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:	
PO1:	**Scientific Knowledge** Apply the knowledge of computing fundamentals, principles of mathematical logic and domain knowledge to solve complex problems
PO2:	**Problem Analysis** Design and analyses of complex problems with appropriate methods
PO3:	**Design and Development of Solution** Finding solutions to the complex problems that meet the specific needs of the society
PO4:	**Conduct investigations of complex problems** Ability to design and develop algorithms by providing solutions to complex problems
PO5:	**Modern tool usage** Create, select and apply appropriate techniques, resources and IT tools to solve real life problems
PO6:	**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**	**TITILE**	**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**
Distribution: Assignment - 5 Marks C.I.A Test 1 - 10 Marks C.I.A Test 2 – 10 Marks Total = 25	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)
Practical Courses	
Distribution: Observation – 10 Marks Test 1 - 15 Marks Test 2 - 15 Marks Total =40 Marks	Practical - 50 Marks **Distribution** Logic - 30 Marks Coding -10 Marks Result -10 Marks Record - 10 Marks Total - 60 Marks

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**, **தமிழ் இலக்கிய வரலாறு**

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 - காகிதப்பூக்கள் 13. ஈரோடு தமிழன்பன் – இப்போது நினைந்து 14. 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.

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	400

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.

<table>
<tr><td>Course Code & Title</td><td colspan="3">ENGLISH FOR COMMUNICATION - I</td></tr>
<tr><td>Class</td><td><u>I YEAR</u></td><td>Semester</td><td><u>I</u></td></tr>
<tr><td>Cognitive Level</td><td colspan="3">K – 1 Acquire
K – 2 Understand
K – 3 Apply
K – 4 Evaluate
K – 5 Analyze</td></tr>
<tr><td>Course Objectives</td><td colspan="3">The Course aims
• 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</td></tr>
<tr><td>UNIT</td><td colspan="2">Content</td><td>No. of Hours</td></tr>
<tr><td>I</td><td colspan="2">1.Spoken English and Broken English: G.B.Shaw
2. Give us a Role Model : Dr. A.P. J. Abdul Kalam</td><td></td></tr>
<tr><td>II</td><td colspan="2">Water-The Elixir of Life : Sir C. V. Raman
No Guarantee Please No Longer : A Newspaper Article</td><td></td></tr>
<tr><td>III</td><td colspan="2">I have a Dream : Martin Luther King Jr.
The Gettysburg Address : Abraham Lincoln</td><td></td></tr>
<tr><td>IV</td><td colspan="2">Mosquitoes : Article
Polluting the World :Article</td><td></td></tr>
<tr><td>V</td><td colspan="2">A Little Incident : Lu Hsun
Jimmy Valentine : O. Henry</td><td></td></tr>
<tr><td></td><td colspan="2">GRAMMAR:
1. Articles
2. Preposition
3. Adjective</td><td></td></tr>
</table>

	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 • 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		

	• 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	**Text Books:** **1.** Tony Gaddis, "***Starting out with python***", 2nd edition, Addison Wesley, Pearson **Reference Books:** 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 **Web References:** 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 • 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** • 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 $e^{kx}, \sin kx, \cos kx, x^k, e^{ax}x$.		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:** 1. **S. Narayanan ,T.K. Manicavachagom Pillai,** Ancillary Mathematics,Vol-I, S.V.Publications-2012 (Unit I,II) 2. **S. Narayanan ,T.K. Manicavachagom Pillai,** Ancillary Mathematics,Vol-II, S.V.Publications-2012 (Unit II,IV,V) 3. **S.Narayanan ,T.K. Manicavachagom,**Pillai, Calculus, Volume III, S.V.Publications 2010(Unit-III) **Reference Books:** 1. **M.K.Venkataraman,** Engineering mathematics,NPC,1998 2. **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 $e^{kx}, \sin kx, \cos kx, x^k, e^{ax}x$.		**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.	

