Moderately Correlating (M)

Weakly Correlating (W)

Prepared by	Mrs.V.Priya
Verified by	Dr.S.Murugan

Course Code & Title	CC – IV c Cloud Computing	
M.Phil	Semester I	Credit 4
Cognitive Level	K1 – Recall K2 – Understand K3 – Apply K4 – Analyze K6 – Create	
Learning Objectives	This Course aims to <ul style="list-style-type: none"> • learn the cloud computing architecture and model • acquire the knowledge on cloud hardware and software infrastructure • understand the operating system of cloud services • obtain the skill on cloud programming paradigm • attain the knowledge on security services on cloud 	

Unit-I

Cloud Architecture and Model: Cloud Computing – Overview – System Models for Distributed and Cloud Computing – Cloud Models: Characteristics– Cloud Services – Cloud models (IaaS, PaaS, SaaS) – Public vs Private Cloud –Cloud Solutions Cloud ecosystem – Service management – Computing on demand- Applications- Intranets and the Cloud– Cloud Computing Services– Discovering Cloud Services- Development Services and Tools.

Unit-II

Cloud Infrastructure: Cloud hardware and infrastructure-clients-network-services-platforms-cloud storage- Layered Cloud Architecture Development - Cloud software architecture issues- Resource Provisioning and Platform Deployment – Global Exchange of Cloud Resources.

Unit-III

Operating System for the Cloud - Application Patterns and Architecture – Case Studies- Cloud Computing services available under various platforms.

Unit-IV

Programming Model: Parallel and Distributed Programming Paradigms – Map Reduce, Twister and Iterative Map Reduce – Hadoop Library from Apache.

Unit-V

Security In The Cloud: Security Overview – Cloud Security Challenges and Risks – Software as a Service Security – Security Governance – Risk Management – Security Monitoring – Security Architecture Design – Data Security – Application Security – Virtual Machine Security Identity Management and Access Control – Autonomic Security.

Books for Study:

1. Rajkumar Buyya, James Broberg, and Andrzej Goscinski, “Cloud Computing Principles and Paradigms”, John Wiley and Sons, Inc, 2011.

Books for Reference:

1. George Reese, “Cloud Application Architectures”, O’Reilly Media, Inc, First Edition, 2009.
2. Michael Miller, “Cloud Computing: Web based Applications That Change the Way You Work and Collaborate Online”, QUE Publishing, 2009.

Course Outcomes:

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

- CO1:** understand cloud basics, architecture, applications and its services **-K1,K2**
CO2: understand and apply cloud services **-K3**
CO3: analyze the cloud computing service under various platform **-K4**
CO4: learn and apply hadoop map reduce **-K3**
CO5: design and develop secured cloud service **-K6**

Mapping of COs with POs & PSOs:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	S	M	M	M	S	S	M	M	M
CO2	S	S	S	S	M	S	S	S	S	S
CO3	S	S	M	M	S	M	S	M	M	M
CO4	S	S	M	S	M	W	S	M	M	S
CO5	S	S	S	M	M	M	S	M	M	M

Strongly Correlating(S)

Moderately Correlating (M)

Weakly Correlating (W)

Prepared by	Dr.D.Jayachitra
Verified by	Mrs.V.Priya

Course Code & Title	CC-IV d Web Mining	
M.Phil	Semester I	Credit 4
Cognitive Level	K1 – Recall K2 – Understand K3 – Apply K6 – Create	
Learning Objectives	This Course aims to <ul style="list-style-type: none"> • learn the basics of information retrieval • understand social network analysis • attain the skill on web crawling • state opinion mining • gain the knowledge on web usage mining 	

Unit-I

Information Retrieval and Web Search: Basic Concepts of Information Retrieval - Information Retrieval Models - Text and Web Page Pre-Processing - Inverted Index and Its Compression - Latent Semantic Indexing - Web Search - Meta-Search: Combining Multiple Rankings - Web Spamming.

Unit-II

Social Network Analysis: Social Network Analysis - Co-Citation and Bibliographic Coupling – PageRank – HITS - Community Discovery.

