

Thiagarajar College

(An Autonomous Institution Affiliated to Madurai Kamaraj University)
Re-Accredited with 'A' Grade by NAAC



Thirty Eighth Academic Council Meeting

Department of Computer Science

Dr. Rm. Murugappan
Dean – Curriculum Development

B.Sc., Computer Science

ProgrammeCode : UCS

THIAGARAJAR COLLEGE, MADURAI – 9.
(Re-Accredited with ‘A’ Grade by NAAC)
Curriculum structure for
B.Sc., CS, IT & BCA BBA & B.Com
(For those who joined in 2019 and after)

Category	Course	No.of Courses /paper	Credit Distribution	Hrs/ Week	Total Credits	
Part I	Tamil	2	3	-	06	
Part II	English	2	3	-	06	
		Sub Total				12
Part III	Core	-	-	-	84	
	Elective –Main	2	5	-	10	
	Elective – Generic	2+2	5	-	20	
		Sub Total				114
Part IV	AECC I &II Sem	I sem EVS II Sem .Prof.Skill Development	2	4	04	
	NME III & V Sem Horizontal Migration	2	2	8	08	
	SEC IV & VI Sem Vertical Migration	2				
	Value Education V Sem	1	1	2	01	
		Sub Total			14	13
	Total				139	
Part V	NCC (Army &Navy)/ PE/ NSS / Rotaract/ Quality Circle/ Library/ SSL/ Nature Club/Value Education/ YRC/WSC				01	
	Grand Total				140	
	Self-Study Paper (Optional)- -V Sem			05	145	

AECC – Ability Enhancement Compulsory Course

SEC – Skill Enhancement Course

NME – Non Major Elective

For Choice based credit system (CBCS)

- For NME every department offers two papers (one in each at III & V semester)
- For SEC every department offer three papers for each course (Sem IV & VI)
- For Major elective there may be an option for choice.

THIAGARAJAR COLLEGE, MADURAI – 9.**(Re-Accredited with ‘A’ Grade by NAAC)****Curriculum structure for****BA Tamil, English & Economics****B.Sc., Maths, Physics, Chemistry, Botany, Biotechnology Microbiology and Psychology****(For those who joined in 2019 and after)**

Category	Course	No.of Courses /paper	Credit Distribution	Hrs/ Week	Total Credits
Part I	Tamil	4	3	12+12	12
Part II	English	4	3	12+12	12
		Sub Total		48	24
Part III	Core			72 +12	72
	Elect –Main	2	5	10	10
	Elect – Generic	2+2	5	24	20
		Sub Total		118	102
Part IV	AECC I & II Sem	I sem EVS II Sem .Prof.Skill Development	2	4	04
	NME III & V Sem Horizontal Migration	2	2	8	08
	SEC IV & VI Sem Vertical Migration	2			
	Value Education V Sem	1	1	2	1
		Sub Total		14	13
	Total				139
Part V	NCC (Army & Navy)/ PE/ NSS / Rotaract/ Quality/WSC Circle/ Library/ SSL/ Nature Club/Value Education/ YRC				1
	Grand Total				140
	Self-Study Paper (Optional)- -V Sem			05	145

AECC – Ability Enhancement Compulsory Course

SEC – Skill Enhancement Course

NME – Non Major Elective

For Choice based credit system (CBCS)

- For NME every department offers two papers (one in each at III & V semester)
- For SEC every department offer three papers for each course (Sem IV & VI)
- For Major elective there may be an option for choice.

Programme outcome-PO (Aligned with Graduate Attributes)- Bachelor of Science (B.Sc.)

Scientific Knowledge and Critical Thinking

Apply the knowledge of Life Science, Physical and Chemical Science, Mathematics, statistics, Computer science and humanities for the attainment of solutions to the problems that come across in our day-to-day life/activities.

Problem Solving

Identify and analyze the problem and formulate solutions for problems using the principles of mathematics, natural sciences with appropriate consideration for the public health, safety and environmental considerations.,

Communication and Computer Literacy

Communicate the fundamental and advanced concepts of their discipline in written and oral form. Able to make appropriate and effective use of information and information technology relevant to their discipline

Life-Long Learning

Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Ethical, Social and Professional Understanding

Commitment to principles, codes of conduct and social responsibility in order to behave consistently with personal respect. Acquire the responsibility to contribute for the personal development and for the development of the community. Respect the ethical values, social responsibilities and diversity.

Innovative, Leadership and Entrepreneur Skill Development

Function as an individual, and as a member or leader in diverse teams and in multidisciplinary settings. Become an entrepreneur by acquiring technical, communicative, problem solving, intellectual skills.

THIAGARAJAR COLLEGE, MADURAI – 9.
(Re-Accredited with ‘A’ Grade by NAAC)
DEPARTMENT OF COMPUTER SCIENCE

Vision:

- ❖ To be frontier in educating Computer Science and to produce globally competent graduates with moral values committed to build a vibrant nation.

Mission:

- To strengthen the core competence in Computer Science through analytical learning.
- To produce successful graduates with personal and professional responsibilities and commitment to lifelong learning.
- To uplift innovative research in computer science to serve the needs of industry, government and society.

Programme Educational Objective (PEO):

Graduates will be able to

PEO1	Be employed successfully or continue their professional education.
PEO2	Apply knowledge of computing, mathematics and basic sciences that are relevant and appropriate to the domain.
PEO3	Use and develop skills as required for effective professional practices
PEO4	Remain abreast in their profession and be leaders in our technologically vibrant society.
PEO5	Lead a successful technical or professional career including supportive and leadership roles on multidisciplinary teams.

Programme Specific Outcome (PSO):-B.Sc., Computer Science

On the successful completion of B.Sc., Computer Science the students will

PSO1	Develop the knowledge on principles of hardware and software aspects of computing systems.
PSO2	Build up programming efficiency by designing algorithms and applying standard practices in software project development.
PSO3	Apply knowledge on software development tools, software systems and open source platforms.
PSO4	Perceive technical, practical and communicative skills among the students to face the industrial needs.
PSO5	Create awareness on the current issues, latest trends in technological development and thereby innovate new ideas and solutions to existing problems.

THIAGARAJAR COLLEGE:: (AUTONOMOUS):: MADURAI – 09
DEPARTMENT OF COMPUTER SCIENCE
(For those who joined in 2019 and after)

I SEMESTER								
Course	Code No.	Title of the paper	Hrs /wk.	Crds.	Total Hrs.	Marks		
						CIA	SE	TOT
Part 1	U19TM11	Tamil	3	3	45	25	75	100
Part 2	U19EN12	English	3	3	45	25	75	100
EVS	U19ES11	Environmental Studies	2	2	30	15	35	50
Core 1	UCS19C11	Digital Principles & Applications	5	4	75	25	75	100
Core 2	UCS19C12	Programming in C	5	4	75	25	75	100
Allied I	UMA19GE11	Mathematical Foundation for Computer Science	6	4	90	25	75	100
Core Lab1	UCS19CL11	C – Lab	6	3	45	40	60	100
Total			30	23				650
II SEMESTER								
Course	Code No.	Title of the paper	Hrs /wk.	Crds.	Total Hrs.	Marks		
						CIA	SE	TOT
Part 1	U19TM11	Tamil	3	3	45	25	75	100
Part 2	U19EN12	English	3	3	45	25	75	100
AECC	UCS19AE1	English Writing	2	2	30	15	35	50
Core 3	UCS19C21	Object Oriented Programming with C++	5	4	75	25	75	100
Core 4	UCS19C22	Web Designing	4	4	60	25	75	100
Allied II	UMA19GE21CS	Statistics	5	4	75	25	75	100
Core Lab2	UCS19CL21	C++ Lab	4	2	60	40	60	100
Core Lab3	UCS19CL22	Web Designing Lab	4	2	60	40	60	100
Total			30	24				

III SEMESTER								
Course	Code No.	Title of the paper	Hrs /wk.	Crd.	Total Hrs.	Marks		
						CIA	SE	TOT
Core 5	UCS19C31	Fundamentals of Data structure	4	4	60	25	75	100
Core 6	UCS19C32	System Software	5	4	75	25	75	100
Core 7	UCS19C33	Database Management System	4	4	60	25	75	100
Allied III	UMA19GE31CS	Computational Methods	5	4	75	25	75	100
NME	UCS19NE31	Software Development	2	2	30	15	35	50
Core Lab4	UCS19CL31	Data Structure Lab	5	2	75	40	60	100
Core Lab5	UCS19CL32	Database Management Lab	5	2	75	40	60	100
Total			30	22				

IV SEMESTER								
Course	Code No.	Title of the paper	Hrs /wk.	Crd.	Total Hrs.	Marks		
						CIA	SE	TOT
Core 8	UCS19C41	Java Programming	4	4	60	25	75	100
Core 9	UCS19C42	Computer Architecture	4	4	60	25	75	100
Core 10	UCS19C43	Computer Graphics	5	4	75	25	75	100
Allied IV	UMA19GE41CS	Operations Research	5	4	75	25	75	100
SEC – I	UCS19SE41	*Skill Enhanced Electives	2	2	30	15	35	50
Core Lab6	UCS19CL41	Java Programming Lab	5	2	75	40	60	100
Core Lab7	UCS19CL42	Graphics Lab	5	2	75	40	60	100
Total			30	24				

V SEMESTER								
Course	Code No.	Title of the paper	Hrs /wk.	Crd.	Total Hrs.	Marks		
						CIA	SE	TOT
Core 11	UCS19C51	Automata Theory	5	5	75	25	75	100
Core 12	UCS19C52	Software Engineering	5	5	75	25	75	100
Core 13	UCS19C53	Python Programming	5	5	75	25	75	100
Elective – I	UCS19CE51	Core Elective - I	5	4	75	25	75	100
NME	UCS19NE51	Internet Applications	2	2	30	15	35	50
VE	U19VE51	Value Education	2	1	30	15	35	50
Core Lab8	UCS19CL51	Python Programming Lab	6	2	90	40	60	100
Total			27	23				
VI SEMESTER								
Course	Code No.	Title of the paper	Hrs /wk.	Crd.	Total Hrs.	Marks		
						CIA	SE	TOT
Core 14	UCS19C61	Data mining and Warehousing	5	4	75	25	75	100
Core 15	UCS19C62	Data Communication & Networking	5	4	75	25	75	100
Core 16	UCS19C63	Operating System	5	4	75	25	75	100
Core 17	UCS19C64	Cloud Computing	5	4	75	25	75	100
SEC – II	UCS19SE61	*Skill Enhanced Elective	2	2	30	15	35	50
Project	UCS19PJ61	Project	8	6	120	25	75	100
Total			30	24				

List of Electives

Core Electives

- Mobile Applications
- Project
- E-Commerce Technologies
- Artificial Intelligence
- Multimedia Technology

Skill Enhanced Electives

- PHP Programming
- Android Programming
- XML Programming
- Dot Net Programming
- Linux Programming
- PC Troubleshooting

THIAGARAJAR COLLEGE, MADURAI - 9.

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DEPARTMENT OF COMPUTER SCIENCE

(For those joined B.Sc. Computer Science on or after June 2019)

Course code	Course Title	Category	L	T	P	Credit
UCS19C11	Digital Principles and Applications	Core-1	4	1	-	4

L – Lecture

T – Tutorial

P – Practical

Year	Semester	Internal	External	Total
I	I	25	75	100

Preamble

The course enables the students to design Digital Circuits using simplified Boolean functions and to understand concepts of sequential circuits and combinational circuits.

Course Outcomes

On the completion of the course the student will be able to

#	Course Outcome	Knowledge Level (according to Bloom's Taxonomy)
CO1	Build simple logic circuits using Basic gates and Universal Logic gates.	K3
CO2	Analyze various data processing circuits.	K3
CO3	Illustrate the basic idea about number systems and to learn conversion from one number system to another number system.	K2
CO4	Explain characteristics of Clocks and Timing Circuits.	K2
CO5	Analyze various sequential circuits.	K2

K1-Knowledge

K2-Understand

K3-Apply

Mapping of COs with POs

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S				M
CO2	S				L
CO3	M			S	
CO4	S			M	
CO5	S				L

S-STRONG

M-MEDIUM

L-LOW

Blooms taxonomy

	CA		End of Semester
	First	Second	
<i>Knowledge-K1</i>	40%	40%	40%
<i>Understand-K2</i>	40%	40%	40%
<i>Apply-K3</i>	20%	20%	20%
Total Marks	52	52	140

Content

Unit-I (15 Hours)

Digital Logic (3 Hours)

Basic gates-NOT, OR, AND- Universal logic gates- NOR, NAND-AND, OR invert gates- Positive and negative logic.

Combinational logic circuits (12 Hours)

Boolean Laws and Theorems - Sum of Products method - Truth table to Karnaugh Map - Pairs, Quads, and Octets –Karnaugh simplifications - Don't care condition

-Product of sums method - product of sums simplification.

Unit-II (15 Hours)

Data Processing circuits

Multiplexers - Demultiplexers - 1 of 16 Decoder – BCD to decimal Decoders - Seven segment Decoders - Encoders - Exclusive OR gates - Parity Generators and Checkers- Magnitude Comparator.

Unit-III (15 Hours)

Number systems and codes (7 Hours)

Binary Number System- Binary to decimal conversion - Decimal to binary conversion - Octal numbers - Hexadecimal numbers - The ASCII code - The Excess-3 code - The Gray code.

Arithmetic circuits (8 Hours)

Binary Addition - Binary Subtraction - Unsigned Binary Numbers - sign magnitude Numbers - 2's complement Representation - 2's complement Arithmetic - Arithmetic Building Blocks - The Adder - subtracter.

Unit-IV (15 Hours)

Clocks and Timing circuits (5 Hours)

Schmitt trigger - 555 Timer-Astable - 555 Timer-Monostable.

Flip-Flops (10 Hours)

RS FLIP FLOPs - Gated FLIP-FLOPs - Edge-triggered RS FLIP-FLOPs - Edge-triggered D FLIP-FLOPs - Edge-triggered JK FLIP-FLOPs - FLIP-FLOP Timing.

Unit-V (15 Hours)

Registers (9 Hours)

Types of Registers - Serial-In - Serial-Out - Serial-In - Parallel- Out - Parallel-In- Serial-Out - Parallel-In -Parallel-Out.

Counters (6 Hours)

Asynchronous Counters - Decoding Gates - Synchronous Counter - Changing the Counter Modulus - Decade counters.

Text Book Albert Paul Malvino, Donald P. Leach, Gautamsaha, 5th reprinted 2013, Digital Principles and application, 7th edn, McGraw Hill Edition

Chapters

Unit-I : 2.1 to 2.4, 3.1 to 3.8

Unit-II : 4.1 to 4.9

Unit-III : 5.1 to 5.8, 6.1 to 6.8

Unit-IV : 7.3 to 7.5, 8.1 to 8.6

Unit-V : 9.1 to 9.5, 10.1 to 1

References:

1. M.Morris Mano, 2004, Digital Logic and computer design, Prentice - Hall of India.
2. Ronald J.Tocci, 2007, Digital System Principles and Application, Prentice - Hall of India.

Web Resources

1. https://www.tutorialspoint.com/digital_circuits/
2. https://www.electronics-tutorials.ws/sequential/seq_5.html
3. <https://soaneemrana.org/onewebmedia/DIGITAL%20PRINCIPLES%20AND%20APPLICATION%20BY%20LEACH%20&%20MALVINO.pdf>

Course designer: Mrs. SM. Valli

Mr.M.Muthalagu

Ms.R.Sindhu

Lecture Schedule

	Topic	No of lecture hrs.
UNIT 1	Digital Logic & Combinational Logic Circuits	15 Hours
	2.1 Basic gates – NOT, OR ,AND	1
	2.2 Universal logic gates - NOR, NAND	1
	2.3 AND, OR invert gates & 2.4 Positive and negative logic.	1
	3.1 Boolean Laws and Theorems	2
	3.2 Sum of Products method	1
	3.3 Truth table to Karnaugh Map	1
	3.4 Pairs, Quads, and Octets	2
	3.5 Karnaugh simplifications	2
	3.6 Don't care condition	1
	3.7 Product of sums method	2
3.8 product of sums simplification	1	
UNIT 2	Data Processing Circuits	15 Hours
	4.1 Multiplexers	2
	4.2 Demultiplexers	2
	4.3 1 of 16 Decoder	2
	4.4 BCD to decimal Decoders	2
	4.5 Seven segment decoders	2
	4.6 Encoders	1
	4.7 Exclusive OR gates	1
	4.8 Parity Generators and checkers	2
4.9 Magnitude Comparator	1	
UNIT 3	Number Systems and codes& Arithmetic Circuits	15 Hours
	5.1 Binary Number System	1
	5.2 Binary to decimal conversion	1
	5.3 Decimal to binary conversion	1
	5.4 Octal number	1

	5.5 Hexadecimal numbers	1
	5.6 The ASCII code	1
	5.7 The Excess – 3 code & 5.8 The Gray code	1
	6.1 Binary Addition	1
	6.2 Binary Subtraction	1
	6.3 Unsigned Binary Numbers	1
	6.4 sign magnitude Numbers	1
	6.5 2's Complement Representation	1
	6.6 2's Complement Arithmetic	1
	6.7 Arithmetic Building Blocks	1
	6.8 The Adder – Subtractor.	1
	Clocks and Timing Circuits & Flip-Flops	15 Hours
UNIT 4	7.3 Schmitt trigger	1
	7.4 555 timer – Astable	2
	7.5 555 Timer – Monostable	2
	8.1 RS FLIP FLOPs	1
	8.2 Gated FLIP – FLOPs	2
	8.3 Edge – triggered RS FLIP – FLOPs	2
	8.4 Edge – triggered D FLIP – FLOPs	2
8.5 Edge – Triggered JK FLIP – Flops	2	
	8.6 FLIP – FLOP Timing.	1
	Registers & Counters	15 Hours
UNIT 5	9.1 Types of registers	1
	9.2 Serial – in – Serial – out	2
	9.3 Serial – in – Parallel – out	2
	9.4 Parallel – in – Serial – out	2
	9.5 Parallel – in - Parallel – out	2
	10.1 Asynchronous counters	1
	10.2 Decoding Gates	1
	10.3 Synchronous Counter	1
	10.4 Changing the Counter Modulus	2
	10.5 Decade counters.	1

THIAGARAJAR COLLEGE, MADURAI - 9.

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DEPARTMENT OF COMPUTER SCIENCE

(For those joined B.Sc. Computer Science on or after June 2019)

Course code	Course Title	Category	L	T	P	Credit
UCS19C12	Programming in C	Core-2	4	1	-	4

L – Lecture T – Tutorial P – Practical

Year	Semester	Internal	External	Total
I	I	25	75	100

Preamble

This course is designed to introduce the power of three decade old programming language and rendering basic programming concepts and leads to learn other language with ease and promotes to be a successful program developer to meet IT needs.

Course Outcomes

On the completion of the course the student will be able to

#	Course Outcome	Knowledge Level (according to Bloom's Taxonomy)
CO1	Illustrate the procedural paradigm with tokens, variables, operations and I/O functions.	K2
CO2	Demonstrate the concept of control statements.	K2,K3
CO3	Know the concept of array and strings.	K1,K3
CO4	Reveal the concept of functions and structures.	K2
CO5	Know the importance of pointers and file.	K2

K1-Knowledge

K2-Understand

K3-Apply

Mapping of COs with POs

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S				
CO2		M	L		
CO3	M				
CO4	M		M	S	
CO5	M	M	M	S	M

S-STRONG

M-MEDIUM

L-LOW

Blooms taxonomy

	CA		End of Semester
	First	Second	
<i>Knowledge-K1</i>	40%	40%	40%
<i>Understand-K2</i>	40%	40%	40%
<i>Apply-K3</i>	20%	20%	20%
Total Marks	52	52	140

Content

Unit-I: Overview of C and Data types: 28 Hours

History of C – Importance of C – Character set – C tokens – Keywords and identifiers – Constants – Variables – Data types – Declaration of variables – Declaring constants - Defining symbolic constants – Operators – Input and output statements

Unit-II: Decision Making and Branching statements: 20 Hours

Introduction – Simple if – Else...if – Nested if – Ladder if – Switch statement – Conditional operators – Goto statements – While statement – Do...While statement – For statement

Unit-III: Arrays and String :6 Hours

Introduction – One dimensional array – Multi dimensional array – Declaring and initializing string variables – Reading and writing strings.

Unit-IV: Function and Structure: 14 Hours

Introduction to functions – User defined function – Function declaration - Definition of function – Function calls — Categories of function– Function arguments – Recursion – String handling functions.

Introduction to structure – Declaring and defining a structure – Structure members – Arrays of structure – Structure and function.

Unit-V: Pointers and File : 6 Hours

Introduction to Pointers – Understanding pointers – Declaring and initializing of pointer variables

Introduction to file – Opening a file – Closing a file – Input/output operations in file.

Text book

E.Balagurusamy, 2012, Programming in ANSI C, 6thedn, McGraw Hill Publishing Company Ltd, New York.

Chapters (Relevant Topics Only)

Unit -I	: 1.1, 1.2, 2.1 to 2.8, 2.11, 2.12, 3.1 to 3.8, and 4.1 to 4.3
Unit –II	: 5.1 to 5.9, 6.1 to 6.4
Unit –III	: 7.1 to 7.7, 8.1 to 8.4
Unit –IV	: 9.1, 9.2, 9.5, 9.7, 9.8, 9.10, 9.16, 10.1 to 10.4, 10.8, 10.11
Unit –V	: 11.1 to 11.5, 12.1 to 12.4

Reference

1. Byron Gottfried, 2005, Programming C, 28th reprint, Tata McGraw Hill Publishing Company Ltd, New York.
2. Stephen G.Kochen, 2005, Programming C, 3rdedn, Pearson Education, Inc., London.
3. Brian W. Kernighan, Dennis M.Ritchie, 1989, “The C Programming Language”, Prentice Hall of India Pvt. ltd., New Delhi.

Web Resources

<https://www.tutorialspoint.com/cprogramming/>

<https://www.programiz.com/c-programming/>

<https://www.geeksforgeeks.org/c-language-set-1-introduction/>

Course designer

Dr.K.Natarajan,

Mrs.J.Uma,

Mr.R.Chandrasekar

Lecture Schedule

	Topic	No of lecture hrs.
	Overview of C and Data types	28 Hours
UNIT 1	1.1 History of C	2
	1.2 Importance of C	2
	2.2 Character set	2
	2.3 C tokens	2
	2.4 Keywords and identifiers	2
	2.5 Constants	2
	2.6 Variables	2
	2.7 Data types	2
	2.8 Declaration of variables	2
	2.12 Declaring constants	2
	2.11 Defining symbolic constants	2
	3.1- 3.8 Operators	2
	4.1- 4.3 Input and output statements	4
		Decision Making and Branching statements
UNIT 2	5.1 Introduction	1
	5.3 Simple if	2
	5.4 Else...if	2
	5.5 Nested if	2
	5.6 Ladder if	2
	5.7 Switch statement	2
	5.8 Conditional operators	2
	5.9 Goto statements	1
	6.2 While statement	2
	6.3 Do..While statement	2
	6.4 For statement	2
		Arrays and String
UNIT 3	7.1 Introduction	1
	7.2 One dimensional array	1
	7.3 Two dimensional array	1
	8.2 Declaring and initializing string variables	1
	8.3, 8.4 Reading and writing strings.	2
	Function and Structure	14 Hours
UNIT 4	9.1 Introduction to functions	1
	9.2 User defined function	1
	9.5 Definition of function	1
	9.7 Function calls	1
	9.8 Function declaration	1

	9.9 Categories of function	1
	9.10 Function arguments	1
	9.16 Recursion	1
	8.8 String handling functions	1
	10.1 Introduction to structure	1
	10.2 Declaring and defining a structure	1
	10.4 Structure members	1
	10.8 Arrays of structure	1
	10.11 Structure and function	1
	Pointers and File	6 Hours
UNIT 5	11.1 Introduction to Pointers	1
	11.2 Understanding pointers	1
	11.5 Declaring and initializing of pointer variables	1
	12.1 Introduction to file	1
	12.2 Opening a file	1
	12.3 Closing a file	
	12.4 Input/output operations in file	2

THIAGARAJAR COLLEGE, MADURAI - 9.
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DEPARTMENT OF COMPUTER SCIENCE
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Course code	Course Title	Category	L	T	P	Credit
UCS19CL11	C Lab	Core Lab-1	-	-	6	3

L – Lecture T – Tutorial P – Practical

Year	Semester	Internal	External	Total
I	I	40	60	100

Preamble

This lab course is designed to understand the power of three decade old programming language concepts and features and leads to learn other language with ease and promotes to survive in IT field

Course Outcomes

On the completion of the course the student will be able to

#	Course Outcome	Knowledge Level (according to Bloom's Taxonomy)
CO1	Outline the logic using flowchart for a given problem and develop programs using conditional and looping statements	K3
CO2	Develop programs with implementation of arrays, functions and parameter passing techniques.	K1,K2
CO3	Develop programs with string handling functions	K2,K3
CO4	Construct programs with Structure and Union features.	K2,K3
CO5	Gain skills to write file programs and perform various operations on files.	K3

K1-Knowledge

K2-Understand

K3-Apply

Mapping of COs with POs

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M				
CO2		M			
CO3		M			
CO4		M		M	
CO5		M		M	

S-STRONG

M-MEDIUM

L-LOW

Content

Simple programs:

1. Simple interest
2. Find the biggest from two numbers -ordinary /switch case/conditional operator methods
3. Find the biggest from three given numbers
4. Check a given no is odd or even –ordinary/switch case/conditional operator methods
5. Prime no checking
6. Print all prime numbers between any two given limit
7. Check a given character is vowels or not?
8. Perform various arithmetic operations using switch case
9. Find the sum of digits of a given no
10. Binary to decimal- Decimal to binary conversion

Arrays:

1. Arrange “n” numbers in ascending or descending order
2. Arrange “n” strings in alphabetical order
3. Palindrome checking
4. Matrix addition/ subtraction/multiplication

Function and structure:

1. Calculate the factorial value by recursion
2. Reverse a string by recursion
3. Mark list processing- Structure and call by value technique
4. Mark list processing - Structure and call by reference technique
5. EB bill calculation - Structure and call by value technique
6. EB bill calculation - Structure and call by reference technique

Files:

1. Create a data file to store „n” numbers and separate odd and even numbers
2. Create a data file to store „n” characters and separate vowel and non-vowels.

Web Resources

<https://www.tutorialspoint.com/cprogramming/>

<https://www.programiz.com/c-programming>

<https://www.geeksforgeeks.org/c-language-set-1-introduction/>

Course designer:

Dr.K.Natarajan

Mrs.J.Uma

Mr.R.Chandrasekar

THIAGARAJAR COLLEGE, MADURAI - 9.
 (Re-Accredited with 'A' Grade by NAAC)
DEPARTMENT OF COMPUTER SCIENCE
 (For those joined B.Sc. Computer Science on or after June 2019)

Course code	Course Title	Category	L	T	P	Credit
UCS19AE1	English Writing	Skilled Elective	2	-	-	2

L – Lecture T – Tutorial P – Practical

Year	Semester	Internal	External	Total
I	II	15	35	50

Preamble

On the Successful Completion of this course, the student will learn

- to Build Vocabulary
- to improve their Writing Skill

Course Outcomes

On the completion of the course the student will be able to

#	Course Outcome	Knowledge Level (according to Bloom's Taxonomy)
CO1	Know the synonyms, antonyms of vocabularies and making sentences.	K1
CO2	Designed to increase the student's ability to construct written prose of various kinds.	K2, K3
CO3	Demonstrate to write various letters in a formal and informal formats	K1, K2
CO4	Develop paragraph writing and essay writing	K2, K3

K1-Knowledge

K2-Understand

K3-Apply

Mapping of COs with POs

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	-	-	-	S	-
CO2	-	-	-	M	-
CO3	-	-	-	S	-
CO4	-	-	-	M	-

Blooms taxonomy

	CA		End of Semester
	First	Second	
<i>Knowledge-K1</i>	40%	40%	40%
<i>Understand-K2</i>	40%	40%	40%
<i>Apply-K3</i>	20%	20%	20%
Total Marks	52	52	140

Content

Unit-I : 15 Hours

Synonyms – Antonyms – Spelling Rules – Words often misspelt – Words often confused or misspelt – Sentence Completion – Reconstructing Passages.

Unit-II: 15 Hours

Reading Comprehensions – Letter Writing – Professional Letters – Writing Curriculum Vitae – Paragraph Writing– Essay Writing.

Chapter – 12 Pg. No – 321 to 351
Chapter – 11 Pg. No – 301 to 320
Chapter – 4 Pg. No – 120 to 131
Chapter – 5 Pg. No – 132 to 140
Chapter – 7 Pg. No – 182 to 198
Chapter – 9 Pg. No – 277 to 295
Chapter – 8 Pg. No – 237 to 276

Text Books:

Bhatnagar. R. P., and Rajul Bhargava. English for Competitive Examinations. Macmillan, New Delhi. 1999 Print.

Course Designers:

Ms.M.Yogeswari

Lecture Schedule:

	Topic	No of lecture hrs.
	Unit I	15 Hrs
Unit I	Synonyms – Antonyms	4
	Spelling Rules – Words often misspelt	4
	Words often confused or misspelt	3
	Sentence Completion – Reconstructing Passages	4
	Unit II	15 Hrs
Unit II	Reading Comprehensions	3
	Letter Writing – Professional Letters	4
	Writing Curriculum Vitae	3
	Paragraph Writing– Essay Writing.	5

THIAGARAJAR COLLEGE, MADURAI - 9.
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DEPARTMENT OF COMPUTER SCIENCE
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Course code	Course Title	Category	L	T	P	Credit
UCS19C21	Object Oriented Programming with C++	Core 3	4	1	-	4

L – Lecture T – Tutorial P – Practical

Year	Semester	Internal	External	Total
I	II	25	75	100

Preamble

This course provides the basic concepts and techniques of object oriented programming and trains the students to develop skills in writing object oriented programming.

Course Outcomes

On the completion of the course the student will be able to

#	Course Outcome	Knowledge Level (according to Bloom's Taxonomy)
CO1	Describe the procedural and object oriented paradigm with concepts of streams, classes, function, data and objects.	K1
CO2	Apply dynamic memory management techniques using pointers, constructors and destructors.	K3
CO3	Describe the concept of function overloading operator overloading, virtual functions and polymorphism.	K1
CO4	Classify inheritance with understanding of early late binding, usage of exception handling,	K2
CO5	Demonstrate the use of various OOPs concepts with the help of programs	K2

K1- Knowledge

K2- Understand

K3- Apply

Mapping of COs with POs

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S			M
CO2		S	M		
CO3		S			
CO4		S			
CO5	M	S	M	S	M

S-STRONG

M-MEDIUM

L-LOW

Blooms taxonomy

	CA		End of
	First	Second	Semester
<i>Knowledge-K1</i>	40%	40%	40%
<i>Understand-K2</i>	40%	40%	40%
<i>Apply-K3</i>	20%	20%	20%
Total Marks	52	52	140

Content

Unit-I :12 Hours

Principles of Object Oriented Programming(OOP): Procedure oriented programming - OOP Paradigm - Basic concepts of OOP - Benefits of OOP - Object Oriented Languages - Applications of OOP.

Beginning with C++: Simple C++ program - An example with Class - Structure of C++ program.

Unit-II: 12 Hours

Introduction to C++: Tokens, Keywords, Identifiers, Variables, Operators, Manipulators, Expressions and Control Structures in C++.

Function in C++ - Main function - Function Prototyping - Call by reference - Return by reference - Inline functions - Default arguments - Function Overloading.

Unit-III 17 Hours

Classes and Objects: Specifying a class- member functions- Memory allocation of objects- Static data members- Static member functions- Objects as function arguments-Friendly functions- Pointers to members.Constructors and Destructors - Operator overloading and type conversions.

Unit-IV: 12 Hours

Inheritance: Single Inheritance - Multilevel Inheritance - Multiple Inheritance Hierarchical Inheritance - Hybrid Inheritance. **Polymorphism:** Pointers to Objects - Virtual functions.

Unit-V 10 Hours

Working with files: Classes for file stream operations - Opening and closing a file- End-of-file detection - File pointers - Error handling during file operations - Command line arguments.

Text Book

E. Balagurusamy, 2013, Object Oriented Programming with C++, 6th edn, McGraw Hill Education, New Delhi

Chapters:

Unit – I: Chapters 1, 2
Unit - II : Chapters 3, 4
Unit – III : Chapters 5, 6.1-6.5, 6.7, 6.11, 7
Unit - IV : Chapters 8, 9.3 to 9.7
Unit – V : Chapters 11.1 to 11.7,11.9,11.10

Reference Book

Herbert Schildt,2003, The Complete Reference C++, 4th edn, Tata McGraw Hill, New Delhi.