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**

<table>
<tr><td colspan="2">Programme : B.Sc Computer Science</td><td>SEM</td><td>I</td></tr>
<tr><td>Course Code</td><td>Title</td><td>Hours</td><td>Credit</td></tr>
<tr><td></td><td>AC-II OPERATIONS RESEARCH</td><td>4</td><td>4</td></tr>
<tr><td>Cognitive Level</td><td colspan="3">K – 1 : Acquire
K – 2 : Understand
K – 3 : Apply
K – 4 : Evaluate
K – 5 :Analyze</td></tr>
<tr><td>Learning Objectives</td><td colspan="3">The Course aims to
• 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</td></tr>
<tr><td>UNIT</td><td colspan="2">Content</td><td>Hours</td></tr>
<tr><td>I</td><td colspan="2">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</td><td>11</td></tr>
<tr><td>II</td><td colspan="2">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</td><td>11</td></tr>
<tr><td>III</td><td colspan="2">Network: Introduction-Basic Components-Rules of Network Construction –Critical Path Analysis- Measure of activity – PERT computations –CPM computation-Difference between PERT and CPM</td><td>10</td></tr>
<tr><td>IV</td><td colspan="2">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</td><td>10</td></tr>
<tr><td>V</td><td colspan="2">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.</td><td>10</td></tr>
<tr><td>Reference</td><td colspan="3">Text Books:
1. A .Taha ,Operations Research,Keerthi Publishing House, 1997 (Unit – I)
2. KantiSwarup, P.K.Gupta, Man Mohan, Operations Research, Sultan Chand &Company Ltd, 11th Edition, 2003(Unit – II,III,IV and V)

Reference Books:
1. Prem Kumar Gupta and D.S.Hira, Problems in Operations Research, S.Chand, 2010</td></tr>
</table>

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 - மக்காளாட்சித் 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 - பன்பண்பாட்டு 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)
1□. 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. ஒண்பவள வேலை பா.எண் 680
4. மின்னனைய நுண்ணியர் பா. எண் 682
5. வான்ஆளும் மாமதிபோல் பா.எண் 683

வித்துவக்கோட்டு அம்மானை வேண்டி நிற்றல்

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. அஞ்சுநூறு மகம்கொண்ட நாடு . . . . . (பா.எண் -6)
4. மாதம் மூன்றும் மழையுள்ள நாடு . . . . . (பா.எண் -7)

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

9. தமிழ் விடுதூது - 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.சாதிக்பாட்சா, 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	**I YEAR**	**Semester**	**II**
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** • 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 strucutures	
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:**	

	1. E. Balagurusamy, "***Programming in ANSI C***" — 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) **Reference Books:** 1. Byron S. Gottfried, "***Programming with C***", Schaum's Outline Series – Tata McGraw- Hill Publication, Second Edition, ISBN-13: 978-0070240353 2. Yashavant P. Kanetkar, **" Let us C" ,** 13 th Edition, BPB, **ISBN-13:** 978-8183331630 **Web References:** 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.Kalpana**
Verified by	**Mrs.K.P.Lakshmi**

Programme : B.Sc Computer Science		**SEM**	**II**
Course Code	**Title**	**Hours**	**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 • 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 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** 1. Functions 2. Storage Classes 3. Arrays **Programs Using** 1. Structure and Union **Programs Using** 1. Pointers 2. File **Implementation of** 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** • 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:** 1. **M.K Venkataraman,**Numerical Methods in Science and Engineering, The National Publishing company, Chennai. V^{th}edition(Revised and enlarged), Sep 2007. (For Units I, II and III) 2. **S.C.Gupta,**Fundamentals of Statistics, ,Himalaya Publishing House,2009 (Units 4, and 5) (Problems only) **Reference Books:** 1. **S.C. Gupta and V.K. Kapoor** , Fundamentals of Statistics ,Himalayan Publishing House, 2000, ISBN: 81-7014-791-3 2. **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**