Unit-III

Web Crawling: A Basic Crawler Algorithm - Implementation Issues - Universal Crawlers - Focused Crawlers - Topical Crawlers.

Unit-IV

Opinion Mining and Sentiment Analysis: The Problem of Opinion Mining - Document Sentiment Classification - Sentence Subjectivity and Sentiment Classification - Aspect-Based Opinion Mining - Mining Comparative Opinions - Opinion Search and Retrieval - Opinion Spam Detection.

Unit-V

Web Usage Mining: Data Collection and Pre-Processing - Data Modeling for Web Usage Mining - Discovery and Analysis of Web Usage Patterns - Recommender Systems and Collaborative Filtering - Query Log Mining.

Books for Study:

1. Bing Liu, "Web Data Mining Exploring Hyperlinks, Contents, and Usage Data", Second Edition, 2011 print, Springer ISBN 978-3-642-19459-7.

Books for Reference:

1. Soumen Chakrabarti, "Mining the Web: Discovering Knowledge from Hypertext Data", 2002 print, Morgan Kaufmann Publishers, ISBN: 978-1-55860-754-5
2. Matthew A. Russell, "Mining the Social Web", 2nd Edition, O'Reilly Media Publications, October 2013 print, ISBN-13: 978-1449367619
3. Guandong Xu, Yanchun Zhang and Lin Li, "Web Mining and Social Networking: Techniques and Applications", 2011 print, Springer Science, ISBN: 978-1-4419-7735-9

Course Outcomes:

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

- CO1:** identify the functionality of web crawling and web usage mining **-K1,K2**
CO2: understand and analyze the web data **-K2**
CO3: analyze the algorithms to mine social media content **-K3**
CO4: understand and apply opinion mining on web data **-K3**
CO5: develop new algorithms to mine the web with web usage mining **-K6**

Mapping of COs with POs & PSOs:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	S	M	M	M	S	S	M	M	M
CO2	S	S	S	M	M	S	S	S	S	S
CO3	S	S	M	S	S	S	S	S	S	S
CO4	S	S	M	S	S	S	S	M	S	S
CO5	S	S	S	S	S	S	S	M	S	S

Strongly Correlating(S)

Moderately Correlating (M)

Weakly Correlating (W)

Prepared by	Dr.K. Sridevi
Verified by	Dr.M.Muralidharan

Course Code & Title	CC-IV e Data Mining and Warehousing	
M.Phil	Semester I	Credit 4
Cognitive Level	K1 – Recall K2 – Understand K3 – Apply K4 – Analyze K5 – Evaluate K6 – Create	
Learning Objectives	This Course aims to <ul style="list-style-type: none"> • describe data mining and data preprocessing • understand association rule mining • obtain the knowledge on classification and prediction • acquire the skill on cluster analysis • state the model and methods of data warehouse 	

Unit-I Data Mining & Data Preprocessing

Introduction to KDD process – Knowledge Discovery from Databases - Need for Data Preprocessing – Data Cleaning – Data Integration and Transformation – Data Reduction – Data Discretization

Unit–II Association Rule Mining

Introduction - Data Mining Functionalities - Association Rule Mining - Frequent Item set Mining Methods: Apriori Algorithm: Finding Frequent Item sets using Candidate Generation- Generating Association Rules from Frequent Itemsets- A Pattern-Growth Approach for Mining Frequent Itemsets.

Unit–III Classification & Prediction

Classification vs. Prediction – Data preparation for Classification and Prediction – Classification by Decision Tree Introduction – Bayesian Classification – Rule Based Classification – Classification by Back Propagation – Support Vector Machines – Associative Classification – Other Classification Methods – Prediction – Accuracy and Error Measures – Evaluating the Accuracy of a Classifier or Predictor – Ensemble Methods – Model Section.

Unit-IV Clustering:

Cluster Analysis: - Types of Data in Cluster Analysis – A Categorization of Major Clustering Methods – Partitioning Methods – Hierarchical methods – Density-Based Methods – Grid-Based Methods – Model-Based Clustering Methods – Clustering High- Dimensional Data – Constraint- Based Cluster Analysis – Outlier Analysis

Unit-V Data Warehouse

Data Warehousing - Operational Database Systems vs. Data Warehouses - Multidimensional Data Model - Schemas for Multidimensional Databases – OLAP Operations – Data Warehouse Architecture – Indexing – OLAP queries & Tools.