Web Resources:

<https://www.learncpp.com/>

<https://hackr.io/tutorials/learn-c-plus-plus>
<https://www.programiz.com/cpp-programming/examples>

Course designers

Dr.U.Jeyasutharsan Mrs.J.Uma Mrs.K.SuriyaPrabha

Lecture Schedule

Unit	Chapter	Topic	No. of Lecture hrs
I	1.	Principles of Object Oriented Programming(OOP)	12
	1.1	Procedure oriented programming	1
	1.2	OOP Paradigm	1
	1.3	Basic concepts of OOP	1
	1.4	Benefits of OOP	1
	1.5	Object Oriented Languages	1
	1.6	Applications of OOP.	2
	2	Beginning with C++	5
	2.1	Simple C++ program	1
	2.2	An example with Class -	2
2.3	Structure of C++program.	2	
II	3.	Introduction to C++:	12
	3.1	Tokens, Keywords, Identifiers, Variables, Operators, Manipulators, Expressions and Control Structures in C++.	6
	3.2	Function in C++ Main function - Function Prototyping - Call by reference - Return by reference - Inline functions - Default arguments - Function Overloading	6
III	4.	Classes and Objects:	17
	3.1	Specifying a class- member functions- Memory allocation of objects- Static data members- Static member functions- Objects as function arguments-Friendly functions- Pointers to members.	7
	3.2	Constructors and Destructors Constructors Destructors and operator overloading and type conversions	10
IV	4.	Inheritance:	12
	4.1	Single Inheritance - Multilevel Inheritance - Multiple Inheritance Hierarchical Inheritance - Hybrid Inheritance	6
	4.2	Polymorphism:. Pointers to Objects - Virtual functions	6
V	5.	Working with files:	14
	5.1	Classes for file stream operations - Opening and closing a file- End-of-file detection - File pointers - Error handling during file operations - Command line arguments.	
Total(12+12+17+12+14)			60

THIAGARAJAR COLLEGE, MADURAI - 9.
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DEPARTMENT OF COMPUTER SCIENCE
 (For those joined B.Sc. Computer Science on or after June 2019)

Course Code	Course Title	Category	L	T	P	Credit
UCS19C22	Web Designing	Core 4	4	-	-	4
			L - Lecture	T - Tutorial	P-Practicals	
Year	Semester	Internal	External	Total		
I	II	25	75	100		

Preamble

This course is designed to be familiar with the roles, methodologies, and best practices of designing and developing modern websites. Students will take part in the entire production cycle of websites from information gathering to designing layout to development utilizing HTML, CSS, and JavaScript web applications.

Course Outcomes

On the completion of the course the student will be able to

Course Outcomes	Course Outcome	Knowledge Level (according to Bloom's Taxonomy)
CO1	Demonstrate page layout, color schemes, contrast, and typography in the designs.	K2, K1
CO2	Write valid and concise code for webpage.	K3
CO3	Demonstrate knowledge of artistic and design components that are used in the creation of a web site.	K2, K1
CO4	Design dynamic websites that meet specified needs and interests.	K3, K2
CO5	Select appropriate HTML, CSS, and JavaScript code from public repositories that enhances the experience of web application design.	K3

K1 - Knowledge

K2 - Understand

K3 – Apply

Mapping of COs with POs

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M			
CO2		S	M		
CO3		S	M		
CO4	S		M	L	
CO5			S	M	L

S-STRONG

M-MEDIUM

L-LOW

Blooms taxonomy

	CA		End of Semester
	First	Second	
<i>Knowledge-K1</i>	40%	40%	40%
<i>Understand-K2</i>	40%	40%	40%
<i>Apply-K3</i>	20%	20%	20%
Total Marks	52	52	140

Content

UNIT I :(15 Hours)

Introduction to Computers and the Internet : Introduction - Evolution of the Internet and World Wide Web - Web Basics-Multitier Application Architecture - Client-Side Scripting versus Server - Side Scripting - World Wide Web Consortium (W3C) - Web 2.0: Going Social - Data Hierarchy - Operating Systems - Types of Programming Languages - Object Technology - Keeping Up - to - Date with Information Technologies.

Introduction to HTML5: Introduction - Editing HTML5 - First HTML5 Example - W3C HTML5 Validation Service - Headings-Linkingppt – Images - Special Characters and Horizontal Rules-Lists - Tables – interactiveForms-Internal Linking - meta Elements - HTML5 Form input Types - input and data list Elements and autocomplete Attribute smart play-Page-Structure Elements.

UNIT II: (15 Hours)

Introduction to Cascading Style Sheets: Introduction-Inline Styles-Embedded StyleSheets-Conflicting Styles-Linking External Style Sheets-Positioning Elements: Absolute Positioning,ppt z-index-Positioning Elements: Relative Positioning, span-Backgrounds-Element Dimensions-Box Model and Text Flow-Media Types and Media Queries-Drop-Down Menus-(Optional) User Style Sheets ppt- Text Shadows-Rounded Corners -Color-Box Shadows -Linear Gradients; Introducing Vendor Prefixes-Radial Gradients-(Optional: WebKit Only) tutorialText Stroke-Multiple Background Images-(Optional: WebKit Only) Reflections-Image Borders-Animation; Selectors-Transitions and Transformations-tutorialDownloading Web Fonts and 7 the @font-face Rule-Flexible Box Layout Module and :nth-child Selectors-Multicolumn Layout-Media Queries.

JavaScript: Introduction to Scripting: Introduction-Your First Script: Displaying aLine of Text with JavaScript in a Web Page-Modifying Your First Script-Obtaining User Input with prompt Dialogs-Memory Concepts-Arithmetic-Decision Making: Equality and Relational Operators.

UNIT III: (15 Hours)

JavaScript: Control Statements: Introduction-Algorithms-Pseudocode-ControlStatements-if Selection Statement-if...else Selection Statement-while Repetition Statement-pptFormulating Algorithms: Counter-Controlled Repetition-Formulating Algorithms: Sentinel-Controlled Repetition-Formulating Algorithms: Nested Control Statements-Assignment Operators-Increment and Decrement Operators - Essentials of Counter-Controlled Repetition-for Repetition Statement-Examples tutorial Using the for Statement-switch Multiple-Selection Statement-do...while Repetition Statement-break and continue Statements-Logical Operators interactive – Functions.

UNIT IV: (15 Hours)

Arrays: Introduction-Arrays-Declaring and Allocating Arrays-Examples UsingArrays-Random Image Generator Using Arrays-References and Reference Parameters-Passing Arrays to Functions-Sorting Arrays with Array Method sort-Searching Arrays with Array Method index Of-Multidimensional Arraysppt 4

Objects :Introduction-Math Object-String Object-Date Object-Boolean and NumberObjects-document Object-Favorite Twitter Searches: HTML5 Web Storage-Using JSON to Represent Objects

Document Object Model (DOM): Objects and Collections: Introduction-Modelinga Document: DOM Nodes and Trees-Traversing and Modifying a DOM Tree-DOM Collections-Dynamic Styles-Using a Timer and Dynamic Styles to Create Animated Effects 4

UNIT V: (15 Hours)

JavaScript Event Handling: A Deeper Look: Introduction-Reviewing the loadEvent-Event mousemove and the event Object-Rollovers with mouseover and mouseout-Form Processing with focus and blur-More Form Processing with submit and reset-Event Bubbling-More Events 4 interactive

HTML5: Introduction to canvas:Introduction-canvas Coordinate System-Rectangles-Using Paths to Draw Lines-Drawing Arcs and Circles-Shadows-Quadratic Curves-Bezier Curves-Linear Gradients-Radial Gradients-Images-Image interactiveManipulation:Processing the Individual Pixels of a canvas-Patterns-Transformations-Text-Resizing the canvas to Fill the Browser Window-Alpha Transparency-Compositing-Cannon Game-save and restore Methods-A Note on SVG-A Note on canvas 3D

Text Book

Paul J.Deitel - Harvey M.Deitel - Abbey Deitel, 2012, Internet and World wide web How to Program, 5thedn, Prentice Hall, New Delhi

Chapters

Unit	Chapters / Sections
I	1, 2, 3
II	4, 5, 6
III	7, 8, 9
IV	10, 11, 12
V	13, 14

Reference Book

1. N.P.Gopalan and J.Akilandeswari,2010, Web Technology A Developer's – Perspective,4thedn, PHI Learning Pvt.Lt, New Delhi
2. Robin Nixon, 2012, Learning PHP, MySQL, Javascript and CSS , A step by step Guideto creating Dynamic Web Sites,2ndedn, O'Reilly Media, New Delhi
3. FaitheWempen, 2011, HTML5 Step by Step, Microsoft Press

Web Resources:

http://www.tutorialspoint.com/html5/http://www.w3schools.com/html/html5_intro.asp
<http://www.html-5-tutorial.com/>

Course designers

Mrs.A.M.Hema
Mr.J.Prakash
Mr.R.Chandrasekar

Lecture Schedule

UNIT	Topic	No of lecture hrs.
I	Introduction to computer and the internet:15hrs	
	1.1 Introduction	1
	1.2 Evolution of the Internet and World Wide Web	
	1.3 Web Basics	
	1.4 Multitier Application Architecture	
	1.5 Client-Side Scripting versus Server - Side Scripting	1
	1.6 World Wide Web Consortium (W3C)	
	1.7 Web 2.0: Going Social	2
	1.8 Data Hierarchy	
	1.9 Operating Systems	
	1.10 Types of Programming Languages	2
	1.11 Object Technology	
1.12 Keeping Up - to - Date with Information Technologies		

	Introduction to HTML5-Part-1:	
	2.1 Introduction	2
	2.2 Editing HTML5	
	2.3 First HTML5 Example	
	2.4 W3C HTML5 Validation Service	2
	2.5 Headings-2.6 Linking	
	2.7 Images	
	2.8 Special Characters and Horizontal Rules	1
	2.9 Lists	
	2.10 Tables	
	2.11 Forms	2
	2.12 Internal Linking	
	2.13 meta Elements	
	Introduction to HTML –Part-2	2
	3.2 HTML5 Form input Types	
	3.3 input and data list Elements and autocomplete Attribute	
	3.4 Page-Structure Elements	
II	4 Introduction to cascading style sheets Part-1 15hrs	
	4.1 Introduction	3
	4.2 Inline Styles	
	4.3 Embedded Style Sheets	
	4.4 Conflicting Styles	
	4.5 Linking External Style Sheets.	
4.6 Sheets Positioning Elements: Absolute Positioning, z-index-		
	4.7 Positioning Elements: Relative Positioning, span	2
	4.8 Backgrounds	
	4.9 Element Dimensions	
	4.10 Box Model and Text Flow	
	4.11 Media Types and Media Queries3	
	4.12 Drop-Down Menus	
	4.13 (Optional) User Style Sheets	
	5 Introduction to cascading style sheets Part-II	1
	5.1 Introduction	
	5.2 Text Shadows	
	5.3 Rounded Corners	
II	5.4 Color	1
	5.5 Box Shadows	
	5.6 Linear Gradients; Introducing Vendor Prefixes	
	5.7 Radial Gradients	
	5.8 (Optional: WebKit Only) Text Stroke	2
	5.9 Multiple Background Images	
	5.10 (Optional: WebKit Only) Reflections	
5.11 Image Borders		
	5.12 Animation: selectors	3
	5.13 Transitions and Transformations	
	5.14 Downloading Web Fonts and the @font-face Rule	
	5.15 Flexible Box Layout Module and: nth-child Selectors	
	5.16 Multicolumn Layout	
	5.17 Media Queries	

	6 Java Script: Introduction to scripting 6.1 Introduction 6.2 Your First Script: Displaying a Line of Text with JavaScript in a Web Page 6.3 Modifying Your First Script 6.4 Obtaining User Input with prompt Dialogs 6.5 Memory Concepts 6.6 Arithmetic 6.7 Decision Making: Equality and Relational Operators.	3
III	7 Java Script: Control Statements –I 15hrs 7.1 Introduction 7.2 Algorithms 7.3 Pseudo code 7.4 Control Statements 7.5 if Selection Statement 7.6 if...else Selection Statement 7.7 while Repetition Statement	4
	7.8 Formulating Algorithms: Counter-Controlled Repetition 7.9 Formulating Algorithms: Sentinel-Controlled Repetition 7.10 Formulating Algorithms: Nested Control Statements 7.11 Assignment Operators 7.12 Increment and Decrement Operators	4
	8 Java Script: Control Statements –II 8.1 Introduction 8.2 Essentials of Counter-Controlled Repetition 8.3 for Repetition Statement 8.4 Examples Using the for Statement 8.5 Switch Multiple-Selection Statement	4
	8.6 do...while Repetition Statement 8.7 break and continue Statements 8.8 Logical Operators 9.1 Functions	3
	10 Arrays 15 Hours 10.1 Arrays: 10.2 Introduction-Arrays 10.3 Declaring and Allocating Arrays 10.4 Examples Using Arrays 10.5 Random Image Generator Using Arrays	3
IV	10.6 References and Reference Parameters 10.7 Passing Arrays to Functions 10.8 Sorting Arrays with Array Method sort 10.9 Searching Arrays with Array Method index Of 10.10 Multidimensional Arrays	4
	11 Java script: Objects 11.1 Introduction 11.2 Math Object 11.3 String Object 11.4 Date Object 11.5 Boolean and Number Objects 11.6 document Object	4

	12 Document object model(DOM) object and collections: 12.1 Introduction 12.2 Modelling a Document: DOM Nodes and Trees 12.3 Traversing and Modifying a DOM Tree 12.4 DOM Collections 12.5 Dynamic Styles 12.6 Using a Timer and Dynamic Styles to Create Animated Effects	4
V	13 Java script Events Handling: Deeper Look 15hrs 13.1 Introduction 13.2 Reviewing the load Event 13.3 Event mouse move and the event Object 13.4 Rollovers with mouse over and mouse out	3
	13.5 Form Processing with focus and blur 13.6 More Form Processing with submit and reset 13.7 Event Bubbling 13.8 More Events	3
	14 HTML: Introduction to Canvas 14.1 Introduction 14.2 canvas Coordinate System 14.3 Rectangles 14.4 Using Paths to Draw Lines	3
	14.5 Drawing Arcs and Circles 14.6 Shadows 14.7 Quadratic Curves 14.8 Bezier Curves	3
	14.9 Linear Gradients 14.10 Radial Gradients 14.11 Images 14.12 Image Manipulation: Processing the Individual Pixels of a canvas	3

THIAGARAJAR COLLEGE, MADURAI - 9.
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DEPARTMENT OF COMPUTER SCIENCE
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Course code	Course Title	Category	L	T	P	Credit
UCS19CL21	C++ Lab	Core Lab 2	-	-	4	2

L – Lecture T – Tutorial P – Practical

Year	Semester	Internal	External	Total
I	II	40	60	100

Preamble

This course provides the basic concepts and techniques of object oriented programming and trains the students to gain skills in object based programs

Course Outcomes

On the completion of the course the student will be able to

#	Course Outcome	Knowledge Level (according to Bloom's Taxonomy)
CO1	Construct the procedural and object oriented paradigm with concepts of streams, classes, data and objects and familiarize with the language environment.	K2
CO2	Build programs with various function related concepts.	K3
CO3	Develop code on operator overloading and constructors.	K2, K3
CO4	Implement programs on inheritance categories and type conversions.	K2
CO5	Demonstrate the implementation of pointers, virtual functions and files concepts.	K2, K3

K1- Knowledge

K2- Understand

K3- Apply

Mapping of COs with POs

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M		
CO2	M	S	M		M
CO3		M	S		
CO4		M	L		M
CO5		L		M	M

S-STRONG

M-MEDIUM

L-LOW

Content

1. Arithmetic operations
2. Simple and compound interest
3. Default arguments
4. Reference variables
5. Nested functions
6. Function overloading

7. Static member function
8. Object as function argument - Add two times
9. Using friend function-swap
10. Function returning objects - Complex number addition
11. Multiple constructors in a class
12. Copy constructor
13. Unary operator overloading - member function
14. Unary operator overloading - friend function
15. Operator overloading - Complex no.addition
16. Operator overloading - Matrix addition
17. Operator overloading - Matrix multiplication
18. Constructors in derived classes
19. Class to basic conversion
20. Basic to class conversion
21. Class to class conversion
22. Single Inheritance - Private mode
23. Multilevel Inheritance
24. Multiple Inheritance
25. Hybrid inheritance
26. Virtual base class
27. Array of objects - Mark process, EB, Pay process
28. Pointer to objects
29. This pointer
30. Virtual functions
31. File creation

Web Resources

<https://www.learncpp.com/>

<https://hackr.io/tutorials/learn-c-plus-plus>

<https://www.programiz.com/cpp-programming/examples>

Course designer

Dr.U.Jeyasutharsan

Mrs.J.Uma

Mrs.K.SuriyaPrabha

THIAGARAJAR COLLEGE, MADURAI - 9.
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DEPARTMENT OF COMPUTER SCIENCE
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Course code	Course Title	Category	L	T	P	Credit
UCS19CL22	Web Designing Lab	Core lab - 3	-	-	3	2

L – Lecture T – Tutorial P – Practical

Year	Semester	Internal	External	Total
I	II	40	60	100

Preamble

This course is designed to introduce computer science students to the roles, methodologies, and best practices of designing and developing modern websites. Students will take part in the entire production cycle of websites from information gathering to designing layout to development utilizing HTML, CSS, and JavaScript web applications.

Course Outcomes

On the completion of the course the student will be able to

Course Outcomes	Course Outcome	Knowledge Level (according to Bloom's Taxonomy)
CO1	Construct the List tags and its attributes, Table tag and its attributes	K1, K2
CO2	Build programs with Form tag and its attributes, transition and transformation.	K1, K3
CO3	Develop code on CSS embedded style settings, colors and positioning elements.	K2
CO4	Experiment programs with box model and layout.	K3
CO5	Demonstrate the implementation of JavaScript array objects and JavaScript String objects.	K2,K3

K1 - Knowledge

K2 - Understand

K3 – Apply

Mapping of COs with POs

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S		M		
CO2		M	S		
CO3		M	L		
CO4	M		L		
CO5			S	M	

S-STRONG

M-MEDIUM

L-LOW

Content

1. Program to illustrate List tags and its attributes.
2. Program to illustrate Table tag and its attributes.
3. Program to illustrate Form tag and its attributes.
4. Program to illustrate transition and transformation.
5. Program to illustrate CSS embedded style settings.
6. Program to illustrate CSS colors and positioning elements.
7. Program to demonstrate box model and layout.
8. Program to illustrate JavaScript array objects.
9. Program to demonstrate JavaScript String objects.
10. Program to illustrate JavaScript functions using control flow statements.
11. Program to illustrate JavaScript event handling features.

Web Resources

http://www.tutorialspoint.com/html5/http://www.w3schools.com/html/html5_intro.asp
<http://www.html-5-tutorial.com/>

Course designer

Mrs.A.M.Hema
Mr.J.Prakash
Mr.R.Chandrasekar

THIAGARAJAR COLLEGE, MADURAI - 9.
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DEPARTMENT OF COMPUTER SCIENCE
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Course code	Course Title	Category	L	T	P	Credit
UCS19C31	Fundamentals of Data Structure	Core 5	4	-	-	4

L – Lecture T – Tutorial P – Practical

Year	Semester	Internal	External	Total
II	III	25	75	100

Preamble

The course elaborates on basic data structure concepts with different ways of organizing data and developing algorithms for various operations and applications on data structures.

Course Outcomes

On the completion of the course the student will be able to

#	Course Outcome	Knowledge Level (according to Bloom's Taxonomy)
CO1	Compare different algorithms and create efficient programs.	K1
CO2	Explain stack and queue data structure and their practical application.	K2
CO3	Application of link list real application like dynamic storage management.	K3
CO4	Applying tree structure in sets games and decision trees.	K3
CO5	Developing graphs to create network and roadmap structure to find the shortest paths.	K3

K1-Knowledge

K2-Understand

K3-Apply

Mapping of COs with POs

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	L	M	L	L	
CO2	L	M			
CO3		M		M	
CO4		M			M
CO5		M			S

S-STRONG

M-MEDIUM

L-LOW

Blooms taxonomy

	CA		End of Semester
	First	Second	
<i>Knowledge-K1</i>	40%	40%	40%
<i>Understand-K2</i>	40%	40%	40%
<i>Apply-K3</i>	20%	20%	20%
Total Marks	52	52	140

Content

Unit – 1 (14 Hours)

Introduction to Data Structure and SPARKS Language

Overview - SPARKS - Statements - Create programs - Analyze programs.

Array

Axiomatization - Ordered Lists - Sparse Matrices Representation of Arrays.

Unit – II (14 Hours)

Stacks and Queues

Fundamentals -Evaluation of Expressions - Multiple Stacks and Queues.

Linked Lists

Singly Linked lists - Linked Stacks and Queues - Storage pool - More on linked lists.

Unit –III (12 Hours)

Doubly Linked lists - Dynamic storage Management -Generalized lists.

String: A Case Study - Data Representations for String - Pattern Matching inString

Unit – IV (9 Hours)

Trees and Application

Basic Terminology - Binary Trees - Binary Tree Representation-Binary Tree

Traversal - More on Binary Trees - Threaded Binary Trees Applications Of Trees: Set representation - Decision Trees.

Unit – V (11 Hours)

Graphs and Application

Terminology and Representation: Introduction - Definitions and Terminology -

Graph representation - Traversals - Connected Components and Spanning Trees - Shortest Paths and Transitive Closure.

Text Book

Ellis Horowitz, SartajSahni, 2013, Fundamentals of Data Structures, 4thedn, Galgotia Book source

Chapters (Relevant Topics Only)

Unit – I :1,2

Unit – II :3.1,3.3,3.4,4.1,4.2,4.3,4.5

Unit-III : 4.8,4.9,4.11

Unit - IV : 5.1 to 5.6, 5.8.1, 5.8.2

Unit – V : 6.1 to 6.3

Reference

1. SartajSahni, 2000, Data Structures, Algorithms and Applications in C++, McGraw Hill International Edition
2. A.A.Puntambekar, 2009, Data Structures, Technical Publications Pune

Web Resources

- 1.file:///C:/Users/ADLAB/Downloads/Fundamentals%20Of%20Data%20Structures%20%20Ellis%20Horowitz%20_%20Sartaj%20Sahni.pdf
- 2.<https://www.slideshare.net/nirajju/fundamentals-of-data-structures-7794245>
- 3.<http://apachetechnology.in/ati/www/KC/dw/Horowitz%20Sahni%20-%20Data%20Structure.pdf>

Course designers

Dr.U.Jeyasutharsan
Mrs.S.NaseemaBegam
Ms.R.Sindhu

Lecture Schedule

	Topic	No of lecture hrs.
	UNIT I	14 Hrs
1.1	Introduction	2
1.2	Create programs	2
1.3	Analyze programs	2
1.4	Ordered lists	3
1.5	Sparse Matrices	3
1.6	Representation of Arrays	2
	UNIT II	14 Hrs
2.1	Stacks and queues	2
2.2	Evaluation of Experience	2
2.3	Multiple stacks and Queues	3
2.4	Single linked list	3
2.5	Linked stacks and Queues	2
2.6	Storage Pool	2
	UNIT III	12 Hrs
3.1	Doubly linked lists	3
3.2	Dynamic storage Management	3
3.3	Generalized lists	2
3.4	Strings	4
	UNIT IV	9 Hrs
4.1	Binary tree & representation	3
4.2	Binary tree Traversal	2
4.3	Threaded binary trees	2
4.4	Set representation and Decision trees	2
	UNIT V	11 Hrs
5.1	Graph -Terminology	2
5.2	Representation	2
5.3	Graph Traversal	2
5.4	Spanning trees	2
5.5	Shortest paths and transitive closure	3

THIAGARAJAR COLLEGE, MADURAI - 9.
 (Re-Accredited with 'A' Grade by NAAC)
DEPARTMENT OF COMPUTER SCIENCE
 (For those joined B.Sc. Computer Science on or after June 2019)

Course code	Course Title	Category	L	T	P	Credit
UCS19C32	System Software	Core 6	4	1	-	4

L – Lecture T – Tutorial P – Practical

Year	Semester	Internal	External	Total
II	III	25	75	100

Preamble

This course is designed to introduce other side of programming. The focus of the course is to understand the functionality of computing and how it makes computer alive. It helps to recognize how software tools helps in application development and usage and assists students to become system programmer.

Course Outcomes

On the completion of the course the student will be able to

#	Course Outcome	Knowledge Level (according to Bloom's Taxonomy)
CO1	Summarize assembler and its role.	K2
CO2	Know the need of Macros and the role of Macro Preprocessor	K1
CO3	Realize the importance of compilers, Interpreters and their strategies in translating source program	K1
CO4	Infer the role of linker in making binary program	K2
CO5	Summarize the role of software tools in program development and program usage.	K1,K2

K1-Knowledge

K2-Understand

K3-Apply

Mapping of COs with POs

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	M			
CO2	M	S			
CO3	M	M	L	M	
CO4	L	M	L		
CO5	L	L	M	M	M

S-STRONG

M-MEDIUM

L-LOW

Blooms taxonomy

	CA		End of Semester
	First	Second	
<i>Knowledge-K1</i>	40%	40%	40%
<i>Understand-K2</i>	40%	40%	40%
<i>Apply-K3</i>	20%	20%	20%
Total Marks	52	52	140

Content

UNIT - I Assemblers: 15 Hours

Elements of Assembly language - Pass structure of Assemblers - Design of a two pass Assembler.

UNIT - II Macros and Macro Processors: 15 Hours

Introduction - Macro Definition and Call - Macro Expansions - Nested Macro calls - Advanced Macro Facilities - Design of a Macro Preprocessors.

UNIT - III Compilers and Interpreters: 15 Hours

Introduction to Compiler - Semantic gap - Scope rules - Memory allocation - Compilation of Control structures - Code optimization - Interpreter

UNIT – IV Linkers: 15 Hours

Introduction to Linker - Relocation and linking concepts - Design of a linker - Self Relocating Program.

UNIT –V Software Tools: 15 Hours

Introduction - Software tools for programming development - Editors – Debug monitors - User Interface.

Text book

D.M. Dhamdhere, 2012, Systems Programming and operating system, 2ndedn, Tata McGraw Hill Education Pvt., Ltd, New Delhi

Chapters (Relevant topics only)

Unit I	: 4.1 to 4.4
Unit II	: 5.1 to 5.5
Unit III	: 6.1, 6.2, 6.4 to 6.6
Unit IV	: 7.1, 7.2, 7.3
Unit V	: 8.1,8.2, 8.3, 8.5

References:

1. John J Donovan, 2009, System Programming, 46th edn, Tata McGraw Hill Education Pvt. Ltd, New Delhi
2. Leland L. Beck, 1997, System Software: An Introduction to Systems Programming, 3rd edn, Addison-Wesley
3. I.A.Dhotre, A.A.Puntambekar, 2008, System Programming, 3rdedn, TechnicalPublications, Pune

Web Resources

https://www.tutorialspoint.com/computer_fundamentals/system_software.asp
https://www.technicalsymposium.com/SYSTEM_SOFTWARE_FULL_NOTES.html
<https://www.edunotes.in/system-software-notes>
<https://www.geeksforgeeks.org/system-software>
<https://study.com/academy/topic/systems-software.html>

Course Designers:

Dr.K.Natarajan

Mr.J.Prakash

Mrs.K.SuriyaPrabha

Lecture Schedule

	Topic	No of Lecture hrs.
UNIT 1	Assemblers	15 Hours
	4.1,4.2 Elements of Assembly language	5
	4.3 Pass structure of Assemblers	5
	4.4 Design of a two pass Assembler.	5
UNIT 2	Macros and Macro Processors	15 Hours
	5.1 Introduction - Macro Definition and Call	3
	5.2 Macro Expansions	3
	5.3 Nested Macro calls	3
	5.4 Advanced Macro Facilities	3
5.5 Design of a Macro Preprocessors.	3	
UNIT 3	Compilers and Interpreters	15 Hours
	6.1 Introduction to Compiler - Semantic gap - Scope rules	3
	6.2 Memory allocation	3
	6.4 Compilation of Control structures	3
	6.5 Code optimization	3
	6.6 Interpreter	3
UNIT 4	Linkers	15 Hours
	7.1 Introduction to Linker - Relocation and linking concepts	5
	7.2 Design of a linker	5
	7.3 Self-Relocating Program.	5
UNIT 5	Software Tools	15 Hours
	8.1 Introduction - Software tools for programming development	4
	8.2 Editors	4
	8.3 Debug monitors	3
	8.5 User Interface.	4

THIAGARAJAR COLLEGE, MADURAI - 9.
 (Re-Accredited with 'A' Grade by NAAC)
DEPARTMENT OF COMPUTER SCIENCE
 (For those joined B.Sc. Computer Science on or after June 2019)

Course code	Course Title	Category	L	T	P	Credit
UCS19C33	Database Management System	Core 7	4	-	-	4

L – Lecture T – Tutorial P – Practical

Year	Semester	Internal	External	Total
II	III	25	75	100

Preamble

This course is to present an introduction to database management systems, with an emphasis on how to organize, maintain and retrieve - efficiently, and effectively - information from a Data Base Management System.

Course Outcomes

On the completion of the course the student will be able to

#	Course Outcome	Knowledge Level (according to Bloom's Taxonomy)
CO1	Illustrate the fundamental elements of relational database management systems	K1, K2
CO2	Explain the basic concepts of relational data model, entity-relationship model, relational database design, relational algebra and SQL.	K2
CO3	Design ER-models to represent simple database application scenarios	K1, K2
CO4	Improve the ER-model to relational tables, populate relational database and formulate SQL queries on data.	K2,K3
CO5	Improve the database design by normalization	K2,K3

K1-Knowledge

K2-Understand

K3-Apply

Mapping of COs with POs

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M			
CO2	S	M	L		
CO3	S	M	L		
CO4	S	M		L	
CO5	S	M	L		L

S-STRONG

M-MEDIUM

L-LOW

Blooms taxonomy

	CA		End of
	First	Second	Semester
<i>Knowledge-K1</i>	40%	40%	40%
<i>Understand-K2</i>	40%	40%	40%
<i>Apply-K3</i>	20%	20%	20%
Total Marks	52	52	140

Content

Unit-I: Introduction to Database Systems and Structure: 15 Hours

Database System Applications-Purpose of Database System-View of Data-Database Languages-Relational Databases -Database design-Data Storage and Querying-Transaction Management-Database Architecture -Data Mining and Information Retrieval-Specialty Databases-Database users and administrators.

Unit-II: Relational Databases: 15 Hours

Introduction to relational model: Structure of Relational databases -Database schema-Keys-Schema Diagrams-Relational Query Languages-Relational operations.

Introduction to SQL: Overview of SQL language-SQL Data Definition-Basic Structure of SQL Queries-Additional Basic Operations.

Unit-III: SQL: 15 Hours

Set Operations-Null Values-Aggregate Functions-Nested Sub Queries-Modification of the Database. Intermediate SQL: Join Expressions- Views.

Unit-IV: Intermediate SQL: 15 Hours

Transactions-Integrity Constraints -SQL Data types and Schemas-Authorization. Advanced SQL: Accessing SQL from a Programming Language-Functions and Procedures-Triggers-Recursive Queries.

Unit-V: Database Design :15 Hours

Database Design and The ER Model: Overview of the Design process-The Entity -Relationship Model-Constraints -Removing redundant attributes in Entity sets-Entity Relationship Diagrams-Reduction to Relational Schema.

Relational Database Design

Features of Good Relational Designs-Atomic Domains and First Normal Form - Decomposition Using Functional Dependencies - Functional-Dependency Theory - Algorithms for Decomposition - Decomposition Using Multivalued Dependencies - More Normal Forms - Database-Design Process - Modelling Temporal Data.

Text Books:

Abraham Silberschatz, HenryF.Korth, S.Sudarshan, 2013. Database Systems Concepts, 6th Edn, MC Graw Hill Education, New Delhi

Chapters:

UNIT – I	: 1.1 - 1.12
UNIT – II	: 2, 3.1 - 3.4
UNIT – III	: 3.5 - 3.9, 4.1 - 4.2
UNIT – IV	: 4.3 - 4.6, 5.1 - 5.4
UNIT – V	: 7.1 - 7.6, 8.1 – 8.9

Reference:

1. John Garmany, 2005, **Easy oracle PL/SQL programming** : Get started fast with working PL/SQL code Example, Easy oracle series
2. Ragu Rama Krishnan, Johannes Gehrke, 3rdEdn, **Database Management Systems**, MC Graw Hill Education, New Delhi.
3. Shio Kumar Singh, 2ndEdn, **Database system: Concepts Design and application**, Pearson Education.

Web resources:

- <http://www.db-book.com/>
https://www.tutorialspoint.com/dbms/dbms_tutorial.pdf
http://www.tutorialspoint.com/sql/sql_tutorial.pdf

Course designer

Mrs.A.M.Hema
Dr.K.Palaniammal
Mr.M.Muthalagu

Lecture Schedule

UNIT	Topic	No of lecture hrs.
I	Introduction to Database Systems and Structure: 15 Hours	
	1.1 Database System Applications-1.2 Purpose of Database System-1.3 View of Data	5
	1.4 Database Languages-1.5 Relational Databases -1.6 Database design	5
	1.7 Data Storage and Querying-1.8 Transaction Management-1.9 Database Architecture	3
	1.10 Data Mining and Information Retrieval-1.11 Specialty Databases-1.12 Database users and administrators.	2
II	Relational Databases: 15 Hours	
	2.1 Structure of Relational databases -2.2 Database schema-2.3 Keys	5
	2.4 Schema Diagrams-2.5 Relational Query Languages-2.6 Relational operations.	4
	3.1 Overview of SQL language-3.2 SQL Data Definition-3.3 Basic Structure of SQL Queries	5
	3.4 Additional Basic Operations.	1
III	SQL: 15 Hours	
	3.5 Set Operations-3.6 Null Values	5
	3.7 Aggregate Functions	5

	3.8 Nested Sub Queries-3.9 Modification of the Database.	2
	4.1 Join Expressions-4.2 Views.	3
IV	Intermediate SQL: 15 Hours	
	4.3 Transactions-4.4 Integrity Constraints -4.5 SQL Data types and Schemas-4.6 Authorization.	5
	5.1 Accessing SQL from a Programming Language	5
	5.2 Functions and Procedures	2
	5.3 Triggers-5.4 Recursive Queries.	3
V	Database & Relational Database Design : 15 Hours	
	7.1 Overview of the Design process-7.2 The Entity Relationship Model	5
	7.3 Constraints -7.4 Removing redundant attributes in Entity sets-7.5 Entity Relationship Diagrams-7.6 Reduction to Relational Schema.	3
	8.1 Features of Good Relational Designs-8.2 Atomic Domains and First Normal Form – 8.3 Decomposition Using Functional Dependencies	5
	8.4 Functional-Dependency Theory -8.5 Algorithms for Decomposition – 8.6 Decomposition Using Multivalued Dependencies – 8.7 More Normal Forms -8.8 Database-Design Process -8.9 Modelling Temporal Data.	2

THIAGARAJAR COLLEGE, MADURAI - 9.
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DEPARTMENT OF COMPUTER SCIENCE
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Course code	Course Title	Category	L	T	P	Credit
UCS19NE31	Software Development	NME I	2	-	-	2

L – Lecture T – Tutorial P – Practical

Year	Semester	Internal	External	Total
II	III	15	35	50

Preamble

This course enables the students to solve the simple mathematical and logical problems using flowchart and to learn office automation packages.