<table>
<tr><td colspan="3">Programme : B.Sc Computer Science</td><td>SEM</td><td>II</td></tr>
<tr><td>Course Code</td><td colspan="2">Title</td><td>Hours</td><td>Credit</td></tr>
<tr><td></td><td colspan="2">SKBC - I DATA ANALYTIC LAB</td><td>2</td><td>2</td></tr>
<tr><td>Cognitive Level</td><td colspan="4">K – 1 : Acquire
K – 2 : Understand
K – 3 : Apply
K – 4 : Evaluate
K – 5 :Analyze</td></tr>
<tr><td>Learning Objectives</td><td colspan="4">The Course aims to
• 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</td></tr>
<tr><td></td><td colspan="3">Content</td><td></td></tr>
<tr><td></td><td colspan="3">1. Demonstrate the usage of the following built-in-functions in spreadsheet.
MAX, SUM, AVERAGE, CONCATENATE, LEN, LOWER, UPPER and TRIM
2. Demonstrate the usage of the following logical fucntions in spreadsheet.
AND,OR,NOT, IF and IFERROR
3. Demonstrate any 10 math and trignometric functions in spreadsheet.
4. Create and demonstrate the usage of a pivot table in spreadsheet.
5. Create a bar-chart for the following data
<table><tr><th>Region</th><th>A</th><th>B</th><th>C</th></tr><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></table>6. Display the transpose of a given matrix using spreadsheet.
7. Add the Data Analysis Toolpak in the spreadsheet.
8. Demonstrate the descriptive statistics in spreadsheet.
9. Perform the Student's T-test in spreadsheet.
10. Find the Correlation between two vaiables in spreadsheet.
11. Preform Regression analysis in spreadsheet.
12. Generate a Histogram for the data in spreadsheet.</td><td></td></tr>
<tr><td rowspan="3">Course Outcomes</td><td colspan="4">On completion of the course, students should be able to</td></tr>
<tr><td colspan="3">CO1: apply built in functions of spread sheet</td><td>K1,K3</td></tr>
<tr><td colspan="3">CO2: prepare charts using the data in the spreadsheet.</td><td>K2</td></tr>
</table>

	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, தமிழ் இலக்கிய வரலாறு

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 போர்ச்சருக்கம்- 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 பெறுவ単□□・ □ □ □□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	**II YEAR**	**Semester**	**III**
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 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

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** • 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	**Text Books:** 1. E. Balagurusamy, *"**Object Oriented Programming with C++"*** ,Tata McGraw Hill Publishing Ltd., New Delhi., Sixth Edition, *ISBN*-10: 125902993X **Reference Books:** 1. Robert Lafore, ***"Object Oriented Programming in C++"***, Sams Publishing, Fourth Edition, ISBN-13**:** 978-0672323089. 2. Herbert Schilt, ***"The Complete Reference",*** McGraw-Hill Osborne Media, Ninth Edition (March 11, 2014), ISBN-13: 978-0071808552. **Web References:** 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.Kalpana**
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** • 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		

	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** • 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:** 1. V. K.Mehta, Rohit Mehta, Principles of Electronics, S.Chand& Company, New Delhi, Eleventh Edition, 2010.		

	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. **Reference Books:** **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) **Web References:**	
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** • 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 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! என்தோழி (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 COMMUNICTION IV**		
Class	**II YEAR**	**Semester**	**IV**
Cognitive Level	**K – 1 Acquire** **K – 2 Understand** **K – 3 Apply**		