Books for Study

1. Jiawei Han and Micheline Kamber, “Data Mining Concepts and Techniques” , Second Edition, Elsevier, Reprinted 2008., ISBN 13: 978-1-55860-901-3

Books for Reference:

1. K.P. Soman, Shyam Diwakar and V. Ajay, “Insight into Data mining Theory and Practice”, Easter Economy Edition, Prentice Hall of India, 2006., ISBN-10: 8120328973; ISBN-13: 978-8120328976
2. G. K. Gupta, “Introduction to Data Mining with Case Studies”, Easter Economy Edition, Prentice Hall of India, 2006., ISBN-10: 8120343263; ISBN-13: 978-8120343269

Course Outcomes:

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

CO1: identify the KDD process and data preprocessing	-K1,K2
CO2: apply the techniques in association rule in data mining	-K3
CO3: apply the algorithms in classification and prediction	-K4
CO4: develop new algorithms in clustering	-K5
CO5: build the knowledge of data warehousing in forming data warehouses	-K6

Mapping of COs with POs & PSOs:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	S	M	M	M	S	S	M	M	M
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	S	M	M	S	S	S	M	M	M
CO4	S	S	M	S	S	S	S	M	M	S
CO5	S	S	S	M	S	S	S	M	M	M

Strongly Correlating(S) Moderately Correlating (M) Weakly Correlating (W)

Prepared by	Dr.D. Jayachitra
Verified by	Dr.S.Murugan

Course Code & Title	CC- IV f Cryptography and Network Security	
M.Phil	Semester I	Credit 4
Cognitive Level	K1 – Recall K2 – Understand K3 – Apply K4 – Analyze K5 – Evaluate K6 – Create	
Learning Objectives	This Course aims to <ul style="list-style-type: none"> • identify types of attacks and security mechanisms • learn symmetric key algorithms • attain the skill on digital certificates • understand user authentication and Kerberos • state the protocols on network security 	

Unit-I

Security Goals :Types of Attacks – Services and Mechanisms – Techniques - Cryptography Concepts and Techniques :Introduction – Plain Text and Cipher Text – Substitution Techniques – Transposition Techniques – Encryption and Decryption – Symmetric and Asymmetric Key Cryptography – Steganography – Key Range and Key size.

Unit-II

Symmetric Key Algorithms:Introduction – Algorithms types and Modes – Data Encryption Standard (DES) – International Data Encryption Algorithm (IDEA) – Blowfish-AES- Asymmetric Key Algorithms and Digital Signatures:Introduction – The RSA Algorithm – Digital Signatures

Unit- II

Digital Certificates and Public Key Infrastructure (PKI):Introduction – Digital certificates – Private Key Management – XML, PKI and Security. Internet Security Protocols :Introduction – Basic Concepts – Secure Socket Layer (SSL) – Secure Electronic Transaction (SET) –SSL Versus SET- Email Security – WAP Security.

Unit-IV

User Authentication and Kerberos: Introduction – Authentication Basics – Passwords – Authentication Tokens – Certificate based Authentication – Biometric Authentication – Kerberos – Cryptographic Solutions – Key Management.

Unit-V

Network Security : Introduction -Firewalls –IP Security- Trusted Systems .Case Studies: Cookies and Privacy

Books for Study:

1. William Stallings ,“Cryptography and Network Security”, Seventh Edition, Pearson Prantice Hall,2016.

Books For Reference:

1. Bruce Schneier, “Applied Cryptography Protocols, Algorithms”, Second Edition, , John Wiley & Sons Inc 2002.
2. Richard E.Smith, “Internet Cryptography” ,Addison –Wasley Professional Aug 1997.
3. Atul Kahate, “Cryptography and Network Security”, Second Edition, Tata McGraw-Hill Publishing Company Limited, 2008
4. Behrouz A. Forouzan, “Cryptography and Network Security”, Tata McGraw-Hill Publishing Company Limite,2007.