Course Outcome

On the completion of the course the student will be able to

#	Course Outcome	Knowledge Level (according to Bloom's Taxonomy)
CO1	Develop algorithms and flowchart for solving simple problems.	K2, K3
CO2	Illustrate the application of computers in home and in education field.	K2
CO3	Learn office automation package.	K3
CO4	Learn basic concepts of Database Management System.	K2

K1-Knowledge

K2-Understand

K3-Apply

Mapping of COs with POs

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1		M	S		
CO2	M				
CO3			S	S	
CO4	M			S	

S-STRONG

M-MEDIUM

L-LOW

Blooms taxonomy

	CA		End of
	First	Second	Semester
Knowledge-K1	40%	40%	40%
Understand-K2	40%	40%	40%
Apply-K3	20%	20%	20%
Total Marks	52	52	140

Content

Unit – I: 15 Hours

Flowchart - Purpose - Examples - Problem solving with computers.

Unit – II: 15 Hours

Application of computers: Home computers -Education- Word processing
Database Management System - Spreadsheet.

Textbook

Dharma Rajaraman, V. Rajaraman, 1996, Computer Primer, 2ndedn, Eastern Economy

Chapters:

Unit – I : 5 & 6

Unit – II : 16.1 to 16.5

Web Resources

<https://online.visual-paradigm.com/tutorials/flowchart-tutorial/>

[http://www.tmv.edu.in/pdf/Distance_education/BCA%20Books/BCA%20I%20SEM/BCA-124%20Office%20Automation%20\(W,E,P,A\).pdf](http://www.tmv.edu.in/pdf/Distance_education/BCA%20Books/BCA%20I%20SEM/BCA-124%20Office%20Automation%20(W,E,P,A).pdf)

Course designers

Mrs.S.NaseemaBegam

Dr.K.Palaniammal

Ms.M.Yogeswari

Lecture Schedule

	Topic	No of lecture hrs.
UNIT 1	Flow Chart and Problem Solving with Computers	15 Hours
	5.1 Flowchart	1
	5.2 Purpose	1
	5.3 Examples	6
	6.0 Problem solving with computers	7
UNIT 2	Application of Computers	15 Hours
	16.1 Home computers	3
	16.2 Education	3
	16.3 Word processing	3
	16.4 Database Management System	3
	16.5Spreadsheet	3

THIAGARAJAR COLLEGE, MADURAI - 9.
 (Re-Accredited with 'A' Grade by NAAC)
DEPARTMENT OF COMPUTER SCIENCE
 (For those joined B.Sc. Computer Science on or after June 2019)

Course code	Course Title	Category	L	T	P	Credit
UCS19CL31	Data structure Lab	Core Lab - 4	-	-	5	2

L – Lecture T – Tutorial P – Practical

Year	Semester	Internal	External	Total
II	III	40	60	100

Preamble

The course provides the knowledge is to implement various data structure & algorithm methods that impact the performance of program efficiently.

Course Outcomes

On the completion of the course the student will be able to

#	Course Outcome	Knowledge Level (according to Bloom's Taxonomy)
CO1	Create programs to sort numbers and strings, sequential search and binary search	K2,K3
CO2	Implement Recursion and polynomial addition using ordered lists	K2,K3
CO3	Construct programs of stack data structure and its operations.	K3
CO4	Develop programs for queuedata structure and its operations.	K3
CO5	Demonstrate linked listdata structure and its operations.	K2,K3

K1-Knowledge

K2-Understand

K3-Apply

Mapping of COs with POs

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	M			
CO2	M	M	S	L	
CO3	M	S			L
CO4	M	S			
CO5	M	S	M	S	L

S-STRONG

M-MEDIUM

L-LOW

Content

1. Sorting numbers and strings.
2. Searching: Sequential and Binary
3. Sparse Matrix Transpose.
4. Recursion: GCD, Fibonacci.
5. Polynomial addition using ordered lists.
6. Stack using Array: Inserting and deleting an element (PUSH & POP)
7. Using Stack infix to postfix conversion.
8. Evaluation of an expression using stack.
9. Queue - using Array :Inserting and deleting an element.
10. Circular Queue implementation.
11. Linked List - Inserting and deleting an element.
12. Stack - using Linked List
13. Queue using Linked list
14. Doubly Linked List - Inserting and deleting an element.

Web Resources

1. <https://www.geeksforgeeks.org/data-structures/>
2. <https://www.programiz.com/dsa>

Course designer:

Dr.U.Jeyasutharsan
Mrs.S.NaseemaBegam
Ms.R.Sindhu

THIAGARAJAR COLLEGE, MADURAI - 9.
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DEPARTMENT OF COMPUTER SCIENCE
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Course code	Course Title	Category	L	T	P	Credit
UCS19CL32	Database Management Lab	Core Lab - 5			5	2

L – Lecture T – Tutorial P – Practical

Year	Semester	Internal	External	Total
II	III	40	60	100

Preamble

This course is to present an introduction to database management systems, with an emphasis on how to organize, maintain and retrieve - efficiently, and effectively - information from a Data Base Management System.

Course Outcomes

On the completion of the course the student will be able to

#	Course Outcome	Knowledge Level (according to Bloom's Taxonomy)
CO1	Illustrate DDL and DML operations	K1, K2
CO2	Create and drop views/synonyms/sequence	K2
CO3	Implement user-defined and predefine exceptions	K2
CO4	Demonstrate Functions, Packages and triggers	K2,K3
CO5	Write PL/SQL programs	K2,K3

K1-Knowledge

K2-Understand

K3-Apply

Mapping of COs with POs

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S				
CO2	S	M			
CO3		S	M		
CO4	S			M	L
CO5			S	M	M

S-STRONG

M-MEDIUM

L-LOW

Content

1. Performing DDL, DML operations in a table.
2. Creating and dropping Views/ Synonyms / Sequence.
3. Writing procedures and passing values.
4. Setting predefined Exception
5. Creating User defined Exception
6. Writing Function
7. Creating Package
8. Creating Triggers
9. Splitting a table values and stores them into multiple tables.
10. Simple PL/SQL programs (Non-database problems).
11. Writing program in PL/SQL using aggregate function.
12. Performing Join & Set operations.

Web Resources:

https://www.tutorialspoint.com/dbms/dbms_tutorial.pdf

http://www.tutorialspoint.com/sql/sql_tutorial.pdf

Course designer:

Mrs.A.M.Hema

Dr.K.Palaniammal

Mr.M.Muthalagu

THIAGARAJAR COLLEGE, MADURAI - 9.
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DEPARTMENT OF COMPUTER SCIENCE
 (For those joined B.Sc. Computer Science on or after June 2019)

Course code	Course Title	Category	L	T	P	Credit
UCS19C41	Java Programming	Core 8	4	-	-	4

L – Lecture T – Tutorial P – Practical

Year	Semester	Internal	External	Total
II	IV	25	75	100

Preamble

This course enable the students to construct object oriented java programs using the concept of abstraction,encapsulation,exceptions,thread,packages,interfaces and AWT controls

Course Outcomes

On the completion of the course the student will be able to

#	Course Outcome	Knowledge Level (according to Bloom's Taxonomy)
CO1	Learn object oriented concepts of Java.	K1
CO2	Illustrate the concepts of Packages, Interfaces and Exception.	K2
CO3	Develop programs using Multi-Threading concepts.	K2
CO4	Develop programs using Applets.	K3
CO5	Learn various AWT controls.	K1

K1-Knowledge

K2-Understand

K3-Apply

Mapping of COs with POs

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M			
CO2	M	S		M	M
CO3		S		M	M
CO4		S	M		S
CO5		S	M		S

S-STRONG

M-MEDIUM

L-LOW

Blooms taxonomy

	CA		End of Semester
	First	Second	
<i>Knowledge-K1</i>	40%	40%	40%
<i>Understand-K2</i>	40%	40%	40%
<i>Apply-K3</i>	20%	20%	20%
Total Marks	52	52	140

Content

Unit-I Introduction :15Hrs

Java's Lineage - The Creation of Java –Java Applets & Applications- Java's Magic: The Byte code - The Java Buzzwords.

An overview of JAVA: Object Oriented Programming - A First Simple Program.

Introducing classes: Class fundamentals - Declaring objects - Assigning object reference variables - Introducing methods - Constructors - The this Keyword - Garbage collection - The finalize() method.

Arrays: One-Dimensional Arrays - Multidimensional Arrays - Alternative Array Declaration Syntax.

Unit-II : 15Hrs

A Closer look at Methods and Classes: Overloading methods - Using objects as parameters - A Closer look at Argument passing - Returning objects - Recursion - Introducing Access control - Understanding static - Introducing final - Arrays Revisited - Introducing Nested and Inner classes - Exploring the String class - Using command line Arguments.

Inheritance: Inheritance basics - Using super - Creating a Multilevel hierarchy - Method overriding - Dynamic method dispatch - Using Abstract classes - Using final with Inheritance - The Object class.

Unit-III: 15Hrs

Packages and Interfaces: Packages - Access protection - Importing packages - Interfaces.

Exception Handling: Exception Handling fundamentals – Exception types -Uncaught Exceptions - Using try and catch - Multiple catch clauses - Nested try statements - throw - throws - finally - Java's Built-in Exceptions - Creating your own exception Subclasses.

Unit-IV: 15Hrs

Multithreaded Programming: The Java Thread Model - The Main Thread - Creating a Thread - Creating Multiple Threads - Using is Alive() and join() - Thread priorities

Applet fundamentals: Applet Basics: Applet Class - Applet Architecture -Applet Skeleton - Simple Applet display method - Requesting repainting - HTML-Applet tag - Passing parameter to Applet - Improving the Applet

Unit-V: 15Hrs

Introducing the AWT:AWT classes –Window Fundamentals - Working with Frame windows -Creating a frame window in an applet - Creating a windowed program - Displaying Information within a window.

Working with Graphics and Text: Working with graphics - Working with color - Setting the paint mode Working with fonts - Managing Text Output using Font Metrics.

Using AWT Controls, Layout Managers, and Menus: Control fundamentals - Labels - Using buttons - Applying check boxes - CheckBoxGroup - choice controls - Using lists - Managing scroll bars - Using a TextField - Using a Text Area - Understanding Layout Managers - Menu Bars and Menus.

Text Book

Herbert Schildt, 54th reprint 2013, The Complete Reference
Java 2, 5thedn, McGraw Hill Edition

Chapters: (Relevant Topics only)

	:
Unit – I	1,2,3,6
Unit - II	: 7,8
Unit-III	: 9,10
Unit-IV	: 11,19
Unit-V	: 21,22

Reference:

1. CAY S.Horstmann Gary Cornell, 2005, Core JAVA 2 Volume-1 Fundamental, 7thedn, Pearson Education
2. E.Balagurusamy, 2010, Programming with JAVA A Primer, 4thedn, Tata McGraw Hill

Web Resources

<https://www.javatpoint.com/java-tutorial>

<https://www.guru99.com/java-tutorial.html>

<https://www.cs.usfca.edu/~parrrt/doc/java/JavaBasics-notes.pdf>

Course designer

Mrs.SM.Valli

Mr.J.Prakash

Mr.R.Chandrasekar

Lecture Schedule

	Topic	No of lecture hrs.
UNIT 1	Introduction, An overview of JAVA	15
	1.1 Java's Lineage – the creation of java	1
	1.2 Java Applets & Applications	1
	1.3 Java's Magic: The Byte code	1
	1.4 The Java Buzzwords.	1
	2.1 Object Oriented Programming	1
	2.2 A First Simple Program	1
	3.9 One-Dimensional Arrays - Multidimensional Arrays Alternative Array Declaration Syntax.	2
	6.1 Class fundamentals	1
	6.2 Declaring objects	1
	6.3 Assigning object reference variables	1
	6.4 Introducing methods	1

	6.5 Constructors	1
	6.6 The this keyword & 6.7 Garbage Collection & 6.8 The finalize() method	2
UNIT 2	A Closer look at Methods and Classes	15
	7.1 Overloading methods	1
	7.2 Using objects as parameters & 7.3 A Closer look at Argument passing	1
	7.4 Returning objects	1
	7.5 Recursion	1
	7.6 Introducing Access control	1
	7.8 Understanding static & 7.9 Introducing final	1
	7.10 Arrays Revisited	1
	7.11 Introducing Nested and Inner classes	1
	7.12 Exploring the String class & 7.13 Using command line Arguments.	1
	8.1 Inheritance basics	1
	8.2 Using super	1
	8.3 Creating a Multilevel hierarchy	1
	8.4 Method overriding & 8.5 Dynamic method dispatch	1
	8.6 Using Abstract classes	1
	8.7 Using final with Inheritance & 8.8 The object class	1
UNIT 3	Packages and Interfaces	15
	9.1 Packages	1
	9.2 Access protection	1
	9.3 Importing packages	1
	9.4 Interfaces	1
	10.1 Exception Handling fundamentals	1
	10.2 Exception types	1
	10.3 Uncaught Exceptions	1
	10.4 Using try and catch	1
	10.5 Multiple catch clauses	1
	10.6 Nested try statements	1
	10.7 throw	1
	10.8 throws	1
	10.9 finally	1
	10.10 Java's Built-in Exceptions	1
10.11 Creating your own exception Subclasses.	1	
UNIT 4	Multithreaded Programming	15
	11.1 The Java Thread Model	1
	11.2 The Main Thread	1
	11.3 Creating a Thread	1
	11.4 Creating Multiple Threads	1
	11.5 Using is Alive() and join()	1
	11.6 Thread priorities	1
	19.1 Applet Class	1
	19.2 Applet Architecture	2
	19.3 Applet Skeleton	1
	19.4 Simple Applet display method	1
19.5 Requesting repainting	1	

	19.6 HTML-Applet tag	1
	19.7 Passing parameter to Applet – Improving the Applet	2
UNIT 5	Introducing the AWT	15
	21.1 AWT classes	5
	21.2 Working with Graphics and Text	5
	22 Using AWT Controls, Layout Managers, and Menus	5

THIAGARAJAR COLLEGE, MADURAI - 9.
 (Re-Accredited with 'A' Grade by NAAC)
DEPARTMENT OF COMPUTER SCIENCE
 (For those joined B.Sc. Computer Science on or after June 2019)

Course code	Course Title	Category	L	T	P	Credit
UCS19C42	Computer Architecture	Core 9	4	-	-	4

L – Lecture T – Tutorial P – Practical

Year	Semester	Internal	External	Total
II	IV	25	75	100

Preamble:

This course is to acquire knowledge about computer hardware basics and organization. It helps to understand the function and design of individual units in a computer and interaction among these components

Course Outcome:

#	Course Outcome	Knowledge Level (according to Bloom's Taxonomy)
CO1	Explain the organization of basic computers, its design and the design of control unit.	K1
CO2	Demonstrate the working of central processing unit.	K2
CO3	Describe the operators and language of the registers transfer, micro operations and input / output organization.	K1
CO4	Explain the organization of memory and memory management hardware.	K2
CO5	Elaborate advanced concepts of computer architecture parallel processing, inter process communication and synchronization.	K1

K1- Knowledge

K2- Understand

K3- Apply

Mapping of COs with POs

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M				
CO2	S			M	
CO3	L	L	L		
CO4	S			M	
CO5	S			L	S

S-STRONG

M-MEDIUM

L-LOW

Blooms taxonomy

	CA		End of Semester
	First	Second	
<i>Knowledge-K1</i>	40%	40%	40%
<i>Understand-K2</i>	40%	40%	40%
<i>Apply-K3</i>	20%	20%	20%
Total Marks	52	52	140

Content

Unit-I -Basic Computer Organization:12hrs

Instruction codes - Computer Registers - Computer Instructions - Timing and control - Instruction cycle - Memory reference instructions - Input, Output and Interrupt - Complete Computer Description.

Unit -II - CPU:10hrs

General register organization - Design of arithmetic logic shift unit - Stack organization - Instruction formats - Addressing modes - Data transfer and manipulation - Program control.

Unit-III - Computer Arithmetic:11hrs

Hardware implementation and Algorithm for Addition, Subtraction, Multiplication, Division - Booth multiplication algorithm - Floating point Arithmetic operations - Decimal Arithmetic unit and Operations.

Unit-IV - I/O and Memory Organisation:15hrs

Input-output interface - Direct memory access - Input-Output processor – Memory Hierarchy - Main memory - Associative memory - Cache memory - Virtual memory.

Unit-V -Advanced Processing:12hrs

RISC, CISC characteristics - Parallel Processing - Pipelining - Arithmetic pipeline - Instruction pipeline - Vector Processing - Array processors - Multiprocessors - Interconnection structures.

Text Book:

M.Morris Mano, 2013, Computer System Architecture, 3rdedn, PearsonPrintice Hall

Units	chapter
I	5.1 to 5.8
II	8.1 to 8.7,4.7
III	10.1 to 10.7
IV	11.2 , 11.6, 11.7, 12.1, 12.2, 12.4 to 12.6
V	8.8, 9.1 to 9.4, 9.6, 9.7, 13.1, 13.2

Reference

1. V.CarlHamacher, ZvoknoG.Vranesic, SafwatG.Zaky,2008, Computer organization, 4thedn, Tata Mc-Graw Hill

Web Resources

1. https://www.tutorialspoint.com/parallel_computer_architecture/
2. <https://lecturenotes.in/subject/9/computer-organisation-and-architecture-coa>
3. <https://www.computer-pdf.com/tutorials-computer-architecture-textbook>

Course designers

Dr.U.Jeyasutharsan
Mrs.L.Krishnaveni
Mrs.K.SuriyaPrabha

Lecture Schedule

Units		Topic	No of lecture hrs.
I	5	Basic Computer Organization:12hrs	
	5.1	Instruction codes	1
	5.2	Computer registers	1
	5.3	Computer instructions	1
	5.4	Timing and Control	2
	5.5	Instruction Cycle	2
	5.6	Memory Reference instruction	2
	5.7	Interrupts	1
	5.8	Complete Computer Description	2
II	8	CPU:10hrs	
	8.1	General Register Organization	1
	8.2	Design and ALU	2
	8.3	Stack Organization	1
	8.4	Instruction formats	1
	8.5	Addressing modes	1
	8.6	Data transfer and manipulator	3
	8.7	Program Control	1
III	10	Computer Arithmetic:11hrs	
	10.1	Addition and subtraction algorithms	3
	10.2	Multiplication algorithms	2
	10.3	Floating point arithmetic operators	3
	10.4	Decimal arithmetic unit and operation	3
IV	11	I/O and Memory Organization: 15hrs	
	11.1	Input output interface	2
	11.2	Direct memory Access	1
	11.3	Input output process	2
	11.4	Memory Hierarchy	1
	11.5	Main Memory	3
	11.6	Associative Memory	2
	12.1 to	Cache Memory	2
	12.6	Virtual Memory	2
V	9	Advanced processing: 12hrs	
	9.1	RISC and CISC	1
	9.2	Parallel processing	1
	9.3	Pipelining arithmetic and instruction pipeline	4
	9.4 to9.7	Vector processing	1
	13.1	Array processing	1
	13.2	Multiprocessors and interconnection structures	3
Total(12+10+11+15+12)			60

THIAGARAJAR COLLEGE, MADURAI - 9.

(Re-Accredited with 'A' Grade by NAAC)

DEPARTMENT OF COMPUTER SCIENCE

(For those joined B.Sc. Computer Science on or after June 2019)

Course code	Course Title	Category	L	T	P	Credit
UCS19C43	Computer Graphics	Core-10	4	1	-	4

L – Lecture

T – Tutorial

P – Practical

Year	Semester	Internal	External	Total
II	IV	25	75	100

Preamble

This course is designed to facilitate to understand, design and implementation of pictorial data. This understandability makes the students to be a successful Graphics programmer.

Course Outcomes

On the completion of the course the student will be able to

#	Course Outcome	Knowledge Level (according to Bloom's Taxonomy)
CO1	Recognize the necessity of pictorial data	K1
CO2	Describe the procedure for line segment	K2
CO3	Initiate the importance of polygon in graphics environment	K1
CO4	Initiate the techniques of manipulating pictorial data	K2
CO5	Describe windowing and clipping concepts	K1,K2

K1-Knowledge

K2-Understand

K3-Apply

Mapping of COs with POs

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	L			
CO2	M	M	M	M	
CO3	L	M	M	M	M
CO4	M	M	M	M	S
CO5	L	L	M	M	M

S-STRONG

M-MEDIUM

L-LOW

Blooms taxonomy

	CA		End of
	First	Second	Semester
Knowledge-K1	40%	40%	40%
Understand-K2	40%	40%	40%
Apply-K3	20%	20%	20%
Total Marks	52	52	140

Content

Unit-I Line Generation and Graphics Primitives (15 Hours)

Line Generation: Overview of Graphics concept- Line segment - Vector- Pixels and Frame buffer - Vector Generation algorithm – Bresenham’s algorithm - Character Generation.

Graphics Primitives: Introduction - Display devices.

Unit-II Display File and Polygon (15 Hours)

Display file: Concept - Display file primitive operations - Display file interpreter- Normalized device co-ordinates - Display file structure and routines.

Polygon: Introduction - Polygon Representation - Entering Polygons - Inside Test - Polygon interfacing algorithms

Unit-III Transformations (15 Hours)

Transformations: Introduction - Scaling – Rotation - Homogeneous coordinates and Translation - Rotation about an arbitrary point.

Unit-IV Segments (15 Hours)

Segments : Introduction- Segment Table - Segment Creation - Closing a Segment- Deleting a Segment - Renaming a Segment - Saving and Showing a Segment - Other Display file Structure.

Unit-V Windowing and Clipping (15 Hours)

Windowing: Introduction - Multiple Windowing

Clipping: Concepts - Cohen-Sutherland Outcode Algorithm - Sutherland-Hodgman Algorithm- Clipping a polygon.

Textbook

Steven Harrington, 1987, Computer Graphics (A Programming approach), 2nd edn, McGraw-Hill International Editions, New Delhi.

Chapters (Relevant Topics Only)

Unit-I	: 1,2
Unit-II	: 2,3
Unit-III	: 4
Unit-IV	: 5
Unit-V	: 6

Reference

1. Donald Hearn , M. Pauline Baker, 2001, Computer Graphics, 2nd edn, PHI Prentice Hall
2. Foley, VanDam, 1997, Computer Graphics-Principles and Practices, 2nd edn, Addison Wesley
3. Jeffrey J. McConnell, 2005, Computer Graphics: Theory into Practice, Jones and Bartlett Publishers, Inc

Web Resources

1. <https://lecturenotes.in/subject/59/computer-graphics-cg>
2. <http://www.svecw.edu.in/Docs%5CCSECGLNotes2013.pdf>
3. https://www.tutorialspoint.com/computer_graphics/computer_graphics_tutorial.pdf

Course designers

Dr.K.Natarajan
Mr.M.Muthalagu
Mrs.R.Sindhu

Lecture Schedule

	Topic	No of lecture hrs.
Unit-I	Line Generation and Graphics Primitives	15 Hours
	Line Generation: Overview of Graphics concept	2
	Line segment	2
	Vector- Pixels and Frame buffer	2
	Vector Generation algorithm	2
	Bresenham's algorithm	3
	Character Generation	2
	Graphics Primitives: Introduction - Display devices	2
Unit-II	Display File and Polygon	15 Hours
	Display file: Concept - Display file primitive operations	2
	Display file interpreter	2
	Normalized device co-ordinates	2
	Display files structure and routines.	2
	Polygon: Introduction - Polygon Representation	3
	Entering Polygons - Inside Test	2
	Polygon interfacing algorithms	2
Unit-III	Transformations	15 Hours
	Transformations: Introduction - Scaling – Rotation	5
	Homogeneous coordinates and Translation	5
	Rotation about an arbitrary point.	5
Unit-IV	Segments	15 Hours
	Segments : Introduction- Segment Table	3
	Segment Creation - Closing a Segment	3
	Deleting a Segment - Renaming a Segment	3
	Saving and Showing a Segment	3
	Other Display file Structure	3
Unit-V	Windowing and Clipping	15 Hours
	Windowing: Introduction – Multiple Windowing	5
	Clipping: Concepts - Cohen-Sutherland Outcode Algorithm	5
	Sutherland-HodgmanAlgorithm- Clipping a polygon.	5

THIAGARAJAR COLLEGE, MADURAI - 9.
 (Re-Accredited with 'A' Grade by NAAC)
DEPARTMENT OF COMPUTER SCIENCE
 (For those joined B.Sc. Computer Science on or after June 2019)

Course code	Course Title	Category	L	T	P	Credit
UCS19CL41	Java Programming Lab	Core Lab 6	-	-	5	2

L – Lecture T – Tutorial P – Practical

Year	Semester	Internal	External	Total
II	IV	40	60	100

Preamble

This course enable the students to construct object oriented java programs using the concept of abstraction, encapsulation, exceptions, thread, packages, interfaces and AWT controls

Course Outcomes

On the completion of the course the student will be able to

#	Course Outcome	Knowledge Level (according to Bloom's Taxonomy)
CO1	Implement Object Oriented programming concept.	K2
CO2	Create user defined packages and to demonstrate interfaces	K3
CO3	Implement exception handling mechanism and multithreading concept.	K3
CO4	Develop GUI applications using Java applets	K3
CO5	Handle Events using AWT components	K3

K1-Knowledge

K2-Understand

K3-Apply

Mapping of COs with POs

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S			
CO2			S	M	
CO3			S		M
CO4				S	S
CO5				S	S

S-STRONG

M-MEDIUM

L-LOW

Content

1. Program to demonstrate Multilevel Inheritance.
2. Program to demonstrate Method Overloading.
3. Program to demonstrate Method Overriding.
4. Dynamic Method dispatch.
5. Program to demonstrate interfaces.
6. Program to demonstrate packages.
7. Program to demonstrate user-defined exception.
8. Program to demonstrate Multi-threading concept.
9. Applet program to demonstrate basic controls i.e. Button, labels, checkbox etc.
10. Program to demonstrate font class.
11. Program to demonstrate Graphics class.
12. Program to demonstrate layout manager.
13. Program to create Menus.
14. Program to demonstrate animation.
15. Program to demonstrate mouse events and keyboard events

Web Resources

<https://www.javatpoint.com/java-tutorial>
<https://www.guru99.com/java-tutorial.html>

Course Designer:

Mrs.SM.Valli
Mr.J.Prakash
Mr.R.Chandrasekar

THIAGARAJAR COLLEGE, MADURAI - 9.
 (Re-Accredited with 'A' Grade by NAAC)
DEPARTMENT OF COMPUTER SCIENCE
 (For those joined B.Sc. Computer Science on or after June 2019)

Course code	Course Title	Category	L	T	P	Credit
UCS19CL42	Graphics Lab	Core Lab - 7	-	-	5	2
L – Lecture T – Tutorial P – Practical						
Year	Semester	Internal	External	Total		
II	IV	40	60	100		

Preamble

This lab course is designed to facilitate the design, implementations and the role of pictorial data in graphics field. This understandability makes the students to be a successful Graphics programmer.

Course Outcomes

On the completion of the course the student will be able to

#	Course Outcome	Knowledge Level (according to Bloom's Taxonomy)
CO1	Learn algorithm and construct program for line segment using Vector generation algorithm and Bresenham's algorithm	K3
CO2	Draw polygon using Vector generation algorithm and Bresenham's algorithm	K2
CO3	Demonstrate basic transformation techniques.	K3
CO4	Construct polygon for create, delete and translate a segment	K2
CO5	Demonstrate clipping strategies	K2,K3

K1-Knowledge

K2-Understand

K3-Apply

Mapping of COs with POs

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M				
CO2		M			
CO3	L	M		M	
CO4		M			M
CO5	L	M			L

S-STRONG

M-MEDIUM

L-LOW

Content

Line Segment

1. Creating a line segment - Using Vector generation algorithm
2. Creating a line segment - Using Bresenham's algorithm.

Polygon

1. Draw a Polygon - Using Vector generation algorithm
2. Draw a Polygon - Using Bresenham's algorithm.

Transformation

1. Scale a line segment.
2. Rotate a line segment.
3. Translate a line segment.
4. Rotate a line segment about an arbitrary point.
5. Scale a polygon.
6. Rotate a polygon.
7. Translate a polygon.
8. Rotate a polygon about an arbitrary point.
9. Animating an image.

Segment

1. Create a segment.
2. Delete a segment.
3. Scale a segment.
4. Rotate a segment.
5. Translate a segment.

Clipping

1. Clip a line segment.

Web Resources

<https://www.geeksforgeeks.org/basic-graphic-programming-in-c/>

<http://www.eazynotes.com/pages/computer-graphics/computer-graphics-programs.html>

Course Designer:

Dr.K.Natarajan

Mr.M.Muthalagu

Mrs.R.Sindhu

THIAGARAJAR COLLEGE, MADURAI - 9.

(Re-Accredited with 'A' Grade by NAAC)

DEPARTMENT OF COMPUTER SCIENCE

(For those joined B.Sc. Computer Science on or after June 2019)

Course code	Course Title	Category	L	T	P	Credit
UCS19C51	Automata Theory	Core-11	4	1	-	4

L – Lecture

T – Tutorial

P – Practical

Year	Semester	Internal	External	Total
III	V	25	75	100

Preamble

This course is designed to understand the fundamentals of set theory, relations, functions, Graphs and the basic principles of finite automata.

Course Outcomes

On the completion of the course the student will be able to

#	Course Outcome	Knowledge Level (according to Bloom's Taxonomy)
CO1	Describe the basic principles of finite automata.	K2
CO2	Elaborate the concept of Deterministic finite automata and Non-deterministic finite automata.	K1
CO3	Solve some simple problems in automata theory.	K3
CO4	Explain the concept of Parse tree.	K2
CO5	Gain knowledge about context free grammar and context free language.	K1

K1-Knowledge

K2-Understand

K3-Apply

Mapping of COs with POs

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1			M		L
CO2		L	M		
CO3					M
CO4			L	M	
CO5		L			S

S-STRONG

M-MEDIUM

L-LOW

Blooms taxonomy

	CA		End of
	First	Second	Semester
<i>Knowledge-K1</i>	40%	40%	40%
<i>Understand-K2</i>	40%	40%	40%
<i>Apply-K3</i>	20%	20%	20%
Total Marks	52	52	140

CONTENT

UNIT I (15 Hours):

Finite Automata: Finite State Machines and its Model – Deterministic Finite Automata – Simplified Notation – FA with and without Epsilon Transitions – Language of Deterministic Finite Automata – Acceptability of a String by a DFA – Processing of Strings by DFA – Nondeterministic Finite Automata – Language of NFA – Equivalence between DFA and NFA

UNIT II (15 Hours)

Finite Automata: NFA with and without Epsilon transitions – Two way finite automata – FA with output: Moore and Mealy machines – From finite automata to Moore machine – Interconversion between the machines – Equivalence between Moore and Mealy machines – Minimization of FA – Properties of transition function – Extending Transition function to strings – Applications of Finite automata – Limitations of finite state machines

UNIT III (15 Hours)

Formal Languages: Theory of formal languages – Kleene and Positive closure – Defining languages – Recursive definition of languages - Arithmetic expressions – Grammars – Classification of Grammars and languages – Languages and their relations – Operations on languages – Chomsky Hierarchy

UNIT IV (15 Hours)

Regular Language and regular Grammar: Regular language – Regular expressions – Operators of regular expressions – Identity rules – Algebraic laws for RE – Finite automata and regular expressions – Equivalence of two regular expressions.

Unit V (15 Hours)

Context free grammar and context free language: Definition of context free grammar – Context free language – Deterministic context free language – Deterministic context free language (DCFL) – Derivations – Parse trees – From inference to tree- Derivation tree and new notation of arithmetic expressions – sentential forms – Rightmost and leftmost derivation of strings – Ambiguity in Grammar and language.

Text Book:

Rajendra Kumar, “**Theory of Automata , Languages and Computation**”, 2010 , Tata McGraw Hill Educations Private Limited , New Delhi

CHAPTERS / Sections

Unit –I : Chapter 2 - 2.1 – 2.10

Unit –II : Chapter 2 - 2.11 – 2.21

Unit – III : Chapter 3 - 3.1 – 3.10

Unit –IV : Chapter4 – 4.1 – 4.7

Unit –V : Chapter6 - 6.1 – 6.10

Reference Books

1. John E. Hopcroft Jeffrey D. Ullman , 2002, **Introduction to Automata theory ,Languages and Computation** , Narosa Publishing house , New Delhi.
2. Peter Linz ,**An Introduction to Formal languages and automata** , 2011 , Narosa Publishing House, New Delhi.
3. Dr. M.K. Venkatraman , Dr. N. Sridharan , N.Chandrasekaran, 2009, **Discrete Mathematics** , The National publishing company

Web Resources :

<https://mcdtu.files.wordpress.com/2017/03/introduction-to-automata-theory.pdf>

https://www.tutorialspoint.com/automata_theory/

Course Designer :

Dr. B. Arivazhagan

Lecture Schedule

S.No	Title	Lecture Hours
	UNIT –I (15 Hours)	1
1.	Finite State Machines and its Model	
2.	Deterministic Finite Automata	1
3.	FA with and without Epsilon Transitions	2
4.	Language of Deterministic Finite automata	1
5.	Acceptability of a String by a DFA	3
6.	Processing of Strings by DFA	2
7.	Nondeterministic Finite Automata	2
8.	Language of NFA	2
9.	Equivalence between DFA and NFA	1
	UNIT –II (15 Hours)	
10.	NFA with and without Epsilon transitions	1
11.	Two way finite automata	1
12.	FA with output: Moore and Mealy machines	2
13.	From finite automata to Moore machine	2
14.	Interconversion between the machines	2
15.	Equivalence between Moore and Mealy machines	2
16.	Minimization of FA	2
17.	Properties of transition function	1
18.	Extending Transition function to strings	1
19.	Applications of Finite automata & Limitations	1
	UNIT III (15 Hours)	
20.	Theory of formal languages	2

21	Kleene and Positive closure	2
22.	Defining languages	2
23.	Recursive definition of languages	2
24.	Arithmetic expressions – Grammars	2
25.	Classification of Grammars and languages	2
26.	Languages and their relations	2
27.	Operations on languages and Chomsky Hierarchy	1
28.	UNIT IV (15 Hours) Regular language – Regular expressions	3
29.	Operators of regular expressions	3
30.	Identity rules	3
31	Algebraic laws for RE	3
32.	Finite automata and regular expressions	2
33.	Equivalence of two regular expressions.	3
34.	UNIT V (15 Hours) Definition of context free grammar – Context free language	3
35.	Deterministic context free language	3
36.	Deterministic context free language (DCFL)	2
37.	Derivations – Parse trees	3
38.	From inference to tree- Derivation tree and new notation of arithmetic expressions	2
39.	sentential forms – Rightmost and leftmost derivation of strings	1
40.	Ambiguity in Grammar and language	1

THIAGARAJAR COLLEGE, MADURAI - 9.
 (Re-Accredited with 'A' Grade by NAAC)
DEPARTMENT OF COMPUTER SCIENCE
 (For those joined B.Sc. Computer Science on or after June 2019)

Course code	Course Title	Category	L	T	P	Credit
UCS19C52	Software Engineering	Core 12	4	1	-	4

L – Lecture T – Tutorial P – Practical

Year	Semester	Internal	External	Total
III	V	25	75	100

Preamble

This course helps students to become efficient programmers by learning best programming practices and testing techniques..