	K – 4 Evaluate **K – 5 Analyze**	
Course Objectives	**The Course aims** • **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 wow 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 : CharlesDickens	
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** • 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		
	LIST OF EXPERIMENTS **(Any 12 experiments)** 1. V-I characteristics of Semiconductor Diode 2. V-I characteristics of Zener Diode-Determination of breakdown voltage. 3. Characteristics of LED 4. Construction and study of Inverting and Non-Inverting amplifier using operational amplifier 5. Construction of adder and subtractor circuits using Op-Amp 6. Study of logic gates using ICs 7. Verification of De-Morgan's theorem 8. Universality of NAND gate. 9. Universality of NOR gate. 10. Construction and verification of Half adder and full adder circuits 11. Construction and verification of Half subtractor and		

	Full subtractor circuits 12. Study of R-S flip flop 13. Study of JK and D flip flops 14. Addition and subtraction of two 8-bit numbers using microcontroller 8051 kit 15. Multiplication and division using microcontroller 16. 8051 kit 17. Interfacing of LED to a microcontroller 8051 kit 18. Interfacing of LCD to a microcontroller 8051 kit 19. Interfacing of stepper motor to a microcontroller 8051 kit 20. Generation of waveform using timers to a microcontroller 8051 kit 21. Counting of pulses to a microcontroller 8051 kit 22. Find the biggest number in a given array using 8051 microcontroller kit 23. Find the smallest number in a given array using 8051 microcontroller kit	
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** • 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 physicUSBC Ê□… ! !y storage devices – Basic Terminology – Disk organization – 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:

1. J.Date ,"***An Introduction to Database Systems***", Pearson Education, Seventh Edition 2000. (Unit I – Chapters 1,2. Unit IV – Chapters 10,11). ISBN 81-7808-231-4
2. Arun K.Majumdar & Pritmoy Bhattacharyya, "***Data Base Management System***", Tata McGraw Hill, New Delhi, 1999. (Unit II, Unit III, Unit V) ISBN 0-07-462239-0.

	Reference Books: 1. Bepin C.Desai, *"**An Introduction to Data base system**"*, Galogotia publications Private limited. 2. Ivan Bayross, "SQL ***and PL/SQL***", 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.Kalpana**

<table>
<tr><td colspan="2">Programme : B.Sc Computer Science</td><td>SEM</td><td>IV</td></tr>
<tr><td>Course Code</td><td>Title</td><td>Hours</td><td>Credit</td></tr>
<tr><td></td><td>CC - VIII RDBMS LAB</td><td>3</td><td>2</td></tr>
<tr><td>Cognitive Level</td><td colspan="3">K – 1 : Acquire
K – 2 : Understand
K – 3 : Apply
K – 4 : Evaluate
K – 5 :Analyze</td></tr>
<tr><td>Learning Objectives</td><td colspan="3">The Course aims to
• 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</td></tr>
<tr><td>UNIT</td><td colspan="2">Content</td><td>Hours</td></tr>
<tr><td></td><td colspan="2">Exercises using
1. DDL Commands
2. DML Commands
3. DCL Commands
4. TCL Commands
5. Queries using operators
a. Logical operators
b. SET operators
6. Nested queries using SQL
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
i. Implicit
ii. Explicit
12. Triggers
13. Functions
14. Procedure</td><td></td></tr>
<tr><td rowspan="6">Course Outcomes</td><td colspan="3">On completion of the course, students should be able to</td></tr>
<tr><td colspan="2">CO1: design and implement database schema for the given problem</td><td>K3</td></tr>
<tr><td colspan="2">CO2: populate and query using DDL,DML,DCL,TCL</td><td>K1</td></tr>
<tr><td colspan="2">CO3: prepare SQL reports.</td><td>K2</td></tr>
<tr><td colspan="2">CO4: create implicit and explicit cursor.</td><td>K4</td></tr>
<tr><td colspan="2">CO5: capable to create triggers, procedures and function.</td><td>K5</td></tr>
</table>