Course Outcomes:

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

- CO1:** identify various algorithms to secure data on network **-K1,K2**
CO2: apply network security algorithms to research problems **-K3**
CO3: analyze the algorithms to enhance the security of network **-K4**
CO4: compare the authentication services and enhance **-K5**
CO5: design algorithms of their own to enhance network security **-K6**

Mapping of COs with POs & PSOs:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	S	M	M	M	S	S	M	M	M
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	S	M	M	S	M	S	M	M	M
CO4	S	S	M	S	M	W	S	M	M	S
CO5	S	S	S	M	S	M	S	M	M	M

Strongly Correlating(S)

Moderately Correlating (M)

Weakly Correlating (W)

Prepared by	Dr.S.Murugan
Verified by	Dr.K.Mani

Course Code & Title	CC – IV g Machine Learning	
M.Phil	Semester I	Credit 4
Cognitive Level	K1 – Recall K2 – Understand K3 – Apply K4 – Analyze K6 – Create	
Learning Objectives	This Course aims to <ul style="list-style-type: none"> • learn the basics of concept learning and algorithms • study decision tree learning and comparison of algorithms • understand Bayesian learning • gain the knowledge on instance based learning • attain the skill on analytical learning 	

Unit- I:

Well-Posed Learning Problems – Designing a Learning System – Perspective and Issues in Machine Learning – Concept learning Task –Concept Learning as search – Version Spaces and the candidate Elimination Algorithm – Remarks on Version Spaces and Candidate – Elimination – Inductive Bias.

Unit- II:

Decision Tree Learning- Representation- Appropriate problems for decision tree learning – Basic Decision Tree Learning Algorithm - Hypothesis Space Search –Inductive Bias –Issues in Decision Tree Learning – Evaluating Hypothesis – Motivation – Estimating Hypothesis Accuracy – Basics of sampling theory – A general approach for deriving confidence intervals – Difference in Error of two hypothesis – Comparing learning algorithms

Unit- III

Bayesian learning – Bayes theorem –Bayes theorem and concept learning –Bayes Optimal Classifier – Gibbs algorithm – Naive Bayes classifier – Bayesian belief networks – EM algorithm – Computational Learning theory –Probably learning an approximately correct hypothesis – Sample Complexity for finite hypothesis Spaces - Sample Complexity for infinite hypothesis Spaces – The mistake bound model of learning

Unit-IV

Instance Based learning – K-nearest neighbor learning – locally weighted regression – radial basis function – case based reasoning – remarks on lazy and eager learning –Learning sets of rules – Sequential covering algorithm – learning rules sets –learning first order rules – learning sets of first order rules(FOIL) – Induction as inverted Deduction –Inverting resolution

Unit-V

Combining Inductive and analytical learning –Inductive analytical approaches to learning – using prior knowledge to initialize the hypothesis – Using prior knowledge to alter the search objective- Using prior knowledge to augment search – Reinforcement Learning – Learning task - Q-learning – Nondeterministic rewards and actions – temporal difference learning-generalizing from examples –relationship to dynamic programming

Books for Study:

1. Tom M.Mitchell, “Machine Learning”, McGraw-Hill, First Edition,2013, ISBN :0070428077

Books for Reference

1. Ethem Alpaydin, “Introduction to Machine Learning”,3rd Edition, Prentice Hall, New Delhi ,2015.Jason Bell,”Machine Learning for Big Data”,Wiley Publication,2014.