Course Outcomes

On the completion of the course the student will be able to

#	Course Outcome	Knowledge Level (according to Bloom's Taxonomy)
CO1	Gain knowledge of basic software engineering methods and practices and their appropriate applications.	K1
CO2	Explain software process models such as waterfall and evolutionary modes	K2
CO3	Describe the role of project management including planning, scheduling, risk management etc.	K2
CO4	Illustrate software requirements and different architecture styles	K2
CO5	Elaborate the approaches to testing, verification and validation.	K2, K3

K1-Knowledge

K2-Understand

K3-Apply

Mapping of COs with POs

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S				
CO2		S	S		
CO3			S	M	M
CO4		S	S		S
CO5				S	S

S-STRONG

M-MEDIUM

L-LOW

Blooms taxonomy

	CA		End of
	First	Second	Semester
<i>Knowledge-K1</i>	40%	40%	40%
<i>Understand-K2</i>	40%	40%	40%
<i>Apply-K3</i>	20%	20%	20%
Total Marks	52	52	140

Content

UNIT I: INRODUCTION TO SOFTWARE ENGINEERING: 8 Hours

Definitions - Size Factors - Quality and Productivity Factors - Managerial Issues.

UNIT II: PLANNING A SOFTWARE PROJECT: 15 Hours

Defining the Problem - Developing a Solution Strategy - Planning the Development Process - Planning an Organizational Structure - Other Planning Activities.

UNIT III: SOFTWARE COST ESTIMATION: 17 Hours

Software Cost Factors - Software Cost Estimation Techniques - Staffing Level Estimation - Estimating Software Maintenance Costs.

SOFTWARE REQUIREMENTS DEFINITION

Software requirement specification - Formal Specification Techniques.

UNIT IV: SOFTWARE DESIGN: 20 Hours

Fundamental Design Concepts - Modules and Modularization Criteria - Design Notations - Design Techniques - Detailed Design Considerations - Real-time and Distributed

System Design - Test Plans.

Implementation Issues: Structured Coding Techniques - Coding Style - Standards and Guidelines - Documentation Guidelines.

UNIT V: VERIFICATION AND VALIDATION TECHNIQUES:13 Hours

Quality Assurance - Walkthroughs and Inspections - Static Analysis - Symbolic Execution - Unit testing and Debugging - System Testing - Formal Verification - Software Maintenance: Introduction - enhancing maintainability during development, managerial aspects of software maintenance - configuration Management - source code metrics - other maintenance tools and techniques.

Text Book:

1. Richard Fairley, 2013, Software Engineering, 39th reprint, Tata Mcgraw-Hill

Chapters:

Unit – I	: 1
Unit – II	: 2
Unit – III	: 3, 4.1,4.2
Unit – IV	: 5.1-5.8,6
Unit – V	: 8,9

Reference Books:

1. Roger S. Pressman, 2007, Software Engineering Concepts, 7thedn, McGraw Hill

2. IAN SOMMERVILLE, 2010, Software Engineering, 10thedn, Pearson Education Asia

Web Resources

1. https://www.tutorialspoint.com/software_engineering/
2. <https://lecturenotes.in/subject/104/software-engineering-se>
3. <https://www.techopedia.com/definition/13296/software-engineering>
4. <https://www.softwareengineerinsider.com/articles/what-is-software-engineering.html>

Course designers

Dr.U.Jeyasutharsan
Mr.M.Muthalagu
Dr.K.Palaniammal

Lecture Schedule

	Topic	No of lecture hrs.
UNIT I		
	1.1 Introduction	2
	1.2 Quality and producing factors	2
	1.3 Size factors	2
	1.4 Managerial issues	2
UNIT II	PLANNING A SOFTWARE PROJECT: 15 Hours	
	2.1 Defining problem	3
	2.2 Developing solution strategies	1
	2.3 Planning the development process	3
	2.4 Planning on organizational structure	3
	2.5 Other planning activities	3
UNIT III	SOFTWARE COST ESTIMATION & SOFTWARE REQUIREMENTS DEFINITION: 17 Hours	
	3.1 Software cost estimation –introduction	1
	3.2 Software cost factors	2
	3.3 Software cost estimation techniques	4
	3.4 Staffing level estimation	2
	3.5 Estimating software maintenance cost	2
	4.1 Software requirement specification	2
	4.2 Formal specification techniques	4
UNIT IV	SOFTWARE DESIGN: 20 Hours	
	5-1 Fundamental design concepts	2
	5.2 Modules	2
	5.3 Design notation	2
	5.4 Design techniques	3
	5.5 Design consideration	1
	5.6 Real time& distributed system design	2
	5.7 Test Plans	1
	6.1 Structured Coding Techniques	3
	6.2 Coding Style	1
	6.3 Standard and Guidelines	1
	6.4 Document Guidelines	1

UNIT V	VERIFICATION AND VALIDATION TECHNIQUES: 13 Hours	
8.1	Quality assurance	1
8.2	Walkthroughs and inspections	1
8.3	Static analysis and Symbolic execution	1
8.4	Unit testing and debugging	1
8.5	System testing	2
8.6	Formal verification	1
8.7	Software maintenance	1
9.1	Enhancing maintainability	1
9.2	Managerial aspects	1
9.3	Configuration management	1
9.4	Source code metrics	1
9.5	Maintenance tools techniques	1

THIAGARAJAR COLLEGE, MADURAI - 9.
 (Re-Accredited with 'A' Grade by NAAC)
DEPARTMENT OF COMPUTER SCIENCE
 (For those joined B.Sc. Computer Science on or after June 2019)

Course code	Course Title	Category	L	T	P	Credit
UCS19C53	Python Programming	Core 13	4	1	-	4

L – Lecture T – Tutorial P – Practical

Year	Semester	Internal	External	Total
III	V	25	75	100

Preamble

This course is designed to provide an introduction to the python programming language. The focus of the course is to provide students with an introduction to programming, utilities, multitasking, GUI and network applications.

Course Outcomes

On the completion of the course the student will be able to

#	Course Outcome	Knowledge Level (according to Bloom's Taxonomy)
CO1	Learn basic concepts of Python and its overview	K2
CO2	Implement application using list, set operation and manage files using python.	K2, K3
CO3	Explain the concept of multithreading.	K1, K2
CO4	Implement Object Oriented Programming using Python.	K1, K2
CO5	Develop GUI based applications and implement TCP/IP and UDP network programming using python.	K2, K3

K1-Knowledge

K2-Understand

K3-Apply

Mapping of COs with POs

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M			
CO2		S	M		
CO3	S	M		L	
CO4	S	S			M
CO5			M	S	S

S-STRONG

M-MEDIUM

L-LOW

Blooms taxonomy

	CA		End of
	First	Second	Semester
<i>Knowledge-K1</i>	40%	40%	40%
<i>Understand-K2</i>	40%	40%	40%
<i>Apply-K3</i>	20%	20%	20%
Total Marks	52	52	140

Content

Unit-I:

Introduction to Python: 15 Hours

Introduction-Python Overview--Python Identifiers-Reserved Keywords-Operators-Control Statements.

Functions:

Introduction-Built-in Functions-User Defined Functions-Function Calls-Python Recursive Function-Writing Python scripts.

Unit-II:

Lists, Tuples and Dictionaries: 15 Hours

Lists, Tuples and Dictionaries-Strings and Lists– Strings-Lists-Tuples and Dictionaries- Tuples-Dictionaries - Files and Exceptions - Text Files-Directories-Exceptions-Exception with Arguments-User Defined Exceptions.

Unit-III:

Classes and Objects: 15 Hours

Overview of OOP-Class Definition-Creating Objects-Built in Class Attributes-Inheritance-Method Overriding-Data Encapsulation-Data Hiding.

Thread:

Single Tasking-Multitasking-Differences between a process and a Thread-Concurrent programming and GIL-Uses of Threads-Creating Thread in Python-Creating a Thread without using a class-creating a Thread by Creating a sub class to Thread Class- creating a Thread without Creating Sub Class to Thread Class-Thread Class Methods-Single Tasking using a Thread- Multitasking Using Multiple Threads.

Unit-IV:

Graphical User Interface: 15 Hours

GUI in python-The Root Window-Fonts and Colors-Working with Containers-Canvas-Frame-Widgets-Button Widget-Arranging Widgets in the Frame-Label Widget-Message Widget-Text Widget-Scrollbar Widget-Check button Widget-Radio button Widget-Entry Widget-Spin box Widget-List box Widget-Spin box widget-List box Widget-Menu Widget-creating Tables-Points to Remember.

Unit-V:

Networking in python: 15 Hours

Protocol-TCP/IP Protocol-User Datagram Protocol(UDP)-Sockets-Knowing IP Address-URL-Reading the Source Code of a Web page-Downloading a Web Page from Internet-Downloading an Image from Internet-A TCP/IP Server-A TCP/IP

Client-A UDP Server-A UDP Client-File Server-File Client-Two-Way
Communication Between Server and Client-Sending a Simple mail-points to
Remember.

Text Books:

1. Title: Problem Solving and Python Programming

Author: E. Balagurusamy
Publisher: Mc Graw Hill Education
Year of Edition: 2018

2. Title: Core Python Programming

Author: Dr. R.Nageswara Rao
Publisher: Dreamtech Press
Edition: second

Chapters:

Unit-I- Chapter 3.1,3.2,3.5,3.6,3.9,3.13,4.1,4.2,4.4,4.6,4.6,4.10 (from book 1)

Unit-II: Chapter 5.1, 5.2, 6.1, 6.2, 7.1 to 7.5 (from book 1)

Unit-III: Chapter 8.1 To 8.3, 8.6 To 8.10, 21(Page no: 537 to 549) from book 2

Unit-IV: Chapter 22 (Page no: 569 to 620) from book 2

Unit-V: Chapter 23 (Page no: 623 to 644) from book 2

Reference Book:

1. Chun, J Wesley, Core Python Programming, 2nd Edition, Pearson, reprint 2010.

Web Resources:

- 1) <https://www.learnpython.org/>
- 2) <https://www.tutorialspoint.com/python/>
- 3) <https://www.programiz.com/python-programming/tutorial>

Course Designer:

Mrs.SM.Valli Mr.M.Muthalagu Mr.J.Prakash

Lecture schedule

Unit No	Topic	No of lecture hrs.
	Introduction to Python & Functions	15 Hours
1.1	Introduction to Python:	7
1.2	Functions	5
1.3	Writing Python Script	3
	Lists, Tuples and Dictionaries	15 Hours
2.1	Lists, Tuples and Dictionaries	8
2.2	Files and Exceptions	7
	Classes and Objects & Thread	15 Hours

3.1	Classes and Objects	7
3.2	Thread	8
	Graphical User Interface	
4.1	GUI in python	5
4.2	Widget	10
	Networking in python	15 Hours
5.1	Protocols TCP/IP & UDP	5
5.2	TCP/IP & UDP Client- Server concept	5
5.3	Two way communication and sending a simple mail	5

THIAGARAJAR COLLEGE, MADURAI - 9.
 (Re-Accredited with 'A' Grade by NAAC)
DEPARTMENT OF COMPUTER SCIENCE
 (For those joined B.Sc. Computer Science on or after June 2019)

Course code	Course Title	Category	L	T	P	Credit
UCS19NE51	Internet Applications	NME II	2	-	-	2

L – Lecture T – Tutorial P – Practical

Year	Semester	Internal	External	Total
III	V	15	35	50

Preamble

The aim of the course is to familiarize students with the history of the development of the Internet and technologies.

Course Outcomes

On the completion of the course the student will be able to

#	Course Outcome	Knowledge Level (according to Bloom's Taxonomy)
CO1	Explain basic internet terminologies.	K2, K3
CO2	Identify Internet Protocols.	K2
CO3	Acquire knowledge about Browsers and search engine.	K3
CO4	Learn E-mail protocols and structure.	K2

K1-Knowledge

K2-Understand

K3-Apply

Mapping of COs with POs

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1		M			
CO2	M				S
CO3			S	S	
CO4	M				S

S-STRONG

M-MEDIUM

L-LOW

Blooms taxonomy

	CA		End of Semester
	First	Second	
<i>Knowledge-K1</i>	40%	40%	40%
<i>Understand-K2</i>	40%	40%	40%
<i>Apply-K3</i>	20%	20%	20%
Total Marks	52	52	140

Content

UNIT I: 15 Hours

Introduction to internet: Internet- Growth of Internet and ARPANet - Owners of the Internet -Anatomy of Internet – History of WWW - Basic Internet Terminologies – Net etiquette - Internet Applications - Commerce on the Internet – Governance on the Internet - Impact of Internet on Society. TCP/IP Internet Technology and Protocols: Packet Switching Technology - Internet Protocols - TCP/IP – Router - Internet Addressing Scheme- Machine Addressing - E-mail Addresses – Resource Addresses.

UNIT II: 15 Hours

Browsers and Search engines: Browsers - What is a browser? – Parts of a browser window -Running a browser - working with a Browser. Search engines: What is search engine - Types of search engines - Search and meta search engines. E-mail: E-mail - E-mail Networks and Servers - E-mail Protocols - Structure of E-mail - Attachments – E-mail Clients - E-mail Clients - web based E-mail-Address book – Signature File.

Text book:

Internet Technology and Web design, Ramesh Bangia, Firewall Media, (An imprint of Lakshmi Publications Pvt. Ltd.), Third Edition, 2011.

UNIT I: Chapter 1.2

UNIT II: Chapter 5(5.1, 5.6), Chapter 6 Chapter 8(8.11 &8.13)

Reference Books:

1. The Internet Book, Douglas E. Comer, Fourth Edition, PHI Learning Pvt. Ltd. , New Delhi, 2009.
2. Using the Internet the Easy Way, Young Kai Seng, Minerva Publications, First Edition, 2000.
3. Fundamentals of Information Technology By Alexis Leon and Mathews Leon, Vikas Publishing House Pvt. Ltd., Revised Edition.

Web Resources

<http://www.just.edu.jo/~mqais/cis99/PDF/Internet.pdf>
<http://www.appf.org.pe/public/cap01.PDF>

Course designer

Mrs.A.M.Hema

Dr.K.Palaniammal

Mr.R.Chandrasekar

Lecture Schedule

	Topic	No of lecture hrs.
	Introduction to Internet and E-mail	15 Hours
1.1	Internet- Growth of Internet and ARPANet - Owners of the Internet -Anatomy of Internet – History of WWW	3
1.2	Basic Internet Terminologies – Net etiquette - Internet Applications - Commerce on the Internet – Governance on the Internet - Impact of Internet on Society.	3
1.3	TCP/IP Internet Technology and Protocols: Packet Switching Technology - Internet Protocols	3
1.4	TCP/IP – Router - Internet Addressing Scheme- Machine Addressing	3
1.5	E-mail Addresses – Resource Addresses.	3
	Browsers and Search Engines	15 Hours
2.1	Browsers - What is a browser? – Parts of a browser window -Running a browser - working with a Browser.	3
2.2	Search engines: What is search engine? - Types of search engines - Search and meta search engines.	5
2.3	E-mail - E-mail Networks and Servers	2
2.4	E-mail Protocols - Structure of E-mail – Attachments	2
2.5	E-mail Clients - E-mail Clients - web based E-mail-Address book – Signature File.	3

THIAGARAJAR COLLEGE, MADURAI - 9.
 (Re-Accredited with 'A' Grade by NAAC)
DEPARTMENT OF COMPUTER SCIENCE
 (For those joined B.Sc. Computer Science on or after June 2019)

Course code	Course Title	Category	L	T	P	Credit
UCS19CL51	Python Programming Lab	Core Lab 8	-	-	6	2

L – Lecture T – Tutorial P – Practical

Year	Semester	Internal	External	Total
III	V	40	60	100

Preamble

This course is designed to provide an introduction to the python programming language. The focus of the course is to provide students with an introduction to programming, utilities, multitasking, GUI and network applications.

Course Outcomes

On the completion of the course the student will be able to

#	Course Outcome	Knowledge Level (according to Bloom's Taxonomy)
CO1	Develop applications using control statements and user defined functions	K3
CO2	Implement applications using set, tuples and dictionaries.	K3
CO3	Handle exception handling and multithreading concept.	K2
CO4	Create GUI applications using widgets and menu bar.	K3
CO5	Develop applications using TCP/IP and UDP network programming.	K3

K1-Knowledge

K2-Understand

K3-Apply

Mapping of COs with POs

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1		S		M	
CO2		M	S	M	
CO3				S	M
CO4			M	S	S
CO5			M	S	S

S-STRONG

M-MEDIUM

L-LOW

Content

1. Program to demonstrate control statements
2. Program to demonstrate built in and user defined function
3. Program to demonstrate set operations
4. Program to demonstrate tuples and dictionaries
5. Program to demonstrate exception and user defined exception
6. Program to demonstrate OOPS concepts
7. Program to demonstrate single threading
8. Program to demonstrate multiple threading
9. Program to demonstrate various widgets
10. Program to demonstrate menu bar
11. Program to demonstrate to access webpage using socket
12. Program to demonstrate Client server communication program

Web Resources

- 1) <https://realpython.com/start-here/>
- 2) <https://www.geeksforgeeks.org/python-programming-language/>
- 3) <https://www.datacamp.com/tracks/python-programming>

Course Designer :

Mrs.SM.Valli

Mr.M.Muthalagu

Mr.J.Prakash

THIAGARAJAR COLLEGE, MADURAI - 9.
 (Re-Accredited with 'A' Grade by NAAC)
DEPARTMENT OF COMPUTER SCIENCE
 (For those joined B.Sc. Computer Science on or after June 2019)

Course code	Course Title	Category	L	T	P	Credit
UCS19C61	Data Mining and Warehousing	Core 14	4	1	-	4

L – Lecture T – Tutorial P – Practical

Year	Semester	Internal	External	Total
III	VI	25	75	100

Preamble

The course provide the knowledge of Database Management principles, the various Data Mining techniques and also carry out some Data analysis for some sample data sets using WEKA software.

Course Outcomes

On the completion of the course the student will be able to

#	Course Outcome	Knowledge Level (according to Bloom's Taxonomy)
CO1	Remember some basic Database management principles and understand the concept of Data mining.	K1
CO2	Explain decision tree algorithms and apply it to construct some decision trees for some simple data sets using WEKA.	K2
CO3	Describe data preprocessing and post processing techniques and Association rule mining technique and apply it to some of the rules for weather data set.	K2
CO4	Illustrate classification algorithms and apply it to solve some problems	K2,K3
CO5	Describe clustering techniques and apply it to solve some problems	K2

K1-Knowledge

K2-Understand

K3-Apply

Mapping of COs with POs

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1		M			
CO2		S	S		L
CO3		L			
CO4		L			
CO5		M			S

S-STRONG

M-MEDIUM

L-LOW

Blooms taxonomy

	CA		End of Semester
	First	Second	
<i>Knowledge-K1</i>	40%	40%	40%
<i>Understand-K2</i>	40%	40%	40%
<i>Apply-K3</i>	20%	20%	20%
Total Marks	52	52	140

Content

UNIT – I 15 Hours

DATA MINING: Introduction - Data Mining - Success Stories - Main Reason for Growth of Data Mining Research - Recent Research Achievements – Graphical Models and Hierarchical Probabilistic Representations – New Applications – Trends that Effect Data Mining - Research Challenges - Testbeds and Infrastructure.

DATA MINING FROM A BUSINESS PERSPECTIVE: Introduction–From Data Mining Tools to Solutions – Evolution of Data Mining Systems – Knowledge Discovery Process - Data Mining Supporting Technologies Overview – Data Mining Techniques

UNIT – II 15 Hours

DATA TYPES, INPUT AND OUTPUT OF DATA MINING ALGORITHMS:

Introduction - Instances and Features - Different Types of Features (Data) – Concept Learning and Concept Description - Output of Data Mining – Knowledge Representation.

DECISION TREES – CLASSIFICATION AND REGRESSION TREES:

Introduction -Constructing Classification Trees - CHAID (Chi-square Automatic Interaction Detection) -CART (Classification and Regression Trees) – Regression Trees - General Problems in Prediction of Classes for Data with Unknown Class Value – Pruning – Introduction - Model Estimation

UNIT – III 15 Hours

PREPROCESSING AND POSTPROCESSING IN DATA MINING:

Introduction - Steps in Preprocessing- Discretization - Feature Extraction, Selection and Construction – Missing Data and Methodological Techniques for dealing it - Example of Dealing Missing Data in Decision Tree Induction – Post processing.

ASSOCIATION RULE MINING: Introduction - Automatic Discovery of Association Rules in Transaction Databases -The Apriori Algorithm - Shortcomings.

UNIT – IV 15 Hours

ALGORITHMS FOR CLASSIFICATION AND REGRESSION: Introduction - Naive Bayes -Multiple Regression Analysis – Logistic Regression - k-Nearest Neighbour Classification - GMDH (Group Method of Data Handling) - Evolutionary Computing and Genetic Algorithms

UNIT – V 15 Hours

CLUSTER ANALYSIS: Introduction–Partitional Clusterings - k-medoids - Modern Clustering Methods – Birch- DBSCAN

Text Book:

K.P.Soman, ShyamDiwakar ,V.Ajay, 2006 , Insight into Data Mining Theory and Practice, Prentice Hall of India Private Limited , New Delhi

Chapters:

Unit –I : Chapters 1 and 2

Unit –II : Chapters 3 and 4

Unit – III : Chapters 5 and 7

Unit –IV : Chapter 9

Unit –V : Chapter 11- Sections 11.1 – 11.6

Reference Books:

1. Jiawei Han , Micheline Kamber , Jian Pei , 2011, Data Mining Concepts and Techniques , Third Edition, Morgan Kaufmann Publishers, An Imprint of Elsevier , New Delhi.
2. Ian H.Witten&Eibe Frank, 2008, Data Mining Practical Machine Learning Tools and Techniques, Second Edition, Morgan Kaufmann Publishers, Imprint of Elsevier , New Delhi.
3. Arun K Pujari , 2013, Data Mining Techniques , Second Edition , University Press, Hyderabad

Web Resources

- 1.<http://myweb.sabanciuniv.edu/rdehkharghani/files/2016/02/The-Morgan-Kaufmann-Series-in-Data-Management-Systems-Jiawei-Han-Micheline-Kamber-Jian-Pei-Data-Mining.-Concepts-and-Techniques-3rd-Edition-Morgan-Kaufmann-2011.pdf>
- 2.https://www.tutorialspoint.com/data_mining/

Course designer :

Dr.B.Arivazhagan

Mrs.S.NaseemaBegam

Mrs.R.Sindhu

Lecture Schedule

S.No	Topics	No.LectureHrs
	UNIT – I	15
1.1	Introduction	2
1.2	Success stories and research achievements	3
1.3	Graphical models	2
1.4	New applications	2
1.5	Trends that effect Data mining	1
1.6	Research challenges	2
1.7	KDD process	1
1.8	Data mining techniques	2
	UNIT – II	15
2.1	Different types of features	2
2.2	Concept learning	2
2.3	Output of data mining	2
2.4	Knowledge representation	2

2.5	CHAID	2
2.6	CART	2
2.7	Regression trees	1
2.8	Pruning	2
	UNIT – III	15
3.1	Preprocessing	2
3.2	Missing data mangement	2
3.3	Examples	2
3.4	Post processing	2
3.5	Association rule mining	2
3.6	Rules in transaction data bases	3
3.8	Apriori algorithm	2
	UNIT – IV	15
4.1	Naïve bayes	1
4.2	Multiple regression	3
4.4	Logistic regression	3
4.5	k- nearest neighbour	4
4.6	GMDH	1
4.7	Genetic algorithms	2
4.8	Revision Exercise	1
	UNIT – V	15
5.1	Cluster analysis introduction	2
5.2	K - Medoids	2
5.3	Modern clustering methods	2
5.4	Birch	3
5.5	DBSCAN	2
5.6	Preparatory Test	2
5.7	Seminar & Review	2
	Total	75

THIAGARAJAR COLLEGE, MADURAI - 9.
 (Re-Accredited with 'A' Grade by NAAC)
DEPARTMENT OF COMPUTER SCIENCE
 (For those joined B.Sc. Computer Science on or after June 2019)

Course code	Course Title	Category	L	T	P	Credit
UCS19C62	Data communication & Networking	Core 15	4	1	-	4

L – Lecture T – Tutorial P – Practical

Year	Semester	Internal	External	Total
III	VI	25	75	100

Preamble

The aim of this course is to discuss and explain about basics of data communication and networking concepts. Some of the major topics which are included in this course are the OSI reference model CSMA/CD, TCP/IP implementation, LANS, WANS, internetworking technologies, Routing and Addressing.

Course Outcomes

On the completion of the course the student will be able to

#	Course Outcome	Knowledge Level (according to Bloom's Taxonomy)
CO1	Recognize the working principles of computer networks	K1
CO2	Distinguish OSI model & TCP/IP protocol suite	K1
CO3	Summarize various error detection & error correction code	K1, K2
CO4	Distinguish different types of transmission media	K2
CO5	Learn the functionalities of different layers	K1, K2

K1-Knowledge

K2-Understand

K3-Apply

Mapping of COs with POs

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M				S
CO2		M	L		
CO3	M		S		
CO4	M				
CO5			S	L	L

S-STRONG

M-MEDIUM

L-LOW

Blooms taxonomy

	CA		End of Semester
	First	Second	
Knowledge-K1	40%	40%	40%
Understand-K2	40%	40%	40%
Apply-K3	20%	20%	20%
Total Marks	52	52	140

Content

Unit-I: 15 Hours

Introduction - Data communications - Networks .

Network models - Layered tasks - The OSI model-Layers in the OSI model- TCP/IP protocol suite.

Unit-II: 15 Hours

Transmission media: Guided Media - Unguided media.

Error detection and correction: Introduction - Block coding - Linear Block codes -Cyclic Codes - Checksum.

Unit-III: 15 Hours

Data Link control: Framing-Flow and Error control-Protocols-Noiseless channels- Noisy channels

Wired LANs: Ethernet: IEEE standards-Standard Ethernet.

Unit-IV: 15 Hours

Network layer: IPv4 Addresses - Internetworking-IPv4.

Routing protocols: Distance vector Routing & Link state Routing

Unit-V: 15 Hours

Transport layer: Process-to-process delivery-User Datagram Protocol (UDP)- TCP. **Application layer:** Domain Name Space - Remote Logging - Electronic Mail and File Transfer.

Text Book

Behrouz A.Forouzan, 22th reprint 2011, Data Communications and Networking, 4th edn, McGraw Hill Publishing Company Limited

Chapters:

Unit-I	: 1.1 to 1.2,	2.1 to 2.4
Unit-II	: 7.1 to 7.2,	10.1 to 10.5
Unit-III	: 11.1 to 11.5,	13.1 to 13.2
Unit-IV	: 19.1, 20.1,20.2	22.3 (Page no:660-674).
Unit-V	: 23.1 to 23.3,	25.2, 26.1 to 26.3

Reference:

1. Andrew S.Tanenbaum, 2004, Computer Networks, 4th edn, Prentice Hall of India Pvt Ltd
2. Prakash C.Gupta, 2006, Data Communications and Computer Networks, Prentice Hall of India Pvt Ltd

ebResources

https://www.tutorialspoint.com/data_communication_computer_network/data_communication_computer_network_tutorial.pdf
http://elearning.ascollegelive.net/studyMaterial/bca/bca_3rd_year/Networking%20Notes.pdf
<http://www.di.unipi.it/~bonucce/11-Datacommunication.pdf>

Course designer

Mr.J.Prakash
Mr.R.Chandrasekar
Ms.M.Yogeswari

Lecture Schedule

	Topic	No of lecture hrs.
UNIT 1	Introduction	15 Hours
	1.1 Data communications	2
	1.2 Networks	2
	2.1 Layered tasks	2
	2.2 The OSI model	2
	2.3 Layers in the OSI model	5
	2.4 TCP/IP protocol suite.	2
UNIT 2	Transmission media & Error detection and correction	15 Hours
	7.1 Guided Media	3
	7.2 Unguided media	2
	10.1 Introduction	2
	10.2 Block coding	2
	10.3 Linear Block codes	2
	10.4 Cyclic Codes	2
10.5 Checksum	2	
UNIT 3	Data Link control & Wired LANs	15 Hours
	11.1 Framing	2
	11.2 Flow and Error control	2
	11.3 Protocols	1
	11.4 Noiseless channels	3
	11.5 Noisy channels	3
	13.1 IEEE Standards	2
13.2 Standard Ethernet	2	
UNIT 4	Network layer & Routing protocols	15 Hours
	19.1 IPv4 Addresses	3
	20.1 Internetworking	3
	20.2 IPv4	3
	22.3 Distance vector Routing & Link state Routing	6
UNIT 5	Transport layer	15 Hours
	23.1 Process-to-process delivery	2
	23.2 User Datagram Protocol(UDP)	2
	23.3 TCP	2
	25.2 Domain Name Space	2
	26.1 Remote Logging	2
	26.2 Electronic Mail	3
	26.3 File Transfer	2

THIAGARAJAR COLLEGE, MADURAI - 9.
 (Re-Accredited with 'A' Grade by NAAC)
DEPARTMENT OF COMPUTER SCIENCE
 (For those joined B.Sc. Computer Science on or after June 2019)

Course code	Course Title	Category	L	T	P	Credit
UCS19C63	Operating System	Core 16	4	1	-	4

L – Lecture T – Tutorial P – Practical

Year	Semester	Internal	External	Total
III	VI	25	75	100

Preamble

The course facilitates the students to familiarize the basic concepts of operating systems and its functions, services and management policies with processes, deadlock, memory, file and disk operations.

Course Outcomes

On the completion of the course the student will be able to

#	Course Outcome	Knowledge Level (according to Bloom's Taxonomy)
CO1	Explain the need of operating system, its components and evolution.	K1, K2
CO2	Introduce the concept of process, operations and scheduling.	K1
CO3	Acquire the knowledge of process synchronization and deadlock concept.	K2, K3
CO4	Enrich their knowledge in memory management concept and management techniques.	K1
CO5	Describe the Disk concepts and its scheduling methods	K2

K1-Knowledge

K2-Understand

K3-Apply

Mapping of COs with POs

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M				
CO2	M	M	L		
CO3	M	M	M	M	
CO4	M	M	L	S	L
CO5	M	L	L	M	

S-STRONG

M-MEDIUM

L-LOW

Blooms taxonomy

	CA		End of Semester
	First	Second	
<i>Knowledge-K1</i>	40%	40%	40%
<i>Understand-K2</i>	40%	40%	40%
<i>Apply-K3</i>	20%	20%	20%
Total Marks	52	52	140

Content

Unit-I Introduction and Operating System Structure: 15 Hours

Introduction : OS Concepts- Batch Systems- Multi programmed Systems- Time sharing Systems- Desktop systems – Multiprocessor Systems - Distributed Systems.
System Structure: System Components- System Calls.

Unit-II Process and CPU Scheduling: 15 Hours

Process: Process concept- Process Scheduling- Operations on Process- Co-operating Processes- Interprocess Communication
CPU Scheduling: Basic Concepts- Scheduling Criteria-Scheduling Algorithms.

Unit-III Process Synchronization and Deadlock: 15 Hours

Process Synchronization: Background- Critical Section Problem
Deadlock: Deadlock characterization-Methods for handling Deadlocks-Deadlock Prevention-Deadlock Avoidance-Deadlock Detection and Recovery.

Unit-IV Memory Management and Virtual Memory: 15 Hours

Memory Management: Background-Swapping-Contiguous Memory Allocation-Paging-Segmentation.
Virtual Memory: Background- Demand Paging-Page Replacement- Allocation of Frames-Thrashing.

Unit-V File System and Disk Scheduling: 15 Hours

File System: File Concepts-Access Methods-Allocation Methods- Free Space Management.
Disk Scheduling: Disk Structure-Disk Scheduling- FCFS Scheduling- SSTF Scheduling- SCAN and CSCAN Scheduling- LOOK and CLOOK Scheduling.

Textbook

SilberschatzGalving Gange,2008, Operating System Concepts,6thedn, Wiley India (P) Ltd.,New Delhi

Chapters (Relevant Topics only)

Unit-I : 1.1 to 1.5, 3.1, 3.3
Unit-II : 4.1 to 4.5, 6.1 to 6.3
Unit-III : 7.1, 7.2, 8.2 to 8.7
Unit-IV : 9.1 to 9.5, 10.1, 10.2, 10.4 to 10.6
Unit-V : 11.1, 11.2, 12.4, 12.5, 14.1,14.2

Reference

1. William Stallings, 2000, Operating Systems, 2nd edn, PHI Prentice Hall, New Delhi
2. Achyut S Godbole, Operating systems, McGraw-Hill, 3rd edn
3. Harvey M Deitel, 1984, "An Introduction to operating system" Addison - Wesley Publishing Co. New York.

Web Resources

<https://nptel.ac.in/downloads/106108101/>

<http://williamstallings.com/Extras/OS-Notes/notes.html>

https://www.tutorialspoint.com/operating_system/operating_system_tutorial.pdf

<https://lecturenotes.in/subject/56/operating-systems-os>

Course designer:

Dr.K.Natarajan

Mrs.J.Uma

Mrs.K.SuriyaPrabha

Lecture Schedule

		Topic	No of lecture hrs.
		Introduction and Operating System Structure	15 Hours
1	Unit - 1	1.1 OS Concepts	3
		1.2.1 Batch Systems	
3		1.2.2 Multiprogrammed System	1
4		1.2.3 Time Sharing systems	1
5		1.3 Desktop Systems	1
6		1.4 Multiprocessor System	1
7		1.5 Distributed Systems	1
8		3.1 System Components	1
9		3.3 System Calls	1
		Process and CPU Scheduling	15 Hours
10	Unit - 2	4.1 Process concepts	2
11		4.2 Process Scheduling	1
12		4.3 Operations on process	1
13		4.4 Co – Operating Processes	1
14		4.5 Inter Process Communication	1
15		6.1 Basic concepts	2
16		6.2 Scheduling Criteria	4
17		6.3 Scheduling Algorithms	
		Process Synchronization and Deadlock	15 Hours
18	Unit - 3	7.1 Background	1
19		7.2 Critical Section Problem	2
20		8.2 Deadlock Characterization	1
21		8.3 Methods for handling Deadlocks	2
22		8.4 Deadlock Prevention	2
23		8.5 Deadlock Avoidance	2
24		8.6 Deadlock Detection	2

25		8.7 Recovery	2
		Memory Management and Virtual Memory	15 Hours
26		9.1 Background	1
27		9.2 Swapping	1
28		9.3 Contiguous Memory Allocation	2
29	Unit - 4	9.4 Paging	3
30		9.5 Segmentation	
31		10.1 Background	2
32		10.2 Demand Paging	
33		10.4 Page replacement	2
34	10.5 Allocation of Frames		
35	10.6 Thrashing		
		File System and Disk Scheduling	15 Hours
36	Unit - 5	11.1 File Concepts	1
37		11.2 Access methods	1
38		12.4 Allocation Methods	1
39		12.5 Free Space Management	1
40		14.1 Disk Structure	1
41		14.2 Disk Scheduling	1
42		14.2.1 FCFS Scheduling	1
43		14.2.2 SSTF Scheduling	1
44		14.2.3 SCAN Scheduling	1
45		14.2.4 CSCAN Scheduling	1
46		14.2.5 LOOK and CLOOK Scheduling	2

THIAGARAJAR COLLEGE, MADURAI - 9.
 (Re-Accredited with 'A' Grade by NAAC)
DEPARTMENT OF COMPUTER SCIENCE
 (For those joined B.Sc. Computer Science on or after June 2019)

Course code	Course Title	Category	L	T	P	Credit
UCS19C64	Cloud Computing	Core 17	4	1		4

L – Lecture T – Tutorial P – Practical

Year	Semester	Internal	External	Total
III	VI	25	75	100

Preamble

This course will introduce the basic concepts related to cloud computing technologies, architecture and different cloud models. It will explore on different cloud programming platforms such as Google app Engine, Amazon Web Services (AWS) and Microsoft Azure. Also covers the basic concepts of Map Reduce programming.

Course Outcomes

On the completion of the course the student will be able to

#	Course Outcome	Knowledge Level (according to Bloom's Taxonomy)
CO1	Explain the key dimensions of the challenge of Cloud Computing	K2
CO2	Know the basic concepts of Map-Reduce Programming models	K1, K3
CO3	Identify various cloud services	K2, K3
CO4	Analyze the components of Amazon, Microsoft Azure & Google Cloud platform	K3
CO5	Describe the key components of Amazon web Service	K2, K3

K1-Knowledge

K2-Understand

K3-Apply

Mapping of COs with POs

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S				L
CO2	S		M		
CO3	S		M		
CO4	S	M			L
CO5	S		M	L	

S-STRONG

M-MEDIUM

L-LOW

Blooms taxonomy

	CA		End of Semester
	First	Second	
<i>Knowledge-K1</i>	40%	40%	40%
<i>Understand-K2</i>	40%	40%	40%
<i>Apply-K3</i>	20%	20%	20%
Total Marks	52	52	140

Content

Unit-I: 15 Hours

Introduction: Cloud Computing at a Glance-Historical Developments-Building Cloud Computing Environments-Computing Platforms and Technologies

Principles of Parallel and Distributed Computing: Eras of Computing-Parallel vs. Distributed Computer-Elements of Parallel Computing-Elements of Distributed Computing-Technologies for Distributed Computing

Unit-II: 15 Hours

Cloud Computing Architecture: Introduction-Cloud Reference Model-Types of Clouds-Economics of the Cloud-Open Challenges

Aneka-Cloud Application Platform: Framework Overview-Anatomy of the Aneka Container-Building Aneka Clouds-Cloud Programming and Management

Unit-III: 15 Hours

Concurrent Computing: Thread Programming: Introduction Parallelism for Single Machine Computation-Programming Applications with Threads-Multithreading with Aneka-Programming Applications with Aneka Threads. **High-Throughput Computing: Task Programming:** Task Computing-Task-based Application Models-Aneka Task-Based Programming

Unit-IV: 15 Hours

Data Intensive Computing: Map-Reduce Programming: What is Data-Intensive Computing? –Technologies for Data-Intensive Computing-Aneka Map Reduce Programming

Cloud Platforms in Industry: Amazon Web Services-Google App Engine-Microsoft Azure

Unit-V: 15 Hours

Cloud Applications: Scientific Applications-Business and Consumer Applications

Advance Topics in Cloud Computing: Energy Efficiency in Clouds-Market Based Managements of Clouds-Federated Clouds/Inter Clouds-Third Party Cloud Services

Text Books:

Rajkumar Buyya, Christian Vacchiola, S.ThamaraiSelvi, 2016, Mastering Cloud Computing, 6th edn, McGraw Hill Education Private Limited, India

Chapters:

UNIT – I	: 1, 2
UNIT – II	: 4, 5
UNIT – III	: 6, 7
UNIT – IV	: 8, 9.1-9.3
UNIT – V	: 10, 11

References Books:

1. M.N.Rao, 2015, Cloud Computing, 1st Edn, PHI Learning Private Limited, India.
2. Aravind Doss, Rajeev Nanda, 1st Edn, McGraw Hill Education Private Limited, India

Web resources:

<http://nptel.ac.in/courses/106106129/28>

<https://azure.microsoft.com/en-in/overview/what-is-cloud-computing/>

<https://aws.amazon.com/what-is-cloud-computing/>

<https://journalofcloudcomputing.springoprn.com/articles/10186/313677-014-0021-5>

Course Designer:

Mrs.A.M.Hema

Mr.M.Muthalagu

Dr.K.Palaniammal

Lecture Schedule

UNIT	Topic	No of lecture hrs.
	Cloud Computing at a Glance- Historical Developments	3
	Computing Building Cloud Computing Environments- Computing Platforms and Technologies	4
	Eras of Computing-Parallel vs. Distributed Computer-Elements of Parallel Computing	3
	Elements of Distributed Computing-Technologies for Distributed Computing	5
II	Introduction-Cloud Reference Model	3
	Types of Clouds-Economics of the Cloud-Open Challenges	3
	Framework Overview-Anatomy of the Aneka Container	3
	Building Aneka Clouds	3
	Cloud Programming and Management	3

III	Introduction Parallelism for Single Machine Computation - Programming Applications with Threads	5
	Multithreading with Aneka- Programming Applications with Aneka Threads	5
	Task Computing-Task-based Application Models	3
	Aneka Task-Based Programming	2
IV	What is Data-Intensive Computing? – Technologies for Data	2
	Intensive Computing-Aneka Map Reduce Programming	5
	Amazon Web Services-Google App Engine	3
	Microsoft Azure	5
V	Scientific Applications-Business and Consumer applications	5
	Energy Efficiency in Clouds	3
	Market Based Managements of Clouds-Federated Clouds/Inter Clouds	2
	Third Party Cloud Services	5

THIAGARAJAR COLLEGE, MADURAI - 9.
 (Re-Accredited with 'A' Grade by NAAC)
DEPARTMENT OF COMPUTER SCIENCE
 (For those joined B.Sc. Computer Science on or after June 2019)

Course code	Course Title	Category	L	T	P	Credit
UCS19CE51(a)	Mobile Applications	Core elective	4	1	-	5

L – Lecture T – Tutorial P – Practical

Year	Semester	Internal	External	Total
III	V/VI	25	75	100

Preamble

The Course elaborates system requirements for mobile applications and generate suitable design using specific mobile development frameworks. Generate mobile application design. Implement the design using specific mobile development frameworks. Deploy the mobile applications in marketplace for distribution.

Course Outcomes

On the completion of the course the student will be able to

#	Course Outcome	Knowledge Level (according to Bloom's Taxonomy)
CO1	Describe the fundamentals and requirements for mobile applications.	K1
CO2	Explain the challenges in mobile application design and development. Identify solution for each functionality at each layer	K2, K3
CO3	Explain the design and developing a graphical user interface.	K2
CO4	Describe fundamental concepts of Web Services including: Client Server systems, communication protocols between processes in distributed systems, Enterprise Application integration, and Web Services	K1, K2
CO5	Demonstrate the Security Issues and its measures and understanding to deploy the Applications developed	K2,K3

K1-Knowledge

K2-Understand

K3-Apply

Mapping of COs with POs

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M				L
CO2		M	S		
CO3			S		
CO4	M				
CO5			S	M	L

S-STRONG

M-MEDIUM

L-LOW

Blooms taxonomy

	CA		End of Semester
	First	Second	
<i>Knowledge-K1</i>	40%	40%	40%
<i>Understand-K2</i>	40%	40%	40%
<i>Apply-K3</i>	20%	20%	20%
Total Marks	52	52	140

Content

UNIT-I: 10 Hours

Introduction: Mobility- Portability- Usability- Functionality-connect ability- Developing Mobile Applications- Umbrella Considerations- Fallacies About Mobile Application Development-Business Context- Who is Going Mobile?-Workers- Consumers-What Do People Want To Do?- Communication- Work-Entertainment- Education- Location-Why Mobilize Your Enterprise?- Pros- Cons.

UNIT – II: 15 Hours

Mobile Application Architectures : Client-Server - Layers - Tiers - Client - Thin Clients - Fat Clients -Web Page Hosting -Server - One-Tier Architecture-Two-Tier architecture- Three-Tier -Architecture - Connection Types- Always Connected-Partially Connected- Never Connected- Synchronization- ContinuousCommunication- Store-and-Forward Synchronization- Interesting ArchitecturalPatterns- Pattern Matrix- Zero-Layer, Three-Tier, Always Connected Architecture-Three-Layer, Three-Tier, Partially Connected Architecture- Good ArchitecturalDesign Tenets- Requirements- Technology Independence- High Performance andAvailability- Scalability- User System Requirements- Mobile Infrastructure- Mobile Device Types- Pagers/RIM -Devices - Cellular Telephones - PDAs- Tablet PCs-Laptop PCs-Hybrids- Capability and Cost Considerations - Mobile DeviceComponents- Connection Methods.

UNIT – III: 12 Hours

Mobile Client User Interface- User Interface - Application Content - UserExperience - Best Practices for Developing a User Interface- Mobile ClientApplications - Thin Client - Fat Client - Web Page Hosting- Best Practices.

UNIT – IV: 13 Hours

Client-Server Data Transfer - HTTP and HTML - WAP and WML - Synchronization Software- RDA and Merge Replication- SOAP and WEB Services - Message Queues - TCP/IP- Mobilizing Existing Application Architectures- Evolutionof Enterprise Architectures- Client-Server Architecture- Web-Enabled Service-CentricArchitecture- User-Centric, Single Sign-On Web Architecture- Anatomy of an Enterprise Web Architecture- Architecture- Logical View- Considerations WhenMobilizing Existing Applications- Architecture- Users, Roles, and Entitlements-Presentation Tier- Application Tier- Database Tier- Existing Back-end Systems-Authentication- Enrollment- Administration- High Availability and Performance-Scalability- Security.

UNIT – V: 10 Hours

Security- Mobilized Enterprise Web Architectures- Vulnerabilities- Threats- Mitigation- User-To-Mobile Client Security Issues- Authentication- Smart Cards-Biometric Authentication- Mobile Client Security Issues- Automatic Logout and Credentials Re-Entry- Data Destruction- Database Encryption- Code-Embedded Usernames and Passwords- Client-Server Communications Security Issues-Communication Encryption- Existing Web Architectures and Back-End Systems Security Issues- Firewalls and Tier Separation- Application Services and Port Lockdown- Communication Encryption- Database Authentication- Database Encryption- Mobile Application Development Management- Project Management-Management Models- Planning- Team Resources- Status Reports and Status Meetings- Financials- Environment- Version and Change Management- Training- Common Managerial Headaches- Requirements- Requirement Types- Gathering Requirements- Documenting Requirements- Design- Design Documentation- Design Considerations- Code Development and Integration- Coding-Unit Testing- Integration and System Testing- Testing Process- Testing Documentation- Testing Considerations- Deployment and Release Management- Mobile Client Production Releases- Server Production Releases- Re-Evaluation and Reiteration- Re-Evaluation-Reiteration- Operations and Maintenance- Day-to-Day Operations- Monitoring- Backup and Restoration.

Text book:

Valentino Lee, Heather Schneider, and Robbie Schell, 2004, Mobile Applications: Architecture, Design, and Development, Prentice Hall.

Chapters:

Unit – I	: Chapter 1, 2
Unit – II	: Chapter 3, 4
Unit – III	: Chapter 5, 6
Unit – IV	: Chapter 7, 8
Unit – V	: Chapter 9, 10

Reference book:

1. Brian Fling, 2009, Mobile Design and Development, O'Reilly Media, Maximiliano.
2. Firtman, 2010, Programming the Mobile Web, O'Reilly Media.
3. Christian Crumlish and Erin Malone, 2009, Designing Social Interfaces, O'Reilly Media.

Web Resources:

<https://www.cs.cmu.edu/~bam/uicourse/830spring09/BFeiginMobileApplicationDevelopment.pdf>
https://www.tutorialspoint.com/mobile_development_tutorials.htm

Course Designer:

Mrs.SM.Valli

Lecture Schedule

	Topic	No of lecture hrs.
I	Introduction	10 Hours
	Mobility - Portability- Usability- Functionality- connect-ability	3
	Developing Mobile Applications- Umbrella Considerations- Fallacies About Mobile Application	3

	Development	
	Business Context- Who is Going Mobile?- Workers- Consumers- What Do People Want To Do?- Communication	2
	Work- Entertainment- Education- Location-Why Mobilize Your Enterprise?- Pros- Cons.	2
II	Mobile Application Architectures	15 Hours
	Client-Server - Layers - Tiers - Client -Thin Clients - Clients -Web Page Hosting -Server - One-Tier Architecture Two-Tier architecture- Three-Tier -Architecture	3
	Connection Types- Always Connected- Partially Connected- Never Connected- Synchronization- Continuous Communication- Store-and-Forward Synchronization- Interesting Architectural Patterns- Pattern Matrix- Zero-Layer, Three-Tier, Always Connected Architecture- Three-Layer, Three-Tier, Partially Connected Architecture	3
	Good Architectural Design Tenets- Requirements- Technology Independence- High Performance and Availability- Scalability-User System Requirements	3
	Mobile Infrastructure- Mobile Device Types- Pagers/RIM - Devices - Cellular Telephones - PDAs- Tablet PCs	3
	Laptop PCs-Hybrids- Capability and Cost Considerations - Mobile Device Components- Connection Methods	3
	Mobile Client User Interface	12 Hours
III	Mobile Client User Interface- User Interface	2
	Application Content - User Experience - Best Practices for Developing a User Interface	3
	Mobile Client Applications	3
	Thin Client- Fat Client	2
	Web Page Hosting- Best Practices	2
	Client-Server Data Transfer	13 Hours
IV	Client-Server Data Transfer - HTTP and HTML - WAP and WML - Synchronization Software- RDA and Merge Replication- SOAP and WEB Services - Message Queues	3
	TCP/IP- Mobilizing Existing Application Architectures- Evolution of Enterprise Architectures- Client-Server Architecture- Web-Enabled Service-Centric Architecture- User-Centric, Single Sign-On Web Architecture	3
	Anatomy of an Enterprise Web Architecture- Architecture- Logical View- Considerations When Mobilizing Existing Applications	3
	Architecture- Users, Roles, and Entitlements- Presentation Tier- Application Tier- Database Tier- Existing Back-end Systems	2
	Authentication- Enrollment- Administration- High Availability and Performance- Scalability- Security	2
	Security	10 Hours
	V	Security

Security- Mobilized Enterprise Web Architectures-3 Vulnerabilities- Threats- Mitigation- User-To-Mobile Client Security Issues- Authentication- Smart Cards- Biometric Authentication- Mobile Client Security Issues- Automatic Logout and Credentials Re-Entry- Data Destruction	3
Database Encryption- Code-Embedded Usernames and Passwords- Client-Server Communications Security Issues- Communication Encryption- Existing Web Architectures and Back-End Systems Security Issues- Firewalls and Tier Separation- Application Services and Port Lockdown- Communication Encryption- Database Authentication- Database Encryption	3
Mobile Application Development Management- Project Management- Management Models- Planning- Team Resources- Status Reports and Status Meetings- Financials- Environment- Version and Change Management- Training- Common Managerial Headaches- Requirements- Requirement Types- Gathering Requirements- Documenting Requirements- Design- Design Documentation- Design Considerations- Code Development and Integration- Coding	2
Unit Testing- Integration and System Testing- Testing Process- Testing Documentation- Testing Considerations- Deployment and Release Management- Mobile Client Production Releases- Server Production Releases- Re- Evaluation and Reiteration- Re-Evaluation- Reiteration- Operations and Maintenance- Day-to-Day Operations- Monitoring- Backup and Restoration	2

THIAGARAJAR COLLEGE, MADURAI - 9.
 (Re-Accredited with 'A' Grade by NAAC)
DEPARTMENT OF COMPUTER SCIENCE
 (For those joined B.Sc. Computer Science on or after June 2019)

Course code	Course Title	Category	L	T	P	Credit
UCS19CE51(b)	E-Commerce Technologies	Core elective	4	1	-	5

L – Lecture T – Tutorial P – Practical

Year	Semester	Internal	External	Total
III	V/VI	25	75	100

Preamble

The aim of the course is to introduce the students of understanding the fundamental principles of e-Business and e-commerce and the role of management, the underlying used technologies with emphasis on Internet Technologies and examines the internet security and security tools.

Course Outcomes

On the completion of the course the student will be able to

#	Course Outcome	Knowledge Level (according to Bloom's Taxonomy)
CO1	Characterizes basic business models on the web and scope of E-Commerce and its applications.	K1, K2
CO2	Recognize the impact of information and communication technologies, especially of the internet in business operations.	K1
CO3	Illustrate the internet security infer with the security algorithms.	K1, K2
CO4	Explain the concepts of EDI and types of electronic payment system.	K1, K3
CO5	Extend the electronic security by make use of security tools and network security	K1, K2

K1-Knowledge

K2-Understand

K3-Apply

Mapping of COs with POs

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M			
CO2	S	M	L		
CO3	S	M	L		
CO4	S		L		
CO5			M	M	L

S-STRONG

M-MEDIUM

L-LOW

Blooms taxonomy

	CA		End of Semester
	First	Second	
<i>Knowledge-K1</i>	40%	40%	40%
<i>Understand-K2</i>	40%	40%	40%
<i>Apply-K3</i>	20%	20%	20%
Total Marks	52	52	140

Content

UNIT I 10 Hours

An introduction to Electronic commerce: What is E-Commerce (Introduction And Definition), Main activities E-Commerce, Goals of E-Commerce, Technical Components of E-Commerce, Functions of E-Commerce, Advantages and disadvantages of E-Commerce, Scope of E-Commerce, Electronic Commerce Applications, Electronic Commerce and Electronic Business(C2C)(C2G,G2G, B2G, B2P, B2A, P2P, B2A, C2A, B2B, B2C)

UNIT II 15 Hours

The Internet: Evolution of Internet, Components of Internet world, Categories of Network, Internet Service Provider, Applications Service Providers ,World Wide Web, Internet Functions, Portals :Electronic Commerce Portals ,B2B Portals, Building own website: Reasons for building your own website - Cost, Time, Reach, Registering a Domain Name, Feedback -Web promotion -Target email, Banner Exchange, Shopping Bots

UNIT III 14 Hours

Internet Security: Secure Transaction, Computer Monitoring, Privacy on Internet, Corporate Email privacy, Computer Crime(Laws , Types of Crimes), Specific Threats, Attack on Computer System, Software Packages, Hacking, Computer Viruses(How it spreads, Virus problem, virus protection), Encryption and Decryption, Secret key Cryptography, DES, Public Key Encryption, RSA, Internet Security, Firewall, Digital Signature(How it Works)

UNIT IV 11 Hours

Electronic Data Exchange: Introduction, Concepts of EDI and Limitation, Applications of EDI, Disadvantages of EDI, EDI model, Electronic Payment System: Introduction, Types of Electronic Payment System, Payment Types, Value Exchange System, Credit Card System, Electronic Fund Transfer, Paperless bill, Modern Payment Cash, Electronic Cash.

UNIT V 10 Hours

E-Security: Introduction–Electronic Security–Attacking Methods- Security Practices – Secure Electronic Transaction (SET)- Security Tools –Network Security – Electronic Commerce Act-Virtual Private Network.

Text book:

C.S.V.Murthy, 2016, E-Commerce Concepts –Models- Strategies, Himalaya Publishing House.

Chapters:

- UNIT – I : 2, 3
- UNIT – II : 4, 5, 9
- UNIT – III : 10
- UNIT – IV : 20, 21
- UNIT – V : 22

Reference book:

1. Gray P. Schneider, 2011, Electronic commerce, International Student Edition.
2. Henry Chan, Raymond Lee, Tharam Dillon, Elizabeth Chang, 2011, E-Commerce, Fundamentals and Applications, Wiley Student Edition

Web Resources:

- https://www.tutorialspoint.com/e_commerce/
- <https://www.thecounty.ca/media/petcounty/documents/department/developing/a/WhatisE-Commerce.pdf>

Course Designer :

Mrs.R.Sindhu

Lecture Schedule

	Topic	No of lecture hrs.
I	Introduction – E – Commerce	10 Hours
	What is E-Commerce (Introduction And Definition), Main activities E-Commerce	3
	Goals of E-Commerce, Technical Components of E-Commerce, Functions of E-Commerce	3
	Advantages and disadvantages of E-Commerce, Scope of E-Commerce	2
	Electronic Commerce Applications Electronic Commerce and Electronic Business(C2C)(C2G,G2G, B2G, B2P, B2A, P2P, B2A, C2A, B2B, B2C)	2
II	Evolution of Internet	15 Hours
	Evolution of Internet, Components of Internet world, Categories of Network	3
	Internet Service Provider, Applications Service Providers, World Wide Web, Internet Functions	3
	Portals :Electronic Commerce Portals ,B2B Portals, Building own website: Reasons for building your own website	3
	Cost, Time, Reach, Registering a Domain Name, Feedback	3
	Web promotion -Target email, Banner Exchange, Shopping Bots	3
III	Internet Security	14 Hours
	Secure Transaction, Computer Monitoring, Privacy on	2

	Internet,	
	Corporate Email privacy, Computer Crime(Laws , Types of Crimes), Specific Threats, Attack on Computer System	3
	Software Packages, Hacking, Computer Viruses(How it spreads, Virus problem, virus protection)	3
	Encryption and Decryption, Secret key Cryptography, DES, Public Key Encryption	3
	RSA, Internet Security, Firewall, Digital Signature(How it Works)	3
	Electronic Data Exchange	11 Hours
IV	Introduction, Concepts of EDI and Limitation, Applications of EDI- Disadvantages of EDI, EDI model	3
	Electronic Payment System: Introduction, Types of Electronic Payment System, Payment Types	3
	Value Exchange System, Credit Card System, Electronic Fund Transfer	3
	Paperless bill, Modern Payment Cash, Electronic Cash	2
	E-Security	10 Hours
V	Introduction – Electronic Security –Attacking Methods- Security Practices	3
	Secure Electronic Transaction (SET)- Security Tools	3
	Network Security	2
	Electronic Commerce Act-Virtual Private Network	2

THIAGARAJAR COLLEGE, MADURAI - 9.
 (Re-Accredited with 'A' Grade by NAAC)
DEPARTMENT OF COMPUTER SCIENCE
 (For those joined B.Sc. Computer Science on or after June 2019)

Course code	Course Title	Category	L	T	P	Credit
UCS19CE51(c)	Artificial Intelligence	Core elective	4	1	-	5

L – Lecture T – Tutorial P – Practical

Year	Semester	Internal	External	Total
III	V/VI	25	75	100

Preamble

This course will introduce the basic principles in artificial intelligence. It will cover simple representation schemes, problem solving paradigms, and search strategies. Areas of application such as knowledge representation, rule based systems will be explored.

Course Outcomes

On the completion of the course the student will be able to

#	Course Outcome	Knowledge Level (according to Bloom's Taxonomy)
CO1	Learn the history, development and various applications of artificial intelligence	K2
CO2	Familiarize with propositional and predicate logic and their roles in logic programming	K1, K2
CO3	Demonstrate logical programming and write programs in declarative programming style	K2, K3
CO4	Learn the knowledge representation and reasoning techniques in rule based systems	K1
CO5	Appreciate how uncertainty is being tackled in the knowledge representation and reasoning process	K2

K1 - Knowledge

K2 - Understand

K3 - Apply

Mapping of COs with POs

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S		L		
CO2		S	M		
CO3		S	M		
CO4			S		S
CO5			M	M	S

S-STRONG

M-MEDIUM

L-LOW

Blooms taxonomy

	CA		End of Semester
	First	Second	
<i>Knowledge-K1</i>	40%	40%	40%
<i>Understand-K2</i>	40%	40%	40%
<i>Apply-K3</i>	20%	20%	20%
Total Marks	52	52	140

Content

UNIT I (15 Hours)

Understanding AI

Introduction to AI – The problem, assumption, AI technique, level of the model, criteria for success, Defining the problem as a state space search, production systems, problem characteristics, production systems characteristics, issue in the design of search programs.

UNIT II (15 Hours)

Heuristic Searching Techniques

Generate and test, Hill climbing, Best – first search, problem reduction, constraint satisfaction, Means – Ends analysis

UNIT III (15 Hours)

Knowledge Representation issues and predicate logic

Representation and mappings – approaches, issue in knowledge representation, frame problem.

Representation of simple facts in logic, instance and ISA relationship, computable function and predicates, resolution, natural deduction.

UNIT IV (15 Hours)

Representing Knowledge using rules

Procedural versus declarative knowledge, logic programming, forward versus backward reasoning, matching, control knowledge.

UNIT V (15 Hours)

Symbolic reasoning under uncertainty

Introduction and logic for non monotonic reasoning, implementation issues, augmenting a problem-solver, implementation of Depth -First Search, Breadth – First search.

Text Book:

Elaine Rich, Ninth reprint 2012, Artificial Intelligence, 3rd edition, Tata McGraw Hill Ltd.

CHAPTERS

Unit –I	: 1.1- 1.5, 2.1- 2.5
Unit –II	: 3.1- 3.6
Unit – III	: 4.1- 4.4, 5.1 - 5.5
Unit –IV	: 6.1- 6.5
Unit –V	: 7.1- 7.6

Reference Books

1. N. J. Nilsson. Artificial Intelligence : A New Synthesis, Elsevier India, 2010
2. Dan W. Patterson, "Introduction to AI and ES", Pearson Education, 2007.
3. Stuart Russel, Peter Norvig "AI – A Modern Approach", 2nd Edition, Pearson Education 2007.

Web Resources

https://www.tutorialspoint.com/artificial_intelligence
<https://data-flair.training/blogs/ai-tutorials-home/>
<https://intellipaath.com/tutorial/artificial-intelligence-tutorial/>

Course Designer:

Mrs.A.M.Hema

Lecture Schedule

UNIT	Topic	No of lecture hrs.
1	Understanding AI - Introduction to AI (15 Hours)	3
	The problem, assumption, AI technique, level of the model	2
	criteria for success problems, production systems,	5
	Production systems characteristics, issue in the design of search programs.	5
2	Heuristic Searching Techniques- Generate and test. (15 Hours)	3
	Hill climbing	2
	Best – first search	3
	Problem reduction.	2
	constraint satisfaction	2
	Means – Ends analysis	3
3	Knowledge Representation issues and predicate logic: (15 Hours)	5
	Representation and mappings – approaches, issue in knowledge representation, frame problem.	
	Representation of simple facts in logic	3
	Instance and ISA relationship	3
	Computable function and predicates, resolution, natural deduction.	4
4	Knowledge and representation rules : (15 Hours)	5
	Procedural versus declarative knowledge	
	Logic programming, forward versus backward reasoning.	5
	Matching control knowledge.	5
5	Symbolic reasoning : (15 Hours)	5
	Introduction and logic for non-monotonic reasoning	
	implementation issues	3
	Implementation of DFS.	4
	Breadth – first search.	3

THIAGARAJAR COLLEGE, MADURAI - 9.
 (Re-Accredited with 'A' Grade by NAAC)
DEPARTMENT OF COMPUTER SCIENCE
 (For those joined B.Sc. Computer Science on or after June 2019)

Course code	Course Title	Category	L	T	P	Credit
UCS19CE51(d)	Multimedia Technology	Core Elective	4	1	-	4

L – Lecture T – Tutorial P – Practical

Year	Semester	Internal	External	Total
III	V/V1	25	75	100

Preamble

This course is to understand the practical use of multimedia in delivering information and to provide knowledge for developing multimedia products by acquiring, integrating and producing the various multimedia elements

Course Outcomes

On the completion of the course the student will be able to

#	Course Outcome	Knowledge Level (according to Bloom's Taxonomy)
CO1	Prepare multimedia professionals equipped with artistic expression and creativity.	K1
CO2	Identify and describe the functions of the general skill sets in the multimedia industry.	K1
CO3	Identify the basic component of a multimedia project.	K2
CO4	Identify the basic hardware and software requirement for multimedia development and playback.	K2,K3
CO5	Learn various multimedia authoring tools.	K1

K1-Knowledge

K2-Understand

K3-Apply

Mapping of COs with POs

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S		M	M	
CO2	L	S	M	M	
CO3	M		M		
CO4	M		L		S
CO5	S		S	M	S

Blooms taxonomy

	CA		End of Semester
	First	Second	
<i>Knowledge-K1</i>	40%	40%	40%
<i>Understand-K2</i>	40%	40%	40%
<i>Apply-K3</i>	20%	20%	20%
Total Marks	52	52	140

Content

Unit-I

Introduction: (12 Hours)

Introduction to multimedia – Resources for multimedia developers – Types of products – Evaluations – Operating systems and software – Multimedia computer architecture.

Unit-II

Text and Graphics: (15 Hours)

Elements of Text – Text data files – Using text in multimedia applications – Hypertext – Elements of graphics – Images and color – Graphics file and application formats – Obtaining images for multimedia use – Using graphics in multimedia applications.

Unit-III

Digital Audio: (12 Hours)

Characteristics of sound and Digital Audio – Digital Audio systems – MIDI – Audio file formats – Using audio in Multimedia applications.

Unit-IV

Digital Video and Animation:(11 Hours)

Background on video – Characteristics of Digital Video – Digital Video data sizing– Video Capture and Playback Systems – Animation – Using Digital Video in Multimedia Applications.

Unit-V

Product Design and Authoring Tools : (10 Hours)

Building blocks – Classes of Products – Content Organizational Strategies – Story Boarding – Authoring Tools – Selecting the right authoring Paradigm.

Text Book

David Hillman, Multimedia Technology and Applications, Reprint 2013, Galgotia Publications Pvt. Ltd 1998.

CHAPTERS

Unit – I : 1,2,3

Unit – II : 4,5

Unit – III : 6

Unit – IV : 7

Unit – V : 8,9

Reference Books

1. Tay Vaughan, Multimedia making it work, McGraw Hill Company, Eighth Edition 2010.
2. James E.Suman, Multimedia in Action, Vikas Publishing House 1997

Web Resources

<https://www.baschools.org>

<https://www.slideshare.net/fareedurrahman/multimedia-technologies-introduction>

Course Designer:

Dr.U.Jeyasutharsan

Lecture Schedule

	Topic	No of lecture hrs.
I	Introduction	12 Hours
	Introduction to multimedia – Resources for multimedia developers	3
	Types of products – Evaluations	3
	Operating systems and software	3
	Multimedia computer architecture	3
II	Text and Graphics	15 Hours
	Elements of Text – Text data files – Using text in multimedia applications	3
	Hypertext – Elements of graphics	3
	Images and color - Graphics file and application formats	3
	Obtaining images for multimedia use	3
Using graphics in multimedia applications	3	
III	Digital Audio	12 Hours
	Characteristics of sound and Digital Audio	3
	Digital Audio systems	3
	MIDI – Audio file formats	3
Using audio in Multimedia applications	3	
IV	Product Design and Authoring Tools	11 Hours
	Background on video – Characteristics of Digital Video	3
	Digital Video data sizing	3
	Video Capture and Playback Systems – Animation	3
Using Digital Video in Multimedia Applications	2	
V	Product Design and Authoring Tools	10 Hours
	Building blocks – Classes of Products	3
	Content Organizational Strategies – Story Boarding	3
	Authoring Tools	2
Selecting the right authoring Paradigm	2	

THIAGARAJAR COLLEGE, MADURAI - 9.

(Re-Accredited with 'A' Grade by NAAC)

DEPARTMENT OF COMPUTER SCIENCE
(For those joined B.Sc. Computer Science on or after June 2019)

Course Code	Course Title	Category	L	T	P	Credit
UCS19SE41/UCS19SE61(a)	PHP Programming Lab	Skill Enhanced Elective	-	-	2	2

L – Lecture T – Tutorial P – Practical

Year	Semester	Internal	External	Total
II/III	IV/VI	15	35	50

Preamble

This course will enable the student to build real-world, dynamic webpages using PHP and MySQL. It provides a platform to create and analyze websites under web 2.0 .

Course Outcomes

On the completion of the course the student will be able to

#	Course Outcome	Knowledge Level (according to Bloom's Taxonomy)
CO1	Build PHP scripts to handle HTML forms	K1, K2
CO2	Construct regular expressions including modifiers, operators, and meta-characters	K1, K3
CO3	Create PHP programs that use various PHP library functions, and that manipulate files and directories	K1, K2, K3
CO4	Implement Cookie creation and usage.	K1, K2
CO5	Develop and solve common Web application tasks by writing PHP programs	K1, K2, K3

K1-Knowledge

K2-Understand

K3-Apply

Mapping of COs with POs

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1		M	S		
CO2			S		L
CO3	L	S			
CO4		M	S		
CO5			M	S	M

S-STRONG

M-MEDIUM

L-LOW

Content:

1. Using HTML Form - To design a student mark database using HTML form and process using PHP.

2. Array Operations - To demonstrate all array operations

(array_search(),array_diff(),array_combine(),array_match(),sort())

3. Control Statements - To demonstrate all control statements(find factorial of the given number using IF, While, Do-while)

4. Key & Value pairs

To display inventory table using key & value pairs.

To print student table using key & value pairs and search particular student number(whether it is present or not)

5. User Defined Functions

a. 1. To illustrate user defined function (define all function type

1. Function without input argument and no return value.

2. Function without input argument and return value.

3. Function with input argument and no return value.

4. Function with input argument and return value.

5. Function with default argument.

b. To find factorial of the given number using recursion.

c. To calculate 'nCr' using include command to include the factorial function.

6. Cookie - Write a PHP program to store current date-time in a COOKIE and display the 'Last visited on' date-time on the web page upon reopening of the same page. To perform string manipulation.

7. File - To process personal details using File.

Web Resources:

<http://www.tutorialpoint.com/php/php.pdf>

<https://www.w3schools.com/php/>

Course Designer:

Mrs.A.M.Hema

THIAGARAJAR COLLEGE, MADURAI - 9.
 (Re-Accredited with 'A' Grade by NAAC)
DEPARTMENT OF COMPUTER SCIENCE
 (For those joined B.Sc. Computer Science on or after June 2019)

Course code	Course Title	Category	L	T	P	Credit
UCS19SE41/UCS19SE61(b)	Android Programming	Skill Enhanced Elective	-	-	2	2

L – Lecture T – Tutorial P – Practical

Year	Semester	Internal	External	Total
II/III	IV/VI	15	35	50

Preamble

This course enables the students will be able to design and create Android apps. Students will do so by leveraging the knowledge of installing Android Studio and Cross Platform Integrated Development Environment.

Course Outcomes

On the completion of the course the student will be able to

#	Course Outcome	Knowledge Level (according to Bloom's Taxonomy)
CO1	Design and implement the user interfaces such as basic controls, views and layouts of Android	K2,K3
CO2	Demonstrate the dialog controls of the Android	K1,K3
CO3	Illustrate the contacts contract provider by showing the contacts and SMS in the mobile phones	K2,K3
CO4	Demonstrate the location based services(LBS).Build program to toggle between map view and satellite view	K1,K3

K1-Knowledge

K2-Understand

K3-Apply

Mapping of COs with POs

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1		S			M
CO2			S		M
CO3				M	
CO4				L	M

S-STRONG

M-MEDIUM

L-LOW

Content

1. BasicControls, Views and Layouts
 - a. Write a program to change the background using button control.
 - b. Write a program to create the options menu (new window, bookmarks, refresh, windows, forward, more) in the browser.
 - c. Write a program to demonstrate scroll view.
 - d. Write a program to demonstrate various Layouts.
2. Dialog Controls
 - a. Write a program to demonstrate alert dialog box.
 - b. Write a program to demonstrate time picker dialog.
 - c. Write a program to demonstrate date picker dialog.
 - d. Write a program to demonstrate progress dialog with spinning wheel.
3. Contacts Contract Provider
 - a. Write a program to show contacts in your phone.
 - b. Write a program to show SMS in your phone.
4. AndroidLBS - GPS
 - a. Write a program to view google map.
 - b. Write a program to know the current location using GPS.
 - c. Write a program to toggle between map view and satellite view.

Text Book:

“Android Aprogrammer” s guide” - Jerome (J.F.) Dimarzio

Web Resources:

<https://developer.android.com/develop/index.html>

<http://www.sanfoundry.com/java-android-programing-examples/>

Course Designer :

Ms.R.Sindhu

THIAGARAJAR COLLEGE, MADURAI - 9.
 (Re-Accredited with 'A' Grade by NAAC)
DEPARTMENT OF COMPUTER SCIENCE
 (For those joined B.Sc. Computer Science on or after June 2019)

Course code	Course Title	Category	L	T	P	Credit
UCS19SE41/UCS19SE61(c)	XML Programming	Skill Enhanced Elective	-	-	2	2

L – Lecture T – Tutorial P – Practical

Year	Semester	Internal	External	Total
II/III	IV/VI	15	35	50

Preamble

This course enables the students to create XML-based schemas and learn to apply transformations using extensible Style sheet Language(XSL). The course examines the wide range of application in XML in DTD creation, schema creation and parsing XML document.

Course Outcomes

On the completion of the course the student will be able to

#	Course Outcome	Knowledge Level (according to Bloom's Taxonomy)
CO1	Create well-formed XML documents.	K1
CO2	Construct programs to import and export the XML documents in the database	K1,K3
CO3	Create XML schemas, XSTL and import, export DTD.	K2,K3
CO4	Develop XML document and parse it using DOM/SAX parser.	K1,K3

K1-Knowledge

K2-Understand

K3-Apply

Mapping of COs with POs

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1		M			M
CO2		M	S		
CO3				M	
CO4		L			S

S-STRONG

M-MEDIUM

L-LOW

Content

1. XML document creation.
 - a. Create XML file that contains the student assessment details (Roll no, Name and marks).
 - b. Create XML file to contain the book details.
2. Importing and Exporting XML document in database
 - a) Import XML data as a binary byte stream
 - b) Import XML data in an existing row
 - c) Importing XML data from a file that contains a DTD
 - d) Specifying the field terminator explicitly using a format file
 - e) Export XML data
3. XSL Transformation.
 - a) Create a CSS stylesheet to display the XML data.
 - b) Link the XSL Style Sheet to the XML Document
4. Internal and External DTD creation.

Create a DTD capturing the document type.
5. XML Schema creation.
6. Parsing XML document using DOM/SAX parser.

Text Book:

“Web Technology” – N.P.GOPALAN, J.AKILANDESWARI

Web Resources:

1. www.xmlmaster.org/en/article/d01/c04
2. www.xmlfiles.com/xml/

Course Designer :

Mrs.R.Sindhu

THIAGARAJAR COLLEGE, MADURAI - 9.
 (Re-Accredited with 'A' Grade by NAAC)
DEPARTMENT OF COMPUTER SCIENCE
 (For those joined B.Sc. Computer Science on or after June 2019)

Course code	Course Title	Category	L	T	P	Credit
UCS19SE41/UCS19SE61(d)	Dot Net Programming	Skill Enhanced Elective	2	-	-	2

L – Lecture T – Tutorial P – Practical

Year	Semester	Internal	External	Total
II/III	IV/VI	15	35	50

Preamble

The aim of this course is to bridge the gap in interoperability between services of various programming languages. It provide environment for developing various types of applications, such as Windows-based applications and Web-based applications

Course Outcomes

On the completion of the course the student will be able to

#	Course Outcome	Knowledge Level (according to Bloom's Taxonomy)
CO1	Develop GUI applications using various form controls.	K2
CO2	Create backend applications using ADO.Net	K3
CO3	Demonstrate string and math functions	K3
CO4	Generate reports using Tree view control	K2, K3
CO5	Handle console and windows applications of C#.Net	K2, K3

K1-Knowledge

K2-Understand

K3-Apply

Mapping of COs with POs

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1		M		L	
CO2		S			S
CO3		M			
CO4				L	M
CO5		L			S

S-STRONG

M-MEDIUM

L-LOW

	CA		End of Semester
	First	Second	
<i>Knowledge-K1</i>	40%	40%	40%
<i>Understand-K2</i>	40%	40%	40%
<i>Apply-K3</i>	20%	20%	20%
Total Marks	30	30	65

Content

1. Control Statements

- Write a program to find out whether the given number is even or odd.
- Write a program to check whether the input is a leap year or not.
- Write a program to find out whether the given number is a prime number.
- Write a program to display the Fibonacci series.

2. Built in Function

i. MathFunction

- Write a program to display the result of one number raised to the power of another.
- Write a program to display the square root of a number.
- Write a program to find the roots of the quadratic equation.

ii. String Function

- Write a program to find the length of a string.
- Write a program to display the reverse of the given string.
- Write a program to determine whether a given string is a palindrome or not.

3. User Defined Function

- Write a program to find the factorial of a given number.
- Write a program to find the average of marks obtained by a student in three subjects.

Text Book:

“Introduction to computing and problem solving using python,
First Edition”E.Balagurusamy

Web Resources:

<https://docs.python.org/3/tutorial/>
<https://www.python.org/about/gettingstarted/>

Course Designer:

Mr.J.Prakash

THIAGARAJAR COLLEGE, MADURAI - 9.
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DEPARTMENT OF COMPUTER SCIENCE
 (For those joined B.Sc. Computer Science on or after June 2019)

Course code	Course Title	Category	L	T	P	Credit
UCS19SE41/UCS19SE61(e)	Linux Programming	Skill Enhanced Elective	2	-	-	2

L – Lecture T – Tutorial P – Practical

Year	Semester	Internal	External	Total
II/III	IV/VI	15	35	50

Preamble

This main aim of this course is to develop software in and for Linux/UNIX environments. Topics to be covered include basic operating system concepts, effective command line usage, shell programming, the C language, programming development tools, system programming, network programming (client-server model and sockets), and GUI programming.

Course Outcomes

On the completion of the course the student will be able to

#	Course Outcome	Knowledge Level (according to Bloom's Taxonomy)
CO1	Know the basic set of commands and utilities in Linux/UNIX systems.	K1
CO2	Build programs for process creation	K1
CO3	Write shell script programs to perform and check the file and directory permissions	K2,K3
CO4	Illustrate AWK programs to display file in the given pattern	K2

K1-Knowledge

K2-Understand

K3-Apply

Mapping of COs with POs

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1		S		M	
CO2		S			
CO3			M	S	
CO4	M	S			S

S-STRONG

M-MEDIUM

L-LOW

	CA		End of Semester
	First	Second	
<i>Knowledge-K1</i>	40%	40%	40%
<i>Understand-K2</i>	40%	40%	40%
<i>Apply-K3</i>	20%	20%	20%
Total Marks	30	30	65

Content

1. Basic Commands
 - a. man, who,cd,ls,mv,rm,mkdir,rmdir,
 - b. date,time,kill,chmod,pwd,ps,echo
2. C – Program
 - a. Write a C – Program to emulate ls-l command
 - b. Write a C- Program to display largest of three numbers
 - c. Write a C- Program to create process.(fork)
 - d. Write a C – Program to find the factorial.
3. Shell - Scripts
 - a. Write a Shell script program to display list of user currently logged in
 - b. Shell script program to check given file is a directory or not.
 - c. Shell script program to implement read, write and execute permission
 - d. Shell program to count number of files in the directory
 - e. Shell program to copy one content in to another
4. AWK program
 - a. Write an AWK script to display files in the directory
 - b. Write an AWK program to display the content of the file in the given pattern.

Text Book:

1. “Gawk: Effective AWK Programming “ Arnold Robbins, Free Software Foundation (July 24, 2009); eBook (updated 2011)
2. “Linux : The complete Reference “, Sixth Edition by Richard Petersen November 2007

Web Resources

1. <http://linux-training.be/linuxfun.pdf>

Course Designer :

Mr.R.Chandrasekar

THIAGARAJAR COLLEGE, MADURAI - 9.
 (Re-Accredited with 'A' Grade by NAAC)
DEPARTMENT OF COMPUTER SCIENCE
 (For those joined B.Sc. Computer Science on or after June 2019)

Course code	Course Title	Category	L	T	P	Credit
UCS19SE41/UCS19SE61(f)	PC Troubleshooting	Skill Enhanced Elective	2	-	-	2

L – Lecture T – Tutorial P – Practical

Year	Semester	Internal	External	Total
II/III	IV/VI	15	35	100

Preamble

The aim of the paper is to provide the basic information related to understanding the hardware components and their maintenance, procedures for troubleshooting.

Course Outcomes

On the completion of the course the student will be able to

#	Course Outcome	Knowledge Level (according to Bloom's Taxonomy)
CO1	Know the basic concepts of PC and Hardware	K1
CO2	Develop techniques in PC assembling	K2
CO3	Identify the peripheral devices.	K2
CO4	Troubleshoot PC assembling	K2,K3

K1-Knowledge

K2-Understand

K3-Apply

Mapping of COs with POs

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S		M		
CO2	M				S
CO3	M				
CO4	S			S	

S-STRONG

M-MEDIUM

L-LOW

Blooms taxonomy

	CA		End of Semester
	First	Second	
<i>Knowledge-K1</i>	40%	40%	40%
<i>Understand-K2</i>	40%	40%	40%
<i>Apply-K3</i>	20%	20%	20%
Total Marks	30	30	65

Content

UNIT 1: 15 Hours

PC, Main Parts: CPU Box, Monitor, & Peripherals [Keyboard, Mouse, Speaker].
Inside CPU Box: Motherboard, I/O Cards, Cables, Floppy Drivers, HDD, CD-Drive.

UNIT2: 15 Hours

Observation of all parts of Floppy drives, HDD, CD, and SMPS. Identification of cables and computers. Mounting Motherboard in cabinet Installation of cards, devices and then connecting cables. Fitting of cabinet. CMOS – Setup Troubleshooting.

Text Books:

- (1) Hardware bible By: Winn L Rosch, Techmedia publications, Publisher: Que Publishing; 6 edition.
- (2) Trouble shooting, maintaining and repairing PCs By: Stephon J Bigelow Tata McGraw Hill Publication, 5 edition.

Web Resources

<http://www.behtek.com/SM/081106Computer.pdf>

<http://www.nbpschools.net/documents/Support%20Services/Technology%20Department/Basic%20Trouble%20Shooting%20Guide.pdf>

Course Designer :

Mr.M.Muthalagu

Lecture Schedule

Ex. No	Topic	No of lecture hrs
1	PC, Main Parts: CPU Box, Monitor, & Peripherals [Keyboard, Mouse, Speaker]	5
2	Inside CPU Box: Motherboard	5
3	I/O Cards, Cables, Floppy Drivers, HDD, CD-Drive	5
4	Observation of all parts of Floppy drives, HDD, CD, and SMPS	5
5	Identification of cables and computers. Mounting Motherboard in cabinet Installation of cards, devices and then connecting cables.	5
6	Fitting of cabinet. CMOS – Setup Troubleshooting.	5

THIAGARAJAR COLLEGE, MADURAI – 9.

(Re-Accredited with 'A' Grade by NAAC)

ENVIRONMENTAL STUDIES

(For those joined B.A., B.Sc., B.Com., B.B.A., B.C.A on or after June 2019)

Course Code	Course Title	Category	L	T	P	Credit
U19EVS11	Environmental Studies	AECC1	2	-	-	2

Year	Semester	Int. Marks	Ext.Marks	Total
First	First	15	35	50

Preamble

Students acquire knowledge on the basic concepts, components and importance of environment.

Course Outcomes

On the completion of the course the student will be able to

	Course outcomes	Knowledge Level
CO1	Define the structure and functions of ecosystem	K1
CO2	Explain the benefits of biodiversity conservation	K2
CO3	Summarise the sources, effects and control measures of various types of Pollutants	K1
CO4	Perceive the environment legislations in India for sustainable development.	K3

K1: Knowledge K2: Understand K3: Apply

Blooms taxonomy: Assessment Pattern

	CA		End of Semester
	First	Second	
<i>Knowledge</i>	40%	40%	40%
<i>Understand</i>	40%	40%	40%
<i>Apply</i>	20%	20%	20%

Unit I

Definition and Scope of Environmental Studies – Ecology and Ecosystem – Structure of an Ecosystem – Food chains, food webs and ecological pyramids – Causes of Biodiversity Loss – Benefit and Conservation of Biodiversity

Unit II

Environmental problems and Management: Causes, effects and Control measures of : Air PSollution – Water PSollution – Noise PSollution – Nuclear Hazards. Solid waste management and Waste DisPSOsal methods. Climate change and Global Warming causes and Measures. Waste and Plastics. Urban environmental problems and measures. Environmental Legislations in India. Sustainable development and Inclusive growth.

Text Book

1. Kanagasabai, C.S. 2005.Environmental Studies. Rasee publishers. Madurai.

Reference Books

1. Yogendra, N. and Srivastava, N. 1998. Environmental Pollution, Ashish Publishing House. New Delhi.
- Sapru R.K.2001. Environment Management in India, Vol. I & Vol. II Ashish publishers house, New Delhi.

THIAGARAJAR COLLEGE, MADURAI – 9.
(Re-Accredited with ‘A’ Grade by NAAC)
VALUE EDUCATION

(For those joined B.A., B.Sc., B.Com., B.B.A., B.C.A on or after June 2019)

Course Code	Course Title	Category	L	T	P	Credit
U19VE51	Value Education	AECC1	2	-	-	2

Year	Semester	Int. Marks	Ext.Marks	Total
Third	Fifth	15	35	50

Preamble

Students acquire knowledge on the basic concepts, components and importance of environment.

Course Outcomes

On the completion of the course the student will be able to

	Course outcomes	Knowledge Level
CO1	Define the structure and functions of ecosystem	K1
CO2	Explain the benefits of biodiversity conservation	K2
CO3	Summarise the sources, effects and control measures of various types of Pollutants	K1
CO4	Perceive the environment legislations in India for sustainable development.	K3

K1: Knowledge K2: Understand K3: Apply

Blooms taxonomy: Assessment Pattern

	CA		End of Semester
	First	Second	
<i>Knowledge</i>	40%	40%	40%
<i>Understand</i>	40%	40%	40%
<i>Apply</i>	20%	20%	20%

Unit I

Self Development – Introduction - Definition and Types of Values – Self Assessment – Values needed for self development - Values needed for family life –Principles of happy living

Character development- Good character – Good relationships - Legendary people of highest character – The quest for character –Developing character -The key to good character.

Unit II:

Positive Thinking and Self Esteem - Types of thoughts - Areas of thinking - Developing thought pattern - External influences on Thoughts - Methods to keep outlook positive – Meaning of Self Esteem – Self empowerment.

Stress free living – Illusions and causes - Symptoms and stages of stress – Self confidence– Role models and leadership qualities – Critical thinking - Communication skills – Happy and successful life.

Reference

Study material / Course material

Values for Excellence in Life|| Compiled by then Curriculum Development Cell Thiagarajar College, Madurai, in collaboration with the Education wing, Brahma Kumaris, Madurai.

விழுமியக் கல்வி

கூறு - 1

சுய முன்னேற்றம்

அறிமுகம் - விழுமியங்களின் விளக்கம் மற்றும் வகைகள் - சுயமதிப்பீடு - சுய முன்னேற்றத்திற்கு விழுமியங்களின் தேவை - குடும்ப வாழ்க்கைக்கு விழுமியங்களின் தேவை - மகிழ்ச்சியான வாழ்க்கைக்கான கொள்கைகள்

பண்பு வளர்ச்சி

நற்பண்பு - நல்லுறவு - உயரிய பண்புகளால் உயர்ந்த பெருமக்களாதல் - பண்புகளைத் தேடல் - பண்புகளை வளர்த்தல் - நற்பண்புகளுக்கான திறவுகோல்.

கூறு - 2

சுயமரியாதையும் நேர்மறைச் சிந்தனையும்

சிந்தனையின் வகைகள் - சிந்தனைப் பகுதிகள் - சிந்தனையை வளர்க்கும் முறை - சிந்தனையில் புறத்தாக்கங்கள் - நேர்மறைப் பண்பை வெளித்தோற்றத்தில் காட்டும்முறை - சுயமரியாதையின் பொருள் - சுய அதிகாரமளித்தல்

அழுத்தமில்லா வாழ்க்கை

பிரமைகளும் காரணங்களும் - அழுத்த நிலைகளுக்கான அறிகுறிகள் - தன்மப்பிக்கை - தலைமைப் பண்பில் முன்னுதாரணங்கள் - விமர்சனச் சிந்தனை - தொடர்புத் திறன்கள் - மகிழ்ச்சி மற்றும் வெற்றிகரமான வாழ்க்கை

Reference

Study material / Course material

**“Values for Excellence in Life” Compiled by then Curriculum Development Cell
Thiagarajar College, Madurai, in collaboration with the Education wing, Brahma
Kumaris, Madurai**

Self Study Paper

Thiagarajar College (Autonomous) :: Madurai – 625 009

SELF STUDY PAPER

(For those joined UG on or after June 2019)

Course Code	Course Title	Category	L	T	P	Credit
U19SS51	Soft Skills	Self Study Paper	-	-	-	5

Year	Semester	Int. Marks	Ext.Marks	Total
Third	Fifth	----	100	100

*** Carries Extra 5 credits that do not form part mandatory credits (140) required for completion of the course. Optional paper not compulsory for all UG students.**

Preamble

Prepare the students to develop skills, provide training to face interview .prepare themselves with the right skill-sets and attitude

Course Outcomes

On the completion of the course the student will be able to

	Course outcomes	Knowledge Level
CO1	Possess a basic idea on the understanding of nature, cause, effect and ways to deal with critical challenges in everyday life	K1,K2
CO2	Overcome the aspects such as Communication barriers, Stress management, Emotions.	K3
CO3	Gain insights into high-in-demand soft skills and prepare themselves with the right skill-sets and attitude	K1,K2
CO4	Develop or take part inteam work, Thinking skills, Creativity and time management.	K3
CO5	Prepare themselves to face different levels of interviews. Develop skills to manage an organization	K3

K1: Knowledge K2: Understand K3: Apply

Blooms taxonomy: Assessment Pattern

	CA		End of Semester
	First	Second	
<i>Knowledge</i>	40%	40%	40%
<i>Understand</i>	40%	40%	40%
<i>Apply</i>	20%	20%	20%

Unit - 1

Self Awareness (Concept of Self-esteem, Positive and Negative self esteem)
Motivation (Nature and types, Factors enhancing and affecting Motivation, Needs and

Drives) (Creativity Introduction, Nature of Creativity, Stages of Creativity, Enhancing Creativity, Verbal and Non Verbal Creativity) Values and Ethics (Nature and Significance, Values, Ethics, Work Ethics, Character building, Manners and Ethics)

Self Management (Self management skills and Social Competency, Social Competency Behaviour, Value Orientation, Life goals)

Unit 2

Communication and Thinking Communication (Definition, Types, Styles, Culture and Communication); Thinking (Nature, Types, Problem Solving, Proactive thinking, Positive Thinking, Assertiveness)

Unit 3

Emotions (Nature of emotions, Emotional Intelligence and its strategies, Attachment, Love, Happiness, Introduction to Anger – Causes, Types, Functions and Consequences, Anger management)

Stress (Nature of stress, Relation between Demands and Coping, Types and Causes, Effects and Indicators, Management of Stress, Time management and Stress reduction) Empathy (Definition, Nature and Factors enhancing empathy)

Unit 4

Excelling through a placement process(Resume writing; Taking a written test; Group discussion – Need, Types, Tips and techniques; Interview handling – Tips and Techniques)

Unit 5

Being effective in an organisation

50 rules of work, Professional Etiquettes and Mannerism, Building relationship within an organisation, Communication skills, Working in teams, Managing conflicts, Effective negotiation skills, Problem solving using creativity.

Text book

1. Life Skills for Success – AlkaWadkar – 2016 Edition SAGE | TEXTS
Sagepublishing.com
2. Campus to Corporate – Roadmap to Employability – Gangadhar Joshi – 2015 Edition
SAGE | TEXTS Sagepublishing.com

Reference textbook

- 1 ACE of Soft skills – Gopalaswamy Ramesh and Mahadevan Ramesh, Pearson
Publication
- 2 Bridging the soft skills gap – Bruce Tulgan – 2015 Edition – Wiley Publication

B.Sc. Computer Science

Assessment values of course learning outcomes and their mapping with program specific outcomes (PSOs)

Major papers

Title of the courses	PSO1	PSO2	PSO3	PSO4	PSO5
Digital Principles & Applications	14	0	0	5	4
Programming in C	9	4	5	6	2
C – Lab	2	8	0	4	0
Object Oriented Programming with C++	4	15	4	3	4
Web Designing	6	8	9	3	1
C++ Lab	4	11	8	2	6
Web Designing Lab	5	4	10	2	0
Fundamentals of Data structure	2	10	4	4	2
System Software	8	10	4	4	2
Database Management System	15	10	3	1	1
Data Structure Lab	10	13	5	4	2
Database Management Lab	9	5	5	4	3
Java Programming	5	14	4	4	10
Computer Architecture	12	1	1	5	3
Computer Graphics	8	8	8	8	7
Java Programming Lab	2	3	6	8	8
Graphics Lab	4	8	0	2	3
Automata Theory	0	2	5	2	6
Software Engineering	3	6	9	5	8
Python Programming	9	10	4	4	5
Python Programming Lab	0	5	7	13	8
Data mining and Warehousing	0	9	3	0	4
Data Communication & Networking	6	2	7	1	4
Operating System	10	7	5	7	1
Cloud Computing	15	2	6	1	2
Project					

NME / SBE papers

Title of the courses	PSO1	PSO2	PSO3	PSO4	PSO5
Environmental Studies					
English Writing					
Software Development	4	2	6	6	0
Options given					
Internet Applications	4	2	3	3	6
Value Education					
Options given					

Allied / Ancillary papers

Title of the courses	PSO1	PSO2	PSO3	PSO4	PSO5
Mathematical Foundation for Computer Science	3	6	6	4	4
Operational Research	9	2	5	2	3
Computational Methods	6	3	2	2	3
Statistics	6	6	5	4	6

Core Electives

Title of the courses	PSO1	PSO2	PSO3	PSO4	PSO5
Mobile Applications	4	2	9	2	2
E-Commerce Technologies	12	6	5	2	1
Artificial Intelligence	3	6	10	2	6
Multimedia Technology	11	3	10	6	6

Skill Enhanced Electives

Title of the courses	PSO1	PSO2	PSO3	PSO4	PSO5
PHP Programming	1	7	11	3	3
Android Programming	0	3	3	3	6
XML Programming	0	5	3	2	5
Dot Net Programming	0	8	0	2	8
Linux Programming	2	9	2	5	3
PC Troubleshooting	10	0	2	3	3

M.Sc.,
Computer Science
ProgrammeCode : PCS

Programme outcome-PO (Aligned with Graduate Attributes)- Master of Science (M.Sc.,)

Knowledge

Acquire an overview of concepts, fundamentals and advancements of science across a range of fields, with in-depth knowledge in at least one area of study. Develop focused field knowledge and amalgamate knowledge across different disciplines.

Complementary skills

Students will be able to engage in critical investigation through principle approaches or methods and through effective information search and evaluation strategies. Employ highly developed conceptual, analytical, quantitative and technical skills and are adept with a range of technologies;

Applied learning

Students will be able to apply disciplinary or interdisciplinary learning across multiple contexts, integrating knowledge and practice. Recognize the need for information; effectively search for, evaluate, manage and apply that information in support of scientific investigation or scholarly debate;

Communication

Communicate effectively on scientific achievements, basic concepts and recent developments with experts and with society at large. Able to comprehend and write reports, documents, make effective presentation by oral and/or written form.

Problem solving

Investigate, design and apply appropriate methods to solve problems in science, mathematics, technology and/or engineering.

Environment and sustainability

Understand the impact of the solutions in ethical, societal and environmental contexts and demonstrate the knowledge of and need for sustainable development.

Teamwork, collaborative and management skills.

Recognise the opportunities and contribute positively in collaborative scientific research. Engage in intellectual exchange of ideas with researchers of other disciplines to address important research issues

THIAGARAJAR COLLEGE – AUTONOMOUS MADURAI – 625 009.

**(Re-Accredited With ‘A’ Grade by NAAC)
Department of Computer Science**

M.Sc. Computer Science

(For those joined B.Sc. Computer Science on or after June 2019)

PROGRAMME EDUCATIONAL OBJECTIVES (PEOS)

PEO1: Graduates are prepared to acquire broad knowledge of Computer Science and a focused understanding of their area of interest.

PEO2: Graduates will gain the ability to work effectively as a team member and/or leader in dynamic professional environment;

PEO3: Graduates will be capable to take up research programmes

PEO4: Graduates are prepared to survive in rapidly changing technology and engage in life-long learning.

PEO5: Graduates work effectively in multi-disciplinary and multi-cultural environments by respecting professionalism and ethical practices within organization and society at national and international level.

PROGRAMME SPECIFIC OUTCOMES:

PSO1: Demonstrate understanding of the principles and working of the hardware and software aspects of computer systems.

PSO2: Assess to understand the structure and development methodologies of software systems.

PSO3: Possess professional skills and knowledge of software design process.

PSO4: Familiarity and practical competence with a broad range of programming language and open source platforms.

PSO5: Be at ease with the contemporary issues, latest trends in technological development and there by innovate new ideas and solutions to existing problems.

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Course Structure

A) Consolidation of Contact Hours and Credits : PG

Semester	Contact Hrs / Week	Credits
I.	30	24
II.	30	24
III.	30	23
IV.	30	19
Total	120	90

B) Curriculum Credits

Core	67 Credits
Major Elective	23 Credits

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DEPARTMENT OF COMPUTER SCIENCE

(For those joined M.Sc. Computer Science on or after June 2019)

M.Sc. Computer Science

(For those joined B.Sc. Computer Science on or after June 2019)

Course Structure

Code No	Type of Paper	Subject	Contact hours /weeks	Credits	Total No of hours Allotted	Max. Marks CA	Max. Marks SE	Total
Semester –I								
PCS19C11	Core 1	Python Programming	5	5	75	25	75	100
PCS19C12	Core 2	Distributed Operating Systems	5	5	75	25	75	100
PCS19C13	Core 3	Advanced DBMS	5	5	75	25	75	100
PCS19C14	Core 4	Discrete Mathematics	5	5	75	25	75	100
PCS19CL11	Core lab1	Lab in Python Programming	5	2	75	40	60	100
PCS19CL12	Core lab 2	Lab in Advanced DBMS	5	2	75	40	60	100
			30	24	450	180	420	600
Semester –II								
PCS19C21	Core 5	Compiler Design	5	5	75	25	75	100
PCS19C22	Core 6	Network Security	5	5	75	25	75	100
PCS19C23	Core 7	Advanced Java	5	5	75	25	75	100
PCS19CE21	Elective I	Elective Paper –I	4	5	60	25	75	100
PCS19CL21	Core lab 3	Lab in Dot Net Programming	6	2	90	40	60	100
PCS19CL22	Core lab 4	Lab in JAVA Programming	5	2	75	40	60	100
			30	24	450	180	420	600

Semester –III								
PCS19C31	Core 8	Data Mining Techniques	5	4	75	25	75	100
PCS19C32	Core 9	Web Technologies	5	4	75	25	75	100
PCS19C33	Core 10	Big Data Analytics	5	4	75	25	75	100
PCS19CE31	Elective -II	Elective-II	4	5	60	25	75	100
PCS19CL31	Core lab 5	Lab in Open Source Technology	4	2	60	40	60	100
PCS19CL32	Core lab 6	Lab in Web Technology	4	2	60	40	60	100
PCS19MP31	MPJ	Mini Project (Elective-III)	3	2	45	40	60	100
			30	23	450	220	480	700
Semester –IV								
PCS19C41	Core 11	Multimedia Technology	6	4	90	25	75	100
PCS19C42	Core 12	Cloud Computing	6	4	90	25	75	100
PCS19CE41	Elective-IV	Elective-IV	6	5	90	25	75	100
PCS19PJ41	PJ	Project Work & Viva Voce (Elective-V)	12	6	-	40	60	100
			30	19	270	115	285	400

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Department of Computer Science
Syllabus for M.Sc. Computer Science
Effect from 2018-2020 Batch onwards

First Semester	
Subjects	Elective
1. Python Programming	
2. Distributed Operating Systems	
3. Advanced DBMS	
4. Discrete Mathematics	
5. Lab in Python Programming	
6. Lab in Advanced DBMS	

Second Semester	
Subjects	Elective
1. Compiler Design	Elective - I
2. Network Security	
3. Advanced JAVA	
4. Lab in Dot Net Programming	
5. Lab in JAVA Programming	

Third Semester	
Subjects	Elective
1. Data Mining Techniques	Elective - II
2. Web Technologies	Elective-III (Mini Project)
3. Big Data Analytics	
4. Lab in Open Source Technology	
5. Lab in Web Technology	

Fourth Semester	
Subject	Elective
1. Multimedia Technology	Elective-IV
2. Cloud Computing	Elective V (Major Project) (4 Months Industrial Project)

M.Sc. Computer Science
(For those joined B.Sc. Computer Science on or after June 2019)

List of Electives

1. Computer Architecture and Parallel Processing
2. Artificial Neural Networks
3. Digital Image Processing
4. Bio-Informatics
5. Parallel Computing
6. Computer Simulation and Modeling
7. Software Project Management
8. Real Time and Embedded Systems
9. Soft Computing
10. Mobile Computing
11. Pervasive Computing
12. Bluetooth Technology
13. Wireless Sensor Networks
14. Virtual Reality
15. Internet Of Things
16. Green Computing

Thiagarajar College, Madurai – 625 009
Department of Computer Science
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Course code	Course Title	Category	L	T	P	Credit
PCS19C11	Python Programming	Core1	5	-	-	5

L – Lecture T – Tutorial P - Practical

Year	Semester	Internal	External	Total
I	I	25	75	100

Preamble:

Python is widely used high-level, general-purpose, interpreted, dynamic programming language. It has simple easy-to-use syntax, making it the perfect language. The course brings Python programming to your desk with anecdotes, analogies and illustrious examples and Deals with Object Oriented Programming, network, web programming with Python.

Prerequisite:

Familiar with any programming language and basic knowledge of concepts in programming.

Course Outcomes:

#	Course Outcome	Knowledge Level (according to Bloom's Taxonomy)
CO1	Define the basic concepts of Python Programming	K2
CO2	Demonstrate the sequence and mapping type.	K2
CO3	Explaining exception and Object Oriented Programming.	K1
CO4	Analyze with network and internet programming and matching with regular expression.	K1, K3,K4
CO5	Develop web applications and database program.	K1,K3,K5

K1-Knowledge K2-Understand K3-Apply K4-Analyze K5-Evaluate

Mapping of COs with POs

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S			L	
CO2	L	S		L	
CO3		M			
CO4				M	
CO5			M	M	S

Blooms taxonomy

	CA		End of Semester
	First	Second	
Knowledge -K1	15% (9)	15% (9)	20% (30)
Understand -K2	15% (9)	15% (9)	20% (30)
Apply-K3	30% (18)	30% (18)	20% (30)
Analyze-K4	20% (12)	20% (12)	20% (30)
Evaluate-K5	20% (12)	20% (12)	20% (30)
Total Marks	60	60	150

Unit - I

Basics: Introduction-Statements and Syntax -Variable Assignments-Identifier-Style-Memory Management-Application Example.

Objects: Introduction-Standard Type- Built-in-type-Internal type-Standard type operator and Built-in functions-Categorizing standard type-Unsupported type.

Numbers: Introduction- Integer-Floating Point-Complex numbers-Operators-Built-in-functions-Other numeric type

Unit - II –Sequence: Strings, Lists, And Tuples: Strings-Strings and Operators-String-Only operators-Built-in-Functions-Built-in-Methods-String Features-Unicode-Related Modules.

List-Operators-Built-in-Functions-Built-in-Methods-Features of List-Tuple: Introduction-Operators and Built-in-Functions-Features-Related Modules.

Mapping type: Dictionaries- Operators-Built-in and Factory Functions-Built-in- Methods-Dictionary Keys.

Conditional And Loops: If statement – else-Expressions- while, for, break, continue, pass statement-Iterators and the iter() function-List comprehensions, Generator expression- Related modules.

Unit – III

Errors and Exceptions: Exceptions in Python –Detecting and Handling Exceptions-Context Management-Exceptions as Strings-Raising ,Assertions & Standard Exceptions-Creating Exceptions- Sys module

Functions and Functional Programming –Object-Oriented Programming: Introduction – classes – Attributes – Instances- static and class methods – subclassing and derivation – Inheritance

Unit – IV

Regular Expressions: Introduction –Special Symbols and characters –REs and Python- Example

Network Programming: Introduction-Sockets-Programming in Python-Socketserver Module-Twisted Framework-Related Modules

Internet Client Programming: Internet Clients – Transferring Files-Network News- E-mail

Unit – V

Web Programming: Introduction – Web surfing with Python-Advanced web Clients-CGI-Application-Unicode with CGI-Advanced CGI-Web Servers

Database Programming: Introduction-DB-API-ORMs-Related modules

TEXT BOOK:

Chun, J Wesley, Core Python Programming, 2nd Edition, Pearson.

Chapters :(Relevant topics only)

Unit-I- Chapter 3,4,5

Unit-II: Chapter6,7,8

Unit-III: Chapter10,11,13

Unit-IV: Chapter 15,16,17

Unit-V: Chapter 20,21

REFERENCES:

Wesley J Chun Core python Application Programming, 3rd Edition

WEB RESOURCES:

1. <https://www.pythonforbeginners.com/basics/python-websites-tutorials>
2. <https://www.computerscienceonline.org/cutting-edge/python/>
3. <https://www.pythonspot.com>

Course Designers:

1. Mr.V.Anand

Course contents and lecture schedule

Sl.No.	Topic	No of lecture hrs.	Mode of teaching
Unit-I		12 Hrs	
1.	Python Introduction	7	Lecture
2	Objects & Numbers	5	Ppt presentation
Unit-II		15 Hrs	
3	Sequences: Strings ,Lists & tuples	5	Lecture
4	Mapping Type Dictionaries	5	Ppt presentation
5	Conditional and Looping Statements	5	Seminar
Unit-III		17 Hrs	
6	Error and Exceptions	5	Seminar
7	Functions & Functional Programming	5	Seminar
8	Object Oriented Programming	7	Ppt presentation
Unit-IV		17 Hrs	
9	Regular Expressions	6	Ppt presentation
10	Network Programming	6	Ppt and demo
11	Internet & Client Programming	5	Lecture
Unit-V		14 Hrs	
12	Web Programming	7	Ppt presentation
13	Database Programming	7	Ppt presentation

THIAGARAJAR COLLEGE – AUTONOMOUS MADURAI – 625 009.

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Department of Computer Science

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Course code	Course Title	Category	L	T	P	Credit
PCS19C12	Distributed Operating Systems	Core2	5	-	-	5

Year	Semester	L – Lecture T – Tutorial P - Practical			Total
		Internal	External		
I	I	25	75	100	

Preamble:

To provide an in in-depth knowledge in Distributed Operating Systems Concepts.

Prerequisite:

Students are expected to know and understand the fundamentals of operating systems which include design and implementation of operating systems, file systems, and distributed operating systems.

Course Outcomes:

#	Course Outcome	Knowledge Level (according to Bloom’s Taxonomy)
CO1	Explain the fundamentals and the basic message passing methods	K1
CO2	Outline the Remote procedure calls , basic models, protocols and Exception handling	K2
CO3	Explain the general architecture , implementation and models of DSM	K2
CO4	Examine the Resource Management and Process Management Techniques	K1,K4
CO5	Extend the concepts Distributed file systems along with case study	K5

K1-Knowledge K2-Understand K3-Apply K4-Analyze K5-Evaluate

Mapping of COs with POs

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S				
CO2		L			
CO3	S				
CO4		M		L	
CO5	M		L		S

Blooms taxonomy

	CA		End of Semester
	First	Second	
Knowledge -K1	15% (9)	15% (9)	20% (30)
Understand -K2	15% (9)	15% (9)	20% (30)
Apply-K3	30% (18)	30% (18)	20% (30)
Analyze-K4	20% (12)	20% (12)	20% (30)
Evaluate-K5	20% (12)	20% (12)	20% (30)
Total Marks	60	60	150

Unit I

Fundamentals: Distributed Computer System– Evolution of Distributed Computing Systems- Distributed Computing Systems Models- Distributed Computing Systems Gaining Popularity- Distributed Operating System- Issues in Designing a Distributed operating System- Introduction to Distributed Computing Environment(DCE).

Message Passing: Introduction-Desirable Features of a Good Message-Passing System-Issues in IPC by Message Passing-Synchronization-Buffering-Multidatagram Messages-Encoding and Decoding of Message Data-Process Addressing-Failure handling-Group Communication-Case Study: 4.3 BSD UNIX IPC Mechanism.

Unit II

Remote Procedure Calls: Introduction-The RPC Model-Transparency of RPC-Implementing RPC Mechanism-Sub Generation-RPC Messages-Marshaling Arguments and Results-Server Management-Parameter-Passing Semantics-Call Semantics-Communication Protocols for RPCs-Complicated RPCs-Client Server Binding-Exception Handling-Security-Some Special Types of RPCs-RPC is Heterogeneous Environments-Light weight RPC-Optimizations for Better Performance-Case Studies: Sun RPC, DCE, and IPC.

Unit III

Distributed Shared Memory: Introduction-General Architecture of DSM Systems-Design and implementation issues of DSM-Granularity-Structure of Shared Memory Space-Consistency Models-Replacement Strategy-Thrashing-Other Approaches to DSM-Heterogeneous DSM-Advantages DSM.

Unit IV

Resource Management: Introduction-Desirable Features of a Good Global Scheduling Algorithm-Task Assignment Approach-Load-Balancing Approach-Load Sharing Approach.

Process Management: Introduction-Process Migration-Threads.

Unit V

Distributed File System: Introduction-Desirable Features of a Good Distributed File System-File Models – File-Accessing Models-File sharing Semantics-File Caching Schemes-File Replication-Fault Tolerance-Atomic Transactions-Design Principles-Case Study: DCE Distributed File Service.

Text Book:

1. Distributed Operating Systems Concepts and Design, Author: Pradeep.K.Sinha, PHI, First Edition.

References:

1. Distributed Operating Systems-Andrews S.Tanenbaum, I edition PHI
2. Distributed Operating System and Algorithms and Analysis-Randy chow, Theodore. Johnson, Pearson Education, Inc.-Addison Wesley.

WEB RESOURCES:

1. <https://www.w3schools.in/operating-system-tutorial/distributed-system/>
2. <https://www.ecomputernotes.com>
3. <https://www.ics.uci.edu/~cs230/lectures/DistributedOSintro.pdf>

Course designer:

Mrs.L.Krishnaveni

Course contents and lecture schedule

S.No	Topic	No of lecture hrs.	Mode of Teaching
Unit-I		14 Hrs	
1	Fundamentals	5	Lecture
2	Distributed Computing Environment	5	PPT Presentation
3	Message Passing	4	PPT Presentation
Unit-II		12 Hrs	
4	Remote Procedure Calls	4	Lecture
5	Communication Protocols for RPCs	5	Lecture
6	Some Special Types of RPCs	3	PPT Presentation
Unit-III		9 Hrs	
7	Distributed Shared Memory	6	Lecture
8	Other Approaches to DSM	3	Demo in Smart Class
Unit-IV		11 Hrs	
9	Resource Management	6	PPT Presentation
10	Process Management	5	Lecture
Unit-V		14 Hrs	
11	Distributed File System	5	Demo in Smart Class
12	File-Accessing Models	5	Seminar
13	Case Study: DCE Distributed File Service	4	Seminar

THIAGARAJAR COLLEGE – AUTONOMOUS MADURAI – 625 009.
(Re-Accredited With ‘A’ Grade By NAAC)

Department of Computer Science

(For those joined M.Sc. Computer Science on or after June 2019)

Course code	Course Title	Category	L	T	P	Credit
PCS19C13	Advanced DBMS	Core3	5	-	-	5

Year	Semester	L – Lecture			T – Tutorial			P - Practical		
		Internal	External	Total	Internal	External	Total	Internal	External	Total
I	I	25	75	100						

Preamble:

Define the terminology, features, classifications, and characteristics embodied in database systems.

Prerequisite:

Familiar to store and manage the data, knowledge about the structured query language.

Course Outcomes:

#	Course Outcome	Knowledge Level (according to Bloom’s Taxonomy)
CO1	Demonstrate an understanding of the relational databases	K1
CO2	Transform an information model into a relational database schema and to use a data definition language and/or utilities to implement the schema using a DBMS.	K2
CO3	Explain the Data storage and experiment with query processing	K4
CO4	Demonstrate the basic concept of Transaction processing	K1
CO5	Classify the system architecture for better understanding of databases	K2,K3,K4

K1-Knowledge K2-Understand K3-Apply K4-Analyze K5-Evaluate

Mapping of COs with POs

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S				
CO2		L		S	
CO3			M		
CO4	S			S	
CO5				M	S

Blooms taxonomy

	CA		End of Semester
	First	Second	
Knowledge -K1	15% (9)	15% (9)	20% (30)
Understand -K2	15% (9)	15% (9)	20% (30)
Apply-K3	30% (18)	30% (18)	20% (30)
Analyze-K4	20% (12)	20% (12)	20% (30)
Evaluate-K5	20% (12)	20% (12)	20% (30)
Total Marks	60	60	150

Unit -I

RELATIONAL DATABASES Structure of Relation Databases – Database Schema – Keys – Schema Diagrams – Relational Query Languages – Relational Operations – Overview of SQL Query Language – SQL Data Definition – Basic Structure of SQL Queries – Additional Basic Operations – Set Operations – Null Values

– Aggregate Functions – Nested Subqueries – Modification of the Database – Join Expressions – Views – Transactions – Integrity Constraints – SQL Data Types and Schemas – Authorization.

Unit- II

DATABASE DESIGN Accessing SQL From a Programming Language – Functions and Procedures – Triggers – Overview of the Design Process – The Entity- Relationship Model – Constraints – Removing Redundant Attributes in Entity Sets – Entity-Relationship Diagrams – Reduction to Relational Schemas – Entity-Relationship Design Issues – Extended E-R Features – Features of Good Relational Designs – Atomic Domains and First Normal Forms – Decomposition using Functional Dependencies – Functional-Dependency Theory – Algorithms for Decomposition – Decomposition using Multivalued Dependencies – More Normal Forms.

Unit- III

DATA STORAGE AND QUERYING Overview of Physical Storage Media – Magnetic Disk and Flash Storage – RAID – Tertiary Storage – File Organization – Organization of Records in Files – Data-Dictionary Storage – Database Buffer – Basic Concepts of Indexing and Hashing – Ordered Indices – B+- Tree Index Files – B+- Tree Extensions – Multiple-Key Access – Static Hashing – Dynamic Hashing – Overview of Query Processing – Measures of Query Cost – Selection Operation – Sorting – Join Operation.

Unit- IV

TRANSACTION MANAGEMENT Transaction Concept – A Simple Transaction Model – Storage Structure – Transaction Atomicity and Durability – Transaction Isolation – Serializability – Transaction Isolation and Atomicity – Transaction Isolation Levels – Implementation of Isolation Levels – Transactions as SQL Statements – Lock-Based Protocols – Deadlock Handling – Multiple Granularity – Timestamp-Based Protocols – Validation-Based Protocols – Multiversion Schemes – Snapshot Isolation – Insert Operation, Delete Operations, and Predicate Reads – Weak Levels of Consistency in Practice – Concurrency in Index Structures.

Unit -V

SYSTEM ARCHITECTURE – Homogeneous and Heterogeneous Databases – Distributed Data Storage – Distributed Transactions – Commit Protocols – Concurrency Control in Distributed Databases – Availability – Distributed Query Processing – Heterogeneous Distributed Databases – Cloud-Based Databases – Directory Systems – Decision-Support Systems.

Text Book

Abraham Silberschatz, Henry F. Korth, S. Sudharshan, “Database System Concepts”, Sixth Edition, Tata McGraw Hill, 2013

REFERENCE BOOKS

1. C.J.Date, A.Kannan, S.Swamynathan, “An Introduction to Database Systems”, Eighth Edition, Pearson Education, 2006.
2. RamezElmasri, Shamkant B. Navathe, “Fundamentals of Database Systems”, Fifth Edition, Pearson, 2008.
3. Raghu Ramakrishnan, “Database Management Systems”, Fourth Edition, Tata McGraw Hill, 2010.
4. G.K.Gupta, “Database Management Systems”, Tata McGraw Hill, 2011.

WEB RESOURCES:

1. <https://www.tutorialspoint.com/dbms/>
2. https://www.tankonyvtar.hu/...advanced_database_systems/20...
3. <https://www.w3schools.in/dbms/>

Course designer:

Mrs.L.Krishnaveni

Course contents and lecture schedule

Chapters	Topic	No of lecture hrs.	Mode of Teaching
Unit-I		15 Hrs	
1	Introduction to the Relational Model	5	Lecture
2	Introduction to SQL	3	PPT Presentation
3	Intermediate SQL	3	PPT Presentation
4	Advanced SQL	4	Lecture
Unit-II		11 Hrs	
5	Database Design and the E-R Model	6	Lecture
6	Relational Database Design	5	PPT Presentation
Unit-III		15 Hrs	
7	Storage and File Structure	5	Lecture
8	Indexing and Hashing	5	Demo in Smart Class
9	Query Processing	5	PPT Presentation
Unit-IV		6 Hrs	
10	Transactions	6	Lecture
Unit-V		13 Hrs	
11	Concurrency Control	5	Demo in Smart Class
12	Distributed Databases	4	Seminar
13	Data Warehousing and Mining	4	Seminar

THIAGARAJAR COLLEGE – AUTONOMOUS MADURAI – 625 009.

**Department of Computer Science
(For those joined M.Sc. Computer Science on or after June 2019)**

Course code	Course Title	Category	L	T	P	Credit
PCS19C14	Discrete Mathematics	Core4	5	-	-	5

Year	Semester	L – Lecture T – Tutorial P - Practical			Total
		Internal	External		
I	I	25	75	100	

Preamble:

To understand the advanced concepts of mathematics which are essential for better understanding as well as development of the computer science subjects and its applications

Prerequisite:

Familiar with basic abstract algebra

Course Outcomes:

#	Course Outcome	Knowledge Level (according to Bloom's Taxonomy)
CO1	Communicate set theoretical concepts	K1
CO2	Familiarize the fundamental concepts in functions	K1,K2
CO3	Represent graphs in matrix and apply graph theoretical ideas in problem solving	K2,K3
CO4	Demonstrate the notion of effective computability	K4,K5
CO5	Analyze the given language is regular or not	K3,K4,K5

K1-Knowledge K2-Understand K3-Apply K4-Analyze K5-Evaluate

Mapping of COs with POs

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S				
CO2		M	S		
CO3	M				
CO4	S				
CO5			M	L	S

Blooms taxonomy

	CA		End of Semester
	First	Second	
Knowledge -K1	15% (9)	15% (9)	20% (30)
Understand -K2	15% (9)	15% (9)	20% (30)
Apply-K3	30% (18)	30% (18)	20% (30)
Analyze-K4	20% (12)	20% (12)	20% (30)
Evaluate-K5	20% (12)	20% (12)	20% (30)
Total Marks	60	60	150

Unit I: (Set theory, Relations)

Set theory: Introduction – Sets – Notation and Description of Sets – Subsets – Venn-Euler Diagram.

Relations: Cartesian product – Relations– Operations on Relations – Equivalence Relation.

Unit-II: (Functions)

Functions: Functions and Operators – One-one, onto functions – Special types of functions.

Unit III: (Graph theory)

Basic concepts – Matrix representation of Graphs – Trees.

Unit IV: (Finite Automata)

Finite state systems (FA & NFA) – Basic Definitions – FA & NFA with ϵ – moves.

Unit-V: (Regular Expressions & Pumping Lemma)

Regular expressions – Moore and Mealy machines-The pumping Lemma for regular sets.

Text Books:

1. Discrete Mathematics by Dr. M.K. Venkataraman, Dr. N. Sridharan and Author: N. Chandrasekaran (The National Publishing Company)
2. Introduction to Automata theory, Languages and Computation by John. E. Hopcroft, Author:Jeffery d. Ullman (Narosa Publications, 15th Reprint, 1997)

Reference Books:

1. Discrete Mathematics – Schaum's outline series (second edition)
2. Graph theory with application to engineering and computer science by NarsinghDeo.
3. Discrete Mathematics by S. Sundaresan, K.S. Ganapathy Subramanian and K. Ganesan.
4. Invitation to Graph theory by S.Arumugam and Ramachandran.

WEB RESOURCES:

1. <http://home.iitk.ac.in/~aralal/book/mth202.pdf>
2. https://www.tutorialspoint.com/discrete_mathematics/discrete_mathematics_pdf_version.htm
3. <http://www.freebookcentre.net/Mathematics/Discrete-Mathematics-Books.html>

Thiagarajar College, Madurai – 625 009

Department of Computer Science

(For those joined M.Sc. Computer Science on or after June 2019)

Course code	Course Title	Category		L	T	P	Credit
PCS19CL11	Lab in Python Programming	CoreLab1		-	-	5	2

Year	Semester	L – Lecture			T – Tutorial			P - Practical		
		Internal	External	Total	Internal	External	Total	Internal	External	Total
I	I			40		60				100

Preamble:

Python is widely used high-level, general-purpose, interpreted, dynamic programming language. It has simple easy-to-use syntax, making it the perfect language. The course brings Python programming to your desk with anecdotes, analogies and illustrious examples and Deals with Object Oriented Programming, network, web programming with Python.

Prerequisite:

Familiar with any programming language and basic knowledge of concepts in programming.

Course Outcomes:

#	Course Outcome	Knowledge Level (according to Bloom's Taxonomy)
CO1	Construct program using list and dictionary.	K2
CO2	Demonstrate exception handling.	K2
CO3	Implement inheritance in Object Oriented Programming.	K2
CO4	Check pattern matching using regular expression	K2,K3,K4
CO5	Develop web applications and database program.	K1,K3,K5

K1-Knowledge K2-Understand K3-Apply K4-Analyze K5-Evaluate

Mapping of COs with POs

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S				
CO2		M	L		
CO3	M				
CO4	S				
CO5				L	S

List of Programs

1. Program to perform sorting methods using conditional and looping statements
2. Program to handle strings.
3. Program to implement stack operations using list.
4. Program to implement hashing technique using dictionary.
5. Program to demonstrate exception handling.
6. Program to maintain bank account using class in oops.
7. Program to implement inheritance in oops.
8. Program to check pattern matching using regular expression.
9. Program to perform socket programming.
10. Program to demonstrate transforming files from client to server.
11. Program to develop web application.
12. Program to maintain database.

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Course code	Course Title	Category	L	T	P	Credit
PCS19CL12	Advanced DBMS	Core Lab2		-	5	2

Year	Semester	L – Lecture T – Tutorial P - Practical		
		Internal	External	Total
I	I	40	60	100

Preamble:

Define the terminology, features, classifications, and characteristics embodied in database systems.

Prerequisite:

Familiar to store and manage the data, knowledge about the structured query language.

Course Outcomes:

#	Course Outcome	Knowledge Level (according to Bloom’s Taxonomy)
CO1	Demo programs on DDL and DML Commands	K2,K4
CO2	Construct programs for Built-in functions, subqueries and joins	K1, K2
CO3	Hands on programs to sort and index database.	K2
CO4	Testing the manipulation process in the database	K2.K4
CO5	Develop program to execute PL/SQL	K3,K5

K1-Knowledge K2-Understand K3-Apply K4-Analyze K5-Evaluate

Mapping of COs with POs

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S				
CO2		S	M		
CO3	S				
CO4	S				S
CO5			M		S

SQL

1. Creating the Database (DDL Commands).
2. Manipulating and Querying the Database (DML Commands).
3. Using Built-in Functions.
4. Processing of Sub Queries.
5. Applying Joins.
6. Sorting the Database.
7. Indexing the Database.
8. Creating and Manipulating Sequences.
9. Creating and Manipulating Views.
10. Creating Users and Roles.

PL/SQL

1. Programs using Control Statements.
2. Programs using Exception Handling.
3. Programs using Implicit Cursors.
4. Programs using Explicit Cursors.
5. Programs using Triggers.
6. Programs using Functions.
7. Programs using Procedures.
8. Programs using Packages.
9. Programs using Transaction Management.
10. Programs using Distributed Database.

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Course code	Course Title	Category	L	T	P	Credit
PCS19C21	Compiler Design	Core5	5	-	-	5

Year	Semester	L – Lecture			T – Tutorial			P - Practical			Internal	External	Total
I	II										25	75	100

Preamble:

Fluency in describing the theory and practice of compilation, in particular, the lexical analysis, syntax, and semantic analysis, code generation and optimization phases of compilation. Ability to design a compiler for a concise programming language.

Prerequisite:

Students should have knowledge about C,C++ and basic data structure concept.

Course Outcomes:

#	Course Outcome	Knowledge Level (according to Bloom’s Taxonomy)
CO1	Illustrate detailed Translators and explain a simple approach to the design of lexical analyzers.	K1,K4
CO2	Make use of the Syntactic Specifications of Programming Languages	K1
CO3	Determine the Syntax-Directed Translation	K4
CO4	Provide an overview of Data structures for symbol tables.	K2,K5
CO5	To understand the concepts of Problems in code generation.	K2,K3

K1-Knowledge K2-Understand K3-Apply K4-Analyze K5-Evaluate

Mapping of COs with POs

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1		S			
CO2	S		L		
CO3		M	S		
CO4	S				
CO5	M				M

Blooms taxonomy

	CA		End of Semester
	First	Second	
Knowledge -K1	15% (9)	15% (9)	20% (30)
Understand -K2	15% (9)	15% (9)	20% (30)
Apply-K3	30% (18)	30% (18)	20% (30)
Analyze-K4	20% (12)	20% (12)	20% (30)
Evaluate-K5	20% (12)	20% (12)	20% (30)
Total Marks	60	60	150

Unit I

Introduction to Compilers

Compilers and Translators – Why do we need Translators? – The Structure of a compiler – Lexical Analysis – Syntax Analysis – Intermediate code generation – Optimization – Code generation – Bookkeeping – The role of the lexical analyzer – A simple approach to the design of lexical analyzers – Regular expressions – Finite automata – From regular expressions to finite automata – Minimizing the number of states of a DFA.

Unit II

The Syntactic Specifications of Programming Languages

Context-free grammars – Derivations and parse trees – Capabilities of context-free grammars – Parses – Shift-reduce parsing – Operator-precedence parsing – Top-down parsing – Predictive parses – LR parses.

Unit III

Syntax-Directed Translation

Syntax-directed translation schemes – Implementation of syntax-directed translators – Intermediate code – Postfix notation – Parse trees and syntax trees – Three-address code, quadruples, and triples – Translation of assignment statements – Boolean expressions – Statements that alter the flow of control – Postfix translations – Translation with a top-down parser.

Unit IV

Symbol tables

The contents of a symbol table – Data structures for symbol tables – Representing scope information – The principal sources of optimization - Loop optimization.

Unit V

Code Generation

Object programs – Problems in code generation – A machine model – A simple code generator – Register allocation and assignment.

Text Book:

1. Alfred V.Aho, Ravi Sethi, Jeffrey D.Ullman, “Principles of Compiler Design”, Narosa Publishing House.

Reference Books:

1. Henk Alblas and Albert Nymeyer, “Practice and Principles of Compiler Building with C”, PHI/

Web Resources:

https://www.tutorialspoint.com/compiler_design/

<https://www.geeksforgeeks.org/compiler-design-tutorials/>

http://www.vssut.ac.in/lecture_notes/lecture1422914957.pdf

Course designers:

Mrs.L.Krishnaveni

Course contents and lecture schedule

S.No	Topic	No of lecture hrs.	Mode of Teaching
Unit-I		15 Hrs	
1	Introduction , Compilers and Translators	5	Lecture
2	Code generation, A simple approach to the design of lexical analyzers	5	PPT Presentation
3	Regular expressions	5	PPT Presentation
Unit-II		11 Hrs	
4	The Syntactic Specifications of Programming Languages	5	Lecture
5	Capabilities of context-free grammars	6	Lecture
Unit-III		18 Hrs	
6	Syntax-Directed Translation	6	PPT Presentation
7	Parse trees and syntax trees	6	Lecture
8	Translation with a top-down parser	6	Demo in Smart Class
Unit-IV		12 Hrs	
9	Symbol tables	6	PPT Presentation
10	The principal sources of optimization	6	Lecture
Unit-V		15 Hrs	
11	Code Generation	5	Demo in Smart Class
12	A machine model	5	Seminar
13	Register allocation and assignment	5	Seminar

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Course code	Course Title	Category	L	T	P	Credit
PCS19C22	Network Security	Core6	5	-	-	5

L – Lecture T – Tutorial P - Practical

Year	Semester	Internal	External	Total
I	II	25	75	100

Preamble:

To be familiar with information security awareness and a clear understanding of its importance.

Prerequisite:

Students should have the awareness of the basics cryptographic concept and networks.

Course Outcomes:

#	Course Outcome	Knowledge Level (according to Bloom’s Taxonomy)
CO1	Explain the various encryption techniques.	K2
CO2	Illustrate the master fundamentals of secret and public cryptography.	K1
CO3	Compare with Hash Algorithms, Signature and network security designs.	K1,K4
CO4	Identifying network security designs using available secure solutions(such as IP security, WP security, SSL etc.,)	K1,K5
CO5	Examine with advanced security issues and technologies.	K2,K4

K1-Knowledge K2-Understand K3-Apply K4-Analyze K5-Evaluate

Mapping of COs with POs

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S				
CO2	S	M			
CO3	S		L		
CO4			L		M
CO5					S

Blooms taxonomy

	CA		End of Semester
	First	Second	
Knowledge -K1	15% (9)	15% (9)	20% (30)
Understand -K2	15% (9)	15% (9)	20% (30)
Apply-K3	30% (18)	30% (18)	20% (30)
Analyze-K4	20% (12)	20% (12)	20% (30)
Evaluate-K5	20% (12)	20% (12)	20% (30)
Total Marks	60	60	150

Unit – I:

Overview

Services, Mechanisms and Attacks – The OSI Security Architecture – A Model for Network Security.

Encryption Techniques

Symmetric Cipher Model – Substitution Techniques – Transposition Techniques. Simplified DES – Block Cipher Principles – The Data Encryption Standard – The Strength of DES – Differential and Linear Cryptanalysis – Block Cipher Design Principles – Block Cipher Modes of Operations.

Unit – II:

Public Key Cryptography and RSA

Principles of Public Key Cryptosystem – The RSA Algorithm – Key Management – Diffie – Hellman Key Exchange – Elliptic Curve Arithmetic – Elliptic Curve Cryptography – Message Authentication and Hash Function – Authentication Requirements – Authentication Functions – Message Authentication Codes – Hash Function – Security of Hash Function and MACS.

Unit – III:

Hash Algorithm

MD5 Message Digest Algorithm – Secure Hash Algorithm – RIPEMD-160, HMAC - Digital Signatures and authentication protocols – Digital signature standard – Kerberos – X.509 Authentication Service – Pretty Good Privacy – S/MIME – Data Compression using ZIP – Radix-64 Conversion – PGP Random Number Generation.

Unit – IV:

IP Security and Web Security

IP Security – Architecture – Authentication Header – Encapsulating Security Payload – Combining Security Association – Key Management – Internetworking and Internet Protocols – Web Security Consideration – Secure Sockets Layer and Transport Layer Security – Secure Electronic Transaction.

Unit - V:

System Security

Intruders – Intrusion Detection – Password Management – Malicious Software – Viruses and Related Threats – Virus Counter – Measures – Firewalls – Design Principles – Trusted System.

Text Book:

1. Cryptography and Network Security: Principles and Practices
Author: William Stallings (Pearson Education, Third Edition)

Reference Book:

1. Cryptography Demystified - John E. Hershey (McGraw-Hill)
2. "Handbook of Applied Cryptography" by Alfred J. Menezes, Paul C. VanOorschot and Scott A. Vanstone

Web Resources:

1. cs.uccs.edu/~cs591/chapter8.ppt
2. https://vowi.fsinf.at/images/3/3d/TU_Wien-ntroduction_to_Security_VU_%28Weippl%29_-_Computer_Security_Principles_and_Practice_%283rd_Edition_-_2015%29.pdf
3. http://www.srmuniv.ac.in/sites/default/files/downloads/unit5_system_security.pdf

Course designers

Mrs.N.Hemavathi

Course contents and lecture schedule

Sl.No	Topic	No of lecture hrs.	Mode of Teaching
Unit-I		15 Hrs	
1.1	Services, Mechanisms and Attacks	3	Lecture
1.2	The OSI Security Architecture	3	PPT Presentation
1.3	A Model for Network Security.	3	PPT Presentation
1.4	Encryption Techniques	6	Demo in Smart Class
Unit-II		14Hrs	
2.1	Principles of Public Key Cryptosystem	5	Lecture
2.2	Elliptic Curve Arithmetic and Elliptic Curve Cryptography	4	Lecture
2.3	Message Authentication and Hash Function	5	Demo in Smart Class
Unit-III		15Hrs	
3.1	MD5 Message Digest Algorithm	5	Lecture
3.2	Digital Signatures and authentication protocols	4	PPT Presentation
3.3	X.509 Authentication Service	4	Demo in Smart Class
3.4	Pretty Good Privacy	2	PPT Presentation
Unit-IV		10 Hrs	
4.1	IP Security	5	PPT Presentation
4.2	Web Security	5	PPT Presentation
Unit-V		6 Hrs	
5.1	System Security	6	Lecture

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Course code	Course Title	Category	L	T	P	Credit
PCS19C23	Advanced Java	Core7	5	-	-	5

L – Lecture T – Tutorial P - Practical

Year	Semester	Internal	External	Total
I	II	25	75	100

Preamble:

Providing the ability to design console based, GUI based and web based applications and demonstrating the advanced level of object-oriented programming through Core Java.

Prerequisite:

Basic knowledge of Object Oriented Programming. Knowing network programming. Basic idea about database management.

Course Outcomes:

#	Course Outcome	Knowledge Level (according to Bloom’s Taxonomy)
CO1	Provide basics of Java programming	K1, K2
CO2	Illustrate the Packages and Multithreaded programming.	K1, K2
CO3	Examine with Applet programming and AWT controls.	K2 ,K3
CO4	Outline the concept of Networking and JavaBeans.	K2,K3,K4
CO5	Develop Internet Applications with Servlets and JDBC.	K3,K4,K5

K1-Knowledge K2-Understand K3-Apply K4-Analyze K5-Evaluate

Mapping of COs with POs

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M		L		
CO2		S	L		
CO3		L			
CO4	M		S		
CO5				M	S

Blooms taxonomy

	CA		End of Semester
	First	Second	
Knowledge -K1	15% (9)	15% (9)	20% (30)
Understand -K2	15% (9)	15% (9)	20% (30)
Apply-K3	30% (18)	30% (18)	20% (30)
Analyze-K4	20% (12)	20% (12)	20% (30)
Evaluate-K5	20% (12)	20% (12)	20% (30)
Total Marks	60	60	150

Unit I:

Java Fundamentals:

Data Types – Variables – Arrays – Operators – Control Statements.

Classes:

Class Fundamentals – Declaring Objects – Assigning Object Reference Variables – Methods – Constructors – The this Keyword – Overloading Methods – Using Objects as Parameters – Returning Objects – Inheritance Basics – Multilevel Hierarchy – Method Overriding.

Unit II:

Packages and Interfaces:

Defining a Package – Accessing a Package – Importing Packages – Defining an Interface – Implementing Interfaces – Applying interfaces.

Multithreaded Programming:

Thread Model – Main Thread – Creating a Thread – Creating Multiple Threads – Thread Priorities – Suspending, Resuming and Stopping Threads.

Unit III:

Applet:

Applet Basics – Applet Architecture – Applet Skeleton – Applet Display Methods – The HTML APPLET Tag.

Introducing the AWT:

AWT Classes – Window Fundamentals – Working with Frame Windows – Creating a Frame Window in an Applet – Creating a Windowed Program – Working with Graphics – Working with Color – Working with Fonts.

AWT Controls:

Control Fundamentals – Labels – Buttons – Check Boxes – Check Box Group – Choice Controls – Lists – Scroll Bars – Text Field – Text Area – Layout Managers – Menu Bars and Menus – Dialog Boxes – File Dialog.

Unit IV:

Networking:

Networking Basics – Java and the Net – InetAddress – TCP / IP Client Sockets – URL – URL Connection – TCP / IP Server Sockets – A Caching Proxy HTTP Server – Datagrams.

Java Beans:

Java Bean – Advantages – Application Builder Tools – Using the Bean Development Kit (BDK) – JAR Files – Introspection – Developing a Simple Bean using the BDK – Using Bound Properties – Using the BeanInfo Interface – Constrained Properties – Persistence – Customizers – The Java Beans API – Using Bean Builder.

Unit V:

Servlets:

Life Cycle – Using Tomcat – Create and Compile Servlet – Servlet API – Servlet Package – Servlet Parameters – Servlet HTTP Package – HTTP Requests and Responses – Session Tracking.

Database Connectivity – JDBC:

Design of JDBC – Basic JDBC Programming Concepts – Populating a Database –
Executing queries – Scrollable and Updatable Result sets.

Text Books:

1. The Complete Reference Java 2
Author:HerbertSchildt (Tata McGraw-Hill, Fifth Edition)
2. Core Java 2 Volume II – Advanced Features
-Author:Cay S. Horstmann, Gary Cornell (Sun Microsystems Press)

Reference Books:

1. Core Java 2 Volume I – Fundamentals
- Cay S. Horstmann, Gary Cornell (Sun Microsystems Press)
2. Database Programming with JDBC and Java- George Reese (O'Reilly)

Web Resources:

1. www.javapoint.com
2. www.javacodegeeks.com
3. docs.oracle.com/en/java

Course designers

Mr.V.Anand

Course contents and lecture schedule

	Topic	No of lecture hrs.	Mode of teaching
Unit-I		15 Hrs	
1.1	Java Fundamentals	5	Lecture
1.2	Classes and Objects	5	PPT presentation
1.3	Inheritance	5	Lecture
Unit-II		15 Hrs	
2.1	Packages	5	PPT presentation
2.2	Interfaces	5	Seminar
2.3	Multithreaded Programming:	5	PPT presentation
Unit- III		12 Hrs	
3.1	Applet	4	PPT presentation
3.2	Introducing the AWT	4	Lecture
3.3	AWT Controls	4	Seminar
Unit-IV		8 Hrs	
4.1	Networking	4	Lecture
4.2	Java Beans	4	PPT presentation
Unit-V		10 Hrs	
5.1	Servlets	4	Ppt and demo
5.2	Database Connectivity - JDBC	6	PPT presentation

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Course code	Course Title	Category	L	T	P	Credit
PCS19CL21	Lab in Dot Net Programming	Core Lab3	-	-	6	2

L – Lecture T – Tutorial P - Practical

Year	Semester	Internal	External	Total
I	II	40	60	100

Preamble:

Provide the tools and techniques to build dynamic Web sites using the ASP.Net programming environment. Technologies covered include the Common Language Runtime (CLR), .NET framework classes, C#, ASP.NET, and ADO.NET.

Prerequisite:

Familiarity about .Net Framework, Basic Controls, Asp.Net Technology

Course Outcome:

#	Course Outcome	Knowledge Level (according to Bloom's Taxonomy)
CO1	Construct programs using C# for control structures and looping	K1, K2
CO2	Hands on exercises to develop programs in ASP.Net	K3
CO3	Develop programs to connect database in ASP.Net	K3
CO4	Construct the code in developing registration forms, banking process, shopping procedures and reservation etc..	K2,K4
CO5	Develop and Test in creating various applications	K1,K5

K1-Knowledge K2-Understand K3-Apply K4-Analyze K5-Evaluate

Mapping of COs with POs

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S				
CO2		M		S	
CO3	S				
CO4	M			S	S
CO5			M		S

ASP. NET PROGRAMMING LAB Using C#

1. Create web page for Course Registration
2. Create web pages for Banking
3. Create web pages for Shopping Cart
4. Create web pages for Airline reservation
5. Create web pages for Job portal
6. Create web pages for On-Line Telephone Billing System
7. Create web pages for On-Line Quiz.
8. Create web pages for Hospital Management System.

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Course code	Course Title	Category	L	T	P	Credit
PCS19CL22	Lab in Java Programming	Core Lab4	-	-	5	2

L – Lecture T – Tutorial P - Practical

Year	Semester	Internal	External	Total
I	II	40	60	100

Preamble:

Providing the ability to design console based, GUI based and web based applications and demonstrating the advanced level of object-oriented programming through Core Java.

Prerequisite:

Basic knowledge of Object Oriented Programming. Knowing network programming. Basic idea about database management.

Course Outcomes:

#	Course Outcome	Knowledge Level (according to Bloom’s Taxonomy)
CO1	Demonstrate class and object concepts.	K1, K2
CO2	Construct user defined packages.	K2,K3
CO3	Develop multithreaded programming.	K4
CO4	Hands-on network programming.	K3,K4
CO5	Develop Internet Applications with Servlets and JDBC.	K3,K4

K1-Knowledge K2-Understand K3-Apply K4-Analyze K5-Evaluate

Mapping of COs with POs

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S				
CO2	M			S	
CO3	M				S
CO4			M		S
CO5		S			S

Programs to demonstrate Control Statements.

1. Programs to demonstrate Class Concepts.
2. Programs to demonstrate Packages.
3. Programs to demonstrate Interfaces.
4. Programs to demonstrate Multithreaded Programming.
5. Programs to demonstrate Applets.
6. Programs to demonstrate AWT Controls.
7. Programs to demonstrate Networking.
8. Programs to demonstrate Java Beans.
9. Programs to demonstrate Servlets.
10. Programs to demonstrate JDBC.

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Course code	Course Title	Category	L	T	P	Credit
PCS19C31	Data Mining Techniques	Core8	5	-	-	4
L – Lecture			T – Tutorial		P - Practical	
Year	Semester	Internal	External	Total		
II	III	25	75	100		

Preamble:

In Today’s World Increasing amounts of data could be captured via the Internet, websites, point-of-sale devices, bar-code readers etc. Such data has tremendous relevance for managerial decisions. This Course involves learning a collection of techniques for extracting patterns and trends in large amounts of data. It introduces the basic concepts of Data Warehouse and Data Mining techniques.

Prerequisite:

Students should have the knowledge about database, how to manage the data and some tools to analyses the data process.

Course Outcomes:

#	Course Outcome	Knowledge Level (according to Bloom’s Taxonomy)
CO1	Illustrate the various data mining functionalities	K1
CO2	Explaining the concepts of data warehouse and its architecture	K1, K2
CO3	Discover and measure interesting patterns from different kinds of databases.	K3 ,K5
CO4	Apply the techniques of cluster and to categorize its methods to adopt.	K2,K3
CO5	Summarize the concept of Datamining in various applications	K2,K4

K1-Knowledge K2-Understand K3-Apply K4-Analyze K5-Evaluate

Mapping of COs with POs

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S				
CO2	S	L			
CO3		M		S	
CO4	M		S		
CO5		L		S	M

Blooms taxonomy

	CA		End of Semester
	First	Second	
Knowledge -K1	15% (9)	15% (9)	20% (30)
Understand -K2	15% (9)	15% (9)	20% (30)
Apply-K3	30% (18)	30% (18)	20% (30)
Analyze-K4	20% (12)	20% (12)	20% (30)
Evaluate-K5	20% (12)	20% (12)	20% (30)
Total Marks	60	60	150

Unit-I

Introduction – Data mining – Data mining functionalities – kinds of patterns can be mined – classification – Data mining task primitives-major issues. Data pre-processing – Data cleaning – Data Integration and Transformation – Data Reduction – Discretization and concept hierarchy generation

Unit-II

Data warehouse – A multidimensional data model – Data warehouse architecture – Data warehouse implementation – From data warehouse to data mining - Efficient methods for data Cube computation.

Unit-III

Mining Frequent Patterns, Associations and Correlations: Basic Concepts-Efficient and scalable Frequent Itemset Mining Methods-Mining various kinds of association rules-from association Mining to correlation analysis-constraint-based Association Mining. Classification and prediction – Issues regarding classification and prediction – classification by decision tree induction- Bayesian classification- Rule based classification.

Unit-IV

Cluster Analysis – Types of Data in cluster analysis- A categorization of Major clustering methods - Partitioning methods- Hierarchical methods – Density – based methods -Grid based methods -Model based clustering methods – outlier analysis.

Unit-V

Mining Data Streams-Mining Time-Series Data-Mining Sequence patterns in Transactional Data Bases-Multimedia Data Mining-Text Mining-Mining the World Wide Web.

Text Book

1. “Data Mining Concepts and Techniques”,

Author: Jiawei Han, MichelenKamber, Morgan Kaufmann Publishers an Imprint of Elsevie.

Reference Book:

1. Data mining: Practical Machine Learning Tools and Techniques
- Ian H. Witten, Eibe Frank (Morgan Kaufmann, Second Edition)
2. Data mining: a knowledge discovery approach-Krzysztof J.Cios, Witold Pedrycz, W.Swiniarski, Lukasz A.Kurgan.
3. Data Mining Techniques - Arun K Puja ri

Web Resources:

- 1.<https://www.iitr.ac.in/media/facspace/.../Lecture-1-Introduction-to-Data-Mining.pdf>
2. www.dsi.unive.it/~marek/files/06%20-%20datamining
3. <https://ocw.mit.edu/courses/sloan-school-of.../15-062-data-mining.../lecture-notes/>

Course designers

Mrs.N.Hemavathi

Course contents and lecture schedule

	Topic	No of lecture hrs.	Mode of teaching
Unit-I		12 Hrs	
1.1	Introduction and Issues	6	Lecture
1.2	Data Mining Functionalities	6	PPT presentation
Unit-II		14 Hrs	

2.1	Data Warehouse and Multidimensional data model	3	Lecture
2.2	Data Warehouse Architecture	2	PPT presentation
2.3	Data Warehouse Implementation	4	Lecture
2.4	From data warehouse to data mining	2	Lecture
2.5	Efficient methods for data Cube computation.	3	PPT presentation
Unit-III		13 Hrs	
3.1	Mining Frequent Patterns, Associations and Correlations	7	PPT Presentation
3.2	Classification and prediction	6	Lecture
Unit-IV		13 Hrs	
4.1	Cluster Analysis and its types	6	Lecture
4.2	Clustering Methods	7	PPT presentation
Unit-V		8 Hrs	
5.1	Mining Applications	8	Seminar

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Course code	Course Title	Category	L	T	P	Credit
PCS19C32	Web Technologies	Core9	5	-	-	4

L – Lecture T – Tutorial P - Practical

Year	Semester	Internal	External	Total
II	III	25	75	100

Preamble:

The focus in this course is on the World Wide Web as a platform for interactive applications. The development of web-based applications requires knowledge about the underlying technology and the formats and standards the web is based upon. Providing web programming using JavaScript and PHP

Prerequisite:

Knowing markup language like HTML. Fundamental programming skills for web development and idea about back end database tools.

Course Outcomes:

#	Course Outcome	Knowledge Level (according to Bloom’s Taxonomy)
CO1	Define the basics of JavaScript and arrays.	K1
CO2	Outline the fundamentals of PHP programming	K2
CO3	Define functions in PHP and create user input forms.	K2 ,K3
CO4	Create and Manipulate database with MySQL and matching regular expression.	K2,K3,K4
CO5	Demonstrating cookies, session and XML	K2,K5

K1-Knowledge K2-Understand K3-Apply K4-Analyze K5-Evaluate

Mapping of COs with POs

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	m	l			
CO2	s	m			
CO3			m		
CO4			l	m	
CO5				l	s

Blooms taxonomy

	CA		End of Semester
	First	Second	
Knowledge -K1	15% (9)	15% (9)	20% (30)
Understand -K2	15% (9)	15% (9)	20% (30)
Apply-K3	30% (18)	30% (18)	20% (30)
Analyze-K4	20% (12)	20% (12)	20% (30)
Evaluate-K5	20% (12)	20% (12)	20% (30)
Total Marks	60	60	150

Unit I:

Fundamentals of JavaScript:

Capabilities of JavaScript- Structures of JavaScript code - Data and Objects-Tokens, Operators, Expressions and Statements - The JavaScript math Objects - Comparison Operations and decision making Structures - Loop Structures.

Arrays in JavaScript:

Basic Array Properties-Some operations On Arrays-Creating Two Dimensional Arrays-Using Arrays to Access the Contents Of Forms-Hiding the Contents of a JavaScript Script.

Unit II:

JavaScript Functions:

The purpose of Functions - Defining JavaScript Functions-Using JavaScript Functions with HTML Forms-Some Global Methods and Event Handlers-Recursive Functions-Passing Values from One Document to Another.

Introduction to PHP:

Getting Started – Data Types – Variables – Constants - Documents- Operations- Arrays-Conditional Statements- Iterations.

Unit III:

Functions in PHP:

User Defined Functions -Built in Functions- PHP Server Variables- Working with Date and Time-Performing Mathematical operations-Working with string Functions.

Working With Forms:

Form Elements-Adding Elements to a Form

Unit IV:

Regular Expressions:

Regular Expressions Engine- Common Users of regular Expressions-Types Of regular Expressions-Regular Expressions Functions.

My SQL:

PHP My SQL Architecture - Creating Table - Connecting to My SQL -Selecting the Database - Inserting data - Extracting data - Updating data - Deleting data - Closing the database Connection - PHP and My SQL Interaction using a form.

Unit V:

Cookies and Sessions:

An Introduction to Cookies - Creating Cookies Using PHP - An Introduction to session-Sessions Variables - PHP Session Functions.

XML:

An Introduction to XML - What XML Does-Difference between XML and HTML.

Text Books:

1. An Introduction to HTML and JavaScript

Author: David R.Brooks (Springer International Edition,)

2. PHP 5.1 for Beginners

Author: Ivan Bayross and Sharanam Shah (Shroff Publishers and Distributors Pvt. Ltd.

First edition,

References:

1. JavaScript – A Beginner’s Guide
- Scott Duffy (DreamTech Press)
2. SAMS Teach Yourself PHP4 in 24 Hours
- Matt Zandstra, Brian Schaffner (SAMS)
3. Web Standards Programmer's Reference: HTML, CSS, JavaScript, Perl, Python & PHP
- Steven M. Schafer (Wiley Dreamtech)

Web Resources:

1. www.w3schools.com/js
2. <https://www.phptpoint.com/php-tutorial/>
3. www.mysqltutorial.org

Course designers

Mr.V.Anand

Course contents and lecture schedule

	Topic	No of lecture hrs.	Mode of teaching
Unit-I		12 Hrs	
1.1	Fundamentals of JavaScript	7	Lecture
1.2	Arrays in JavaScript	5	Ppt presentation
Unit-II		13 Hrs	
2.1	JavaScript Functions	6	Ppt presentation
2.2	Introduction to PHP	7	Lecture
Unit-III		11 Hrs	
3.1	Functions in PHP	5	Ppt presentation
3.2	Working With Forms	6	Seminar
Unit-IV		10 Hrs	
4.1	Regular Expressions	5	Lecture
4.2	MySQL	5	Ppt and Demo
Unit-V		14 Hrs	
5.1	Cookies	4	Ppt presentation
5.2	Sessions	5	Ppt presentation
5.3	XML	5	Seminar

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Course code	Course Title	Category	L	T	P	Credit
PCS19C33	Big Data Analytics	Core10	5	-	-	4

Year	Semester	L – Lecture			T – Tutorial			P - Practical		
		Internal	External	Total						
II	III	25	75	100						

Preamble:

Big data analytics is the process of examining these data to uncover hidden patterns, unknown correlations and other useful information that can be used to make better decisions. This course contains the Process of collecting, organizing and analyzing large sets of data.

Prerequisite:

Must be familiar about tools, platforms, hardware and software which is used to analyses the patterns, unknown database etc.,

Course Outcomes:

#	Course Outcome	Knowledge Level (according to Bloom’s Taxonomy)
CO1	Explain the concept and challenge of big data	K1,K2
CO2	Interpret the components of Hadoop and Hadoop Eco-System	K1,K2
CO3	Develop a Map Reduce Application	K2 ,K3,K5
CO4	Demonstrate the Hadoop environment to work with	K2,K4
CO5	Develop Applications using Pig and Hive	K1,K3,K5

K1-Knowledge K2-Understand K3-Apply K4-Analyze K5-Evaluate

Mapping of COs with POs

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S				
CO2		M	L		
CO3	L			M	
CO4	S	M			
CO5			S	S	M

Blooms taxonomy

	CA		End of Semester
	First	Second	
Knowledge -K1	15% (9)	15% (9)	20% (30)
Understand -K2	15% (9)	15% (9)	20% (30)
Apply-K3	30% (18)	30% (18)	20% (30)
Analyze-K4	20% (12)	20% (12)	20% (30)
Evaluate-K5	20% (12)	20% (12)	20% (30)
Total Marks	60	60	150

UNIT I -INTRODUCTION TO BIG DATA: Introduction –Understanding Big Data –Capturing Big Data – Benefits-Organizing Big Data –Analyzing –Technology Challenges for Big Data. Big Data Sources and Applications: Introduction-Machine-to-Machine(M2M)Communications - Big Data Applications

Big Data Architecture: Introduction – Standard Big Data Architecture –Big Data Architecture Examples.

UNIT II- HADOOPFundamentals: History of Hadoop- Data Format –Analyzing the Data with Hadoop-Scaling Out-Hadoop Streaming. The Hadoop Distributed File System: The Design of HDFS-HDFS Concepts-The Java Interface to HDFS.

Unit III: Developing a Map Reduce Application: Configuration API-Setting Up the Development Environment-Writing Unit Test with MRUnit- Running Locally to Test Data , Cluster –MapReduce Workflows.How Map Reduce Works: Anatomy of a Map Reduce Job run-Failures-Job Scheduling-Shuffle and Sort – Task execution

UNIT IV -HADOOP ENVIRONMENT Setting up a Hadoop Cluster - Cluster specification - Cluster Setup and Installation - Hadoop Configuration-Security in Hadoop - Hadoop benchmarks. Administering Hadoop: – HDFS - Monitoring-Maintenance

UNIT V- FRAMEWORKS Applications on Big Data Using Pig and Hive : Data processing operators in Pig – Hive services – HiveQL – Querying Data in Hive

Text Books:

1. Anil Maheshwari” Big Data” ,Mc Graw Hill Education
2. Tom White “Hadoop: The Definitive Guide” Third Edition, O’reilly Media, 2012.

Reference Books:

1. Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, Paul Zikopoulos, “Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data”, McGrawHill Publishing, 2012
2. AnandRajaraman and Jeffrey David Ullman, “Mining of Massive Datasets”, Cambridge University Press, 2012.
3. Big Data Analytics for beginners – Faraz Rabbani, Ali Roghani – Create space Independent Publishing Platform – 2014

Web resources:

- 1.<https://searchbusinessanalytics.techtarget.com/definition/big-data-analytics>
- 2.<https://www.marutitech.com/big-data-analytics-need-business/>
- 3.https://en.wikipedia.org/wiki/Big_data

Course designers

Mrs.N.Hemavathi

Course contents and lecture schedule

Sl.No.	Topic	No of lecture hrs.	Mode of Teaching
Unit –I		11 Hrs	
1	Introduction To Big Data	5	Lecture
2	Big Data Applications & Architecture	6	Lecture
Unit- II		14 Hrs	

3	Hadoop Fundamentals	5	PPT Presentation
4	Analyzing the DATA	5	PPT Presentation
5	HDFS Concepts	4	Lecture
Unit-III		15 Hrs	
6	Basics-Developing a Map Reduce Application	8	Demo in Smart Class
7	Working with Map Reduce	7	Demo
Unit-IV		10 Hrs	
8	Hadoop Environment	5	PPT Presentation
9	Hadoop Administration	5	Lecture
Unit-V		10 Hrs	
10	Applications on Big Data using Pig	5	PPT and Demo
11	Applications on Big Data using Hive	5	PPT and Demo

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Course code	Course Title	Category	L	T	P	Credit
PCS19CL31	Open Source Technology	Lab	-	-	4	2

L – Lecture T – Tutorial P - Practical

Year	Semester	Internal	External	Total
II	III	40	60	100

Preamble:

To execute project using Open source technology to meet the industry needs & problems, to promote Open Source awareness among the students and nearby industries.

Prerequisite:

Basic knowledge and awareness about Open Source Software’s to work with

Course Outcomes:

#	Course Outcome	Knowledge Level (according to Bloom’s Taxonomy)
CO1	Determine the process of Open source tools	K1,K2
CO2	Construct programs to execute Mining Functionalities using Mining Tools	K2,K4
CO3	They can work with Research Document Tools(LATEX)	K2,K4,K5
CO4	Construct Programs using LATEX Tool	K2,K4
CO5	Test the programs using Testing Tool	K2,K3,K5

K1-Knowledge K2-Understand K3-Apply K4-Analyze K5-Evaluate

Mapping of COs with POs

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S				
CO2		S			S
CO3	S		S		S
CO4	S		M	S	
CO5		S		M	S

OPEN SOURCE TOOL -1 : Data Mining Tools

- To check Preprocessing
- To Classify, Cluster, Association and to select attributes
- To check Seed ROI Selection and the time series extraction
- To Design PPI Model
- To Implement SEM in Neuroimage.

1. OPEN SOURCE TOOL-2 : Research Document Tool

2. OPEN SOURCE TOOL-3: Testing Tool

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Course code	Course Title	Category	L	T	P	Credit
PCS19CL32	Lab in Web Technology	Lab	-	-	4	2

L – Lecture T – Tutorial P - Practical

Year	Semester	Internal	External	Total
II	III	40	60	100

Preamble:

The focus in this course is on the World Wide Web as a platform for interactive applications. The development of web-based applications requires knowledge about the underlying technology and the formats and standards the web is based upon. Providing web programming using JavaScript and PHP

Prerequisite:

Knowing markup language like HTML. Fundamental programming skills for web development and idea about back end database tools.

Course Outcomes:

#	Course Outcome	Knowledge Level (according to Bloom’s Taxonomy)
CO1	Develop animation using JavaScript.	K4
CO2	Test data validation using JavaScript.	K2,K5
CO3	Hands-on to create user input forms and store in MySQL database.	K2 ,K3,K4
CO4	Demonstrate to handle date, string and objects in PHP.	K2,K3,K4
CO5	Demonstrate cookies & session in PHP	K2,K3,K4

K1-Knowledge K2-Understand K3-Apply K4-Analyze K5-Evaluate

Mapping of COs with POs

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1		M			S
CO2	S			S	S
CO3	M		M	S	
CO4		M			L
CO5	S	M			L

JavaScript

1. Programs to demonstrate Control Statements
2. Programs to demonstrate Built-In Functions.
3. Programs to demonstrate User-Defined Functions.
4. Programs to demonstrate Class Concepts.
5. Programs to demonstrate Arrays.
6. Programs to embed JavaScript in a Web Page.
7. Programs to manipulate Web Forms.
8. Programs to handle Browser Events.
- 9.

10. Programs to handle Frames.
11. Programs to perform Animation.

PHP

1. Programs to demonstrate Control Statements.
2. Programs to demonstrate User-Defined Functions.
3. Programs to demonstrate Date Functions.
4. Programs to demonstrate String Functions.
5. Programs to demonstrate Arrays.
6. Programs to demonstrate Objects.
7. Programs to get user input from Forms and store in Database.
8. Programs to demonstrate cookies.
9. Programs to demonstrate Sessions.

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Course code	Course Title	Category	L	T	P	Credit
PCS19C41	Multimedia Technology	Core11	6	-	-	4

L – Lecture T – Tutorial P - Practical

Year	Semester	Internal	External	Total
II	IV	25	75	100

Preamble:

To identify both theoretical and practical aspects in designing multimedia systems. Learn to combine graphics, audio, video, and text to create programs. Illustrate the various elements and development of Multimedia.

Prerequisite:

Familiarity with hardware components. Knowing multimedia elements and creativity in developing multimedia titles.

Course Outcomes:

#	Course Outcome	Knowledge Level (according to Bloom’s Taxonomy)
CO1	Explain the multimedia and hardware components.	K2
CO2	Illustrate various elements in multimedia and authoring programs.	K1,K2
CO3	Develop and design multimedia titles.	K2 ,K3
CO4	Organize and distribute multimedia titles.	K2,K4
CO5	Discuss issues and trends in multimedia.	K2,K5

K1-Knowledge K2-Understand K3-Apply K4-Analyze K5-Evaluate

Mapping of COs with POs

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M				
CO2		M	L		
CO3			M	L	
CO4				S	
CO5				M	S

Blooms taxonomy

	CA		End of Semester
	First	Second	
Knowledge -K1	15% (9)	15% (9)	20% (30)
Understand -K2	15% (9)	15% (9)	20% (30)
Apply-K3	30% (18)	30% (18)	20% (30)
Analyze-K4	20% (12)	20% (12)	20% (30)
Evaluate-K5	20% (12)	20% (12)	20% (30)
Total Marks	60	60	150

Unit – I:

Introduction to Multimedia

Multimedia – Growth – Examples – Categories of Multimedia – Delivering Multimedia – Inappropriate Use.

Hardware Components of a Multimedia System

Multimedia Personal Computer – Playback System – Development system.

Unit – II:

Multimedia Elements

Working with text – Accommodating Text-Intensive Titles – Software for Creating and Editing Text – Working with graphics – Software for Creating and Editing Graphics – Features of Graphics Programs – Sources of Graphic Images – Sound – MIDI – Animation – Virtual Reality – Video.

Multimedia Authoring Programs

Authoring Programs – Multimedia Presentations – Stand-Alone Applications – How Authoring Systems Work.

Unit – III:

Developing Multimedia Titles

Steps in Developing Interactive multimedia - The planning phase – The Creating Phase – The Testing phase

Designing for multimedia

Basic Design Principles – Designing for interactivity – Guidelines for interactive design

Unit - IV :

Managing Multimedia Projects

Management issues of multimedia Development – The management process and multimedia projects

Distributing Multimedia titles

Distributing Multimedia Titles on CD-ROM – Distributing Multimedia Titles Online - Kiosk-based Multimedia

Unit - V :

Multimedia on Web

Multimedia on the World Wide Web – Design Considerations for Multimedia on the Internet

Issues and trends in Multimedia

Copyright Issues – Privacy Issues – Censorship Issues –Trends in Multimedia Industry

Text Books:

1. Multimedia in Action

Author: James E. Shuman(Cengage Learning), First edition, 1997

Chapters:

Unit – I: 1, 2 from Text book
Unit – II: 3, 4, 5 from Text book
Unit – III: 6,7 from Text book
Unit – IV: 8,10 from Text book
Unit –V : 11,12 from Text book

Reference Books:

1. Multimedia Technology and Applications
 - David Hillman (Galgotia Publications Pvt. Ltd.)

Web Resource :

1. www.niecdelhi.ac.in/uploads/Notes/btech/6sem/cse/multimedia.pdf
 2. www.tutorialpoint.com/multimedia

Course designers:

Mr.V.Anand

Course contents and lecture schedule

S.No.	Topic	No of lecture hrs.	Mode of teaching
Unit-I		12 Hrs	
1	Introduction to Multimedia	6	Lecture
2	Hardware Components of a Multimedia System	6	Ppt presentation
Unit-II		12 Hrs	
3	Multimedia Elements	6	Lecture
4	Multimedia Authoring Programs	6	Ppt presentation
Unit-III		10 Hrs	
5	Developing Multimedia Titles	5	Lecture
6	Designing for Multimedia	5	Ppt presentation
Unit- IV		14 Hrs	
7	Managing Multimedia Projects	6	Seminar
8	Distributing Multimedia titles	8	Seminar
Unit- V		12 Hrs	
9	Multimedia on Web	6	Ppt and demo
10	Issues and Trends in Multimedia	6	Seminar

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Course code	Course Title	Category	L	T	P	Credit
PCS19C42	Cloud Computing	Core12	6	-	-	4

L – Lecture T – Tutorial P - Practical

Year	Semester	Internal	External	Total
II	IV	25	75	100

Preamble:

The main purpose of CLOUD COMPUTING is to present a basic architecture and Learn the fundamentals and essentials of Cloud Computing.

Prerequisite:

The basic knowledge of Virtualization Technologies and Operating Systems along with networking knowledge.

Course Outcomes:

#	Course Outcome	Knowledge Level (according to Bloom’s Taxonomy)
CO1	Explain the Benefits of cloud Computing	K1,K2
CO2	Show a sound foundation of the Cloud Computing and learn how to use Cloud Services	K1,K2
CO3	Infer some important Cloud Computing driven commercial systems	K2,K4
CO4	Outline how to store and share files in cloud	K2,K5
CO5	Analyze using and adopting Cloud Computing Tools and Services in real life Scenario	K3,K4

K1-Knowledge K2-Understand K3-Apply K4-Analyze K5-Evaluate

Mapping of COs with POs

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S				
CO2		S	M		
CO3	L			M	
CO4	L	M		M	
CO5		S		M	S

Blooms taxonomy

	CA		End of Semester
	First	Second	
Knowledge -K1	15% (9)	15% (9)	20% (30)
Understand -K2	15% (9)	15% (9)	20% (30)
Apply-K3	30% (18)	30% (18)	20% (30)
Analyze-K4	20% (12)	20% (12)	20% (30)
Evaluate-K5	20% (12)	20% (12)	20% (30)
Total Marks	60	60	150

Unit I

Understanding cloud computing: An introduction to cloud computing- what it is & what it is not- History - The network is the computer: How cloud computing works. Companies in the cloud: cloud computing today. The pros and cons of cloud computing- benefits- how to develop cloud services.

Unit II

Cloud computing for the community- Cloud computing for the corporation- Using cloud services: collaborating on calendars, schedules, and Task management. Exploring online calendar applications- Exploring online schedule applications- Exploring online planning and task management.

Unit III

Collaborating on Event Management: Event Management applications - Exploring Event Management Applications – Collaborating on project Management: Exploring project Management Applications – Collaborating on databases: how it works Exploring Web-Based Databases.

Unit IV

Storing and sharing Files and other Online Content: Understanding Cloud Storage- Evaluating Online File-Storage and Sharing Services-Exploring Online Book marking Services. Sharing Digital Photographs: Exploring online photo-editing Applications – Exploring Photo- Sharing Communities. Controlling it all with Web Based Desktops.

Unit V

Collaborating via Web - Based Communication Tools: Evaluating Mail Services Instant Messaging Services - Web Conferencing services. Collaborating via Social networks and Groupware: creating groups on social networks – Evaluating online Groupware.

Text Book:

1. Michael Miller “CLOUD COMPUTING Web-Based Applications That Change The Way You Work and Collaborate Online”, Pearson Education, Edition.

References Books:

1. Velte T. Antony, Velte J. Toby., Elsenpeter Robert, “Cloud Computing: A Practical Approach”, Tata McGraw- Hill
2. Beard Haley, “Cloud Computing Best Practices for Managing and Measuring Processes for On-demand Computing, Applications and Data Centers in the Cloud with SLAs”, EmereoPvt. Limited

WEB RESOURCES:

1. https://en.wikipedia.org/wiki/Cloud_computing
2. <https://www.salesforce.com/what-is-cloud-computing/>
3. https://www.webopedia.com/TERM/C/cloud_computing.html

Course designers:

Mrs.N.Hemavathi

Course Contents and lecture schedule

S.No.	Topic	No of lecture hrs.	Mode of Teaching
Unit-I		10 Hrs	
1.1	Understanding cloud computing	2	Lecture
1.2	The network is the computer	2	Lecture
1.3	Companies in the cloud	2	PPT Presentation
1.4	How to develop cloud services.	4	PPT Presentation
Unit-II		15 Hrs	
2.1	Cloud Computing for the community & corporation	4	Lecture
2.2	Using Cloud Services	6	PPT Presentation
2.3	Exploring online calendar ,Schedule applications and Planning and task management	5	PPT Presentation
Unit-III		14 Hrs	
3.1	Collaborating on Event Management	5	Lecture
3.2	Collaborating on project Management	5	Lecture
3.3	Collaborating on databases	4	PPT Presentation
Unit-IV		10 Hrs	
4.1	Storing and sharing Files and other Online Content	5	PPT Presentation
4.2	Sharing Digital Photographs	5	PPT Presentation
Unit-V		10 Hrs	
5.1	Collaborating via Web - Based Communication Tools	5	PPT Presentation
5.2	Collaborating via Social networks and Groupware	5	Seminar