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.Kalpana**

<table>
<tr><td colspan="2">Programme : B.Sc Computer Science</td><td>SEM</td><td>IV</td></tr>
<tr><td>Course Code</td><td>Title</td><td>Hours</td><td>Credit</td></tr>
<tr><td></td><td>AC-VI APPLIED PHYSICS –II</td><td>4</td><td>5</td></tr>
<tr><td>Cognitive Level</td><td colspan="3">K – 1 : Acquire
K – 2 : Understand
K – 3 : Apply
K – 4 : Evaluate
K – 5 :Analyze</td></tr>
<tr><td>Learning Objectives</td><td colspan="3">The Course aims to
• 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</td></tr>
<tr><td>UNIT</td><td colspan="2">Content</td><td>Hours</td></tr>
<tr><td>I</td><td colspan="2">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.</td><td>13</td></tr>
<tr><td>II</td><td colspan="2">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.</td><td>13</td></tr>
<tr><td>III</td><td colspan="2">I/O Port Programming and interfacing
I/O Port Pins and their Functions – Interface 0804 with 8051 Microcontroller – LCD Interfacing – DAC Interfacing</td><td>13</td></tr>
<tr><td>IV</td><td colspan="2">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</td><td>13</td></tr>
<tr><td>V</td><td colspan="2">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</td><td>13</td></tr>
<tr><td>Reference</td><td colspan="3">Text Books:
1. Muhammad Ali Mazidi, Janice GillispieMazidi, Rolin D. Mckinlay,”8051 Microcontroller and Embedded Systems using Assembly and C”, Pearson Education 2008.
2. MykePredko, “Programming and customizing the 8051 microcontroller”, Tata McGraw Hill 2001.
3. Michael J. Pont, ”Embedded C”, Pearson Education, First</td></tr>
</table>

	Edition,2013. **Reference Books** 1. K.UmaRao, AndhePallavi, "*The 8051 Microcontrollers Architecture, Programming and Applications*", Pearson, Second impression 2011. 2. Kenneth.J.Ayala, "*The 8051 Microcontroller*", Thomson, Third Edition 2007 3. ZdraUkoKarakehayou, KnudSmedChristengen,*"Embedded System Design with 8051 Microcontroller"*, 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** • 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** • 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**

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** • 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:** 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.,		

	Chennai, 2004. (Unit V). ISBN 981-254-265-5. **3.** Cays Horstmann and Gary Cornell,"Core Java",Volume II, Pearson Edition, 2001, ISBN: 978-0137081899 and 978-0137081608 **Reference Books:** 1. P. RadhaKrishna,"***Object Oriented Programming through JAVA***", Universities Press, 2007. 2. E. Balagurusamy, "***Programming with Java A Primer 3e***", Tata McGraw Hill Publishing Company Ltd., ISBN 0-07-061713-9. **Web References:** 1. URL:http://Docs.oracle.com/javase/tutorials/java/index.html 2. URL:http://javabeginnerstutorial.com/core-java 3. URL:http://www.w3schools.in/java-tutorial/ 4. URL:http://Docs.oracle.com/javase/tutorials/java/index.html 5. URL:http://javabeginnerstutorial.com/core-java 6. URL:http://www.w3schools.in/java-tutorial/	
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** • 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:** 1. Stuart E.Madnick and John J.Donavan, "***Operating Systems***",Tata McGraw Hill Book Company Ltd, Third Edition, ISBN 0-07-039455-5. **Reference Books:** 1. Milan Milenkovic, "***Operating Systems (Concepts and Design)"***, 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** • 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:** 1. M. Morris Mano, ***"Computer System Architecture",*** Prentice Hall of India Private Ltd, New Delhi. Third Edition, ISBN 81-203-0855-7. **Reference Books:** 1. Thomas c Bartee, ***"Computer Architecture and Logic Design",*** McGraw – Hill, 1991, ISBN 0070039097, 9780070039094. **Web References:** 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** • 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		
	Programming in JAVA 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 **System Administration** 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.Kalpana and Mrs. V. Priya**
Verified by	**Mrs.V.Priya and Ms.P.Kalpana**

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** • 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:** 1. Charles Arehart and Others. ”Professional WAP with WML, WML script, ASP, JSP, XML, XSLT, WTA Push and Voice XML”, Shroff Publishers and Distributers 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:** 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** • 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:** 1. Donald Hearn and M.Pauline Baker, "***Computer Graphics C Version***", 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:** 1. Foley, Vandam, Feiner, Huges, "***Computer Graphics: Principles & Practice***", 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** • 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 s 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:

1. Shankar Kambhampaly, "***Service–Oriented Architecture for 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.

Reference Books:

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** • 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: a. Cut, Copy, Paste options. b. Find and Replace options. c. Undo and Redo options. ii) Format the document: 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 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) a. For opening a new branch b. Inauguration function c. Informing about new scheme or offer **SPREADSHEET** 5. 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,		

<table>
<tr><td></td><td>inserting a row, column, deleting rows and columns).
b. Formatting worksheets
Bold, Italic, Font size changing, Auto fill, date format, Currency format.
6. Open an excel and create fields as follows
<table>
<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>
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.
7. i) Creating and running a macro.
ii) Assigning button to a defined macro.
iii) Editing a macro.

PRESENTATION

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.</td><td></td></tr>
<tr><td rowspan="6">Course Outcomes</td><td colspan="2">On completion of the course, students should be able to</td></tr>
<tr><td>CO1: create documents, apply formatting, editing text and paragraphs</td><td>K1</td></tr>
<tr><td>CO2: create document with tables</td><td>K2</td></tr>
<tr><td>CO3: create a document with mail merge</td><td>K3</td></tr>
<tr><td>CO4: use spreadsheet for calculations and apply formatting</td><td>K3</td></tr>
<tr><td>CO5: apply macro concept</td><td>K5</td></tr>
<tr><td></td><td>CO6: prepare a presentation for a seminar</td><td>K4</td></tr>
</table>

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** • 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 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** • 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:** 1. Andrews S. Tannenbaum, "***Computer Networks***", Prentice Hall of India, New Delhi, Fifth Edition, *ISBN*-13: 978-0132126953 **Reference Books:** 1. Behrouz A. Forouzan, "***Data Communication and Networking***", Tata McGraw Hill, New Delhi 2013, Fifth Edition,*ISBN*: 0073376221. **Web References:** 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** • 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:** 1. Richard Fairley, "***Software Engineering Concepts***", Tata McGraw-Hill, 2nd Edition. ISBN 0-07-463121-7 **Reference Books:** 1. Roger S. Pressman,"***Software Engineering – A Practitioner's Approach"***, 6th Ed., McGraw Hill International, 2005. 2. Ian Sommerville, "***Software Engineering***", Addition Wesely, Singapore,2002 3. K.K.Agarwal & Yogesh Singh, "***Software Engineering***", 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** • 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:** 1. Timothy Boronczyk,Michael, Elizabeth Naramore, Jason Gerner, Yann Le Scouarnec, Jeremy Stolz,, Michael K. Glass "Beginning PHP6, Apache, MySQL® Web Development", Wiley Publishing,		

	2009 Edition.ISBN-13: 978-8126521227. 2. Chris Bates, **"**Web Programming Building Internet Applications**"**, Third Edition, Wiley, 2007, ISBN-*10*: 0470017759. **Reference Books:** 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. David R. Brooks, "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 **Web References:** 1. php.net/manual/en/intro-whatis.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.Kalpana**
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** • 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:** 1. David Flanagan & Yukihiro Matsumoto, "The Ruby Programming Language", O'Reilly, 2008.ISBN 9780596516178. **Reference Books:** 1. Michael Hartl, "Ruby on Rails Tutorial: Learn Web Development with Rails",Addison -Wesley Professional Ruby series **Web References:** 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** • 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:** 1. Lauren Darcey, Shane Conder, "***SAMS Teach Yourself Android Application Development in 24 Hours****"*, Second Edition.ISBN-13: 978-0-672-33569-3 ISBN-10: 0-672-33569-7 (Unit I to IV) 2. Reto Meier, "***Professional Android 4 Application Development*** ", WROX Publication- Wiley – India, 2012 (Unit I and V) **Reference Books:**		

	1. Pradeep Kothari &Kogent Learning Solutions Inc, ***" Android Application Development Black Book***", Dreamtech Press, Edition 2014, ISBN:978-93-5119-409-5 **Web References:** 1. https://developer.android.com/guide/ 2. https://studytonight.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** • 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: • 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** • 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:** 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***		

	Programming, Black book", Dreamtech press, 2007. 5. Schildt, Herbert, "***C#: The Complete Reference***", Second Edition, McGraw-Hill, 2008. **Reference Books:** 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 **Web References:** 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**

<table>
<tr><td colspan="2">Programme : B.Sc Computer Science</td><td>SEM</td><td>VI</td></tr>
<tr><td>Course Code</td><td>Title</td><td>Hours</td><td>Credit</td></tr>
<tr><td></td><td>EC-VIII FUNCTIONAL PROGRAMMING USING HASKELL</td><td>5</td><td>5</td></tr>
<tr><td>Cognitive Level</td><td colspan="3">K – 1 : Acquire
K – 2 : Understand
K – 3 : Apply
K – 4 : Evaluate
K – 5 :Analyze</td></tr>
<tr><td>Learning Objectives</td><td colspan="3">The Course aims to
• 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</td></tr>
<tr><td>UNIT</td><td colspan="2">Content</td><td>Hours</td></tr>
<tr><td>I</td><td colspan="2">Getting Started – Lists – Strings and Characters –Type System – Function Application – Writing Simple functions – Understanding evaluations – Defining new Data types – Algebraic data types – Pattern matching</td><td>15</td></tr>
<tr><td>II</td><td colspan="2">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.</td><td>15</td></tr>
<tr><td>III</td><td colspan="2">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.</td><td>15</td></tr>
<tr><td>IV</td><td colspan="2">File processing – Regular Expressions – Pattern matching – Writing Lazy Function – I/O case study – Find – Naïve finding system – Predicates</td><td>20</td></tr>
<tr><td>V</td><td colspan="2">Data Structures – Association Lists – maps – Monads – Monad type class using new monad – State Monad.</td><td>10</td></tr>
<tr><td>Reference</td><td colspan="3">Text Books:
1. Real World Haskell”,O Realliy,ISBN:0596514980 9780596514983
Reference Books:
1. "Real World Haskell", published by O'Reilly, First edition, released in Nov 2008.
2. "Programming in Haskell", Second Edition, Kindle Edition by Graham Hutton, ISBN-13: 978-1316626221 ISBN-10: 1316626229
3. "The Craft of Functional Programming", Third Edition by Simon Thompson.
Web References:
1. https://www.tutorialspoint.com/haskell
2. https://www.haskell.org.</td></tr>
<tr><td>Course</td><td colspan="3">On completion of the course, students should be able to</td></tr>
</table>

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** • 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	**Text Books:** 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) **Reference Books:** 1. Roger D. Peng, "**R programming for Data Science**", Leanopub, 2015 **Web References:** 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

Elective Course - 1 Principles of Computer Graphics Software Engineering XML and Web Services **Elective Course - 2** Multimedia and Animation Techniques Rapid Application Development Using Python UML Programming **NMEC- 1** Internet and Web Design BPO and Health Care Desktop Publishing **SKBC - 1** Image Editing and Manipulation **SKBC- 2** Image Editing Lab	**List of Elective Courses** 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 **NMEC - I** Internet and Web Design BPO and Health Care **NMEC – II** Office Automation Lab Image Editing Tools Lab **SKBC - 1** Data Analytics **SKBC- 2** Image Editing