Course Outcomes:

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

CO1: identify the basics of machine learning and algorithms	-K1,K2
CO2: apply decision tree learning	-K3
CO3: analyze and understand Bayesian learning	-K4
CO4: apply instance based learning to research problems	-K3
CO5: design new machine learning algorithms	-K6

Mapping of COs with POs & PSOs:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	S	M	M	M	S	S	M	M	M
CO2	S	M	S	S	M	S	S	S	S	S
CO3	S	S	S	M	S	S	S	M	M	M
CO4	S	S	S	S	S	S	S	M	M	S
CO5	S	S	S	S	S	S	S	M	M	M

Strongly Correlating(S)

Moderately Correlating (M)

Weakly Correlating (W)

Prepared by	Dr.M.Muralidharan
Verified by	Dr.K.Mani

Course Code & Title	CC – IV h Social Network Analytics	
M.Phil	Semester I	Credit 4
Cognitive Level	K1 – Recall K2 – Understand K3 – Apply K4 – Analyze	
Learning Objectives	This Course aims to <ul style="list-style-type: none"> • understand the components of the social network • model and visualize the social network • mine the users in the social network • understand the evolution of the social network • know the applications in real time systems 	

Unit I

Introduction to Web - Limitations of current Web – Development of Semantic Web – Emergence of the Social Web – Statistical Properties of Social Networks -Network analysis - Development of Social Network Analysis - Key concepts and measures in network analysis - Discussion networks - Blogs and online communities - Web-based networks.

Unit II

Modeling and Visualization: Visualizing Online Social Networks - A Taxonomy of Visualizations - Graph Representation - Centrality- Clustering - Node-Edge Diagrams - Visualizing Social Networks with Matrix-Based Representations- Node-Link Diagrams - Hybrid Representations - Modelling and aggregating social network data – Random Walks and their Applications –Use of Hadoop and Map Reduce - Ontological representation of social individuals and relationships.

Unit III

Mining Communities: Aggregating and reasoning with social network data, Advanced Representations – Extracting evolution of Web Community from a Series of Web Archive - Detecting Communities in Social Networks - Evaluating Communities – Core Methods for Community Detection & Mining - Applications of Community Mining Algorithms - Node Classification in Social Networks.

Unit IV

Evolution: Evolution in Social Networks – Framework - Tracing Smoothly Evolving Communities - Models and Algorithms for Social Influence Analysis - Influence Related Statistics - Social Similarity and Influence - Influence Maximization in Viral Marketing - Algorithms and Systems for Expert Location in Social Networks - Expert Location without Graph Constraints - with Score Propagation – Expert Team Formation - Link Prediction in Social Networks - Feature based Link Prediction – Bayesian Probabilistic Models - Probabilistic Relational Models.

Unit V

Applications: A Learning Based Approach for Real Time Emotion Classification of Tweets, A New Linguistic Approach to Assess the Opinion of Users in Social Network Environments, Explaining Scientific and Technical Emergence Forecasting, Social Network Analysis for Biometric Template Protection

REFERENCES:

1. Ajith Abraham, Aboul Ella Hassanien, Vaclav Snasel, "Computational Social Network Analysis: Trends, Tools and Research Advances", Springer, 2012
2. Borko Furht, "Handbook of Social Network Technologies and Applications", Springer, 1st edition, 2011
3. Charu C. Aggarwal, "Social Network Data Analytics", Springer; 2014
4. Giles, Mark Smith, John Yen, "Advances in Social Network Mining and Analysis", Springer, 2010.
5. Guandong Xu , Yanchun Zhang and Lin Li, "Web Mining and Social Networking- Techniques and applications", Springer, 1st edition, 2012
6. Peter Mika, "Social Networks and the Semantic Web", Springer, 1st edition, 2007.
7. Przemyslaw Kazienko, Nitesh Chawla, "Applications of Social Media and Social Network Analysis", Springer, 2015

Course Outcomes:

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

CO1: understand the internal components of the social network	-K1,K2
CO2: apply social network model and visualizations	-K3
CO3: analyze the mining communities in the social network	-K4
CO4: understand evolutions of social networking	-K2
CO5: learn the real time application of social networks	-K2

Mapping of COs with POs & PSOs:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	S	M	M	W	S	S	M	M	M
CO2	S	M	S	S	W	S	S	S	S	S
CO3	S	S	M	M	S	S	S	M	M	M
CO4	S	S	M	S	M	S	S	M	M	S
CO5	S	S	S	M	M	S	S	M	M	M

Strongly Correlating(S)

Moderately Correlating (M)

Weakly Correlating (W)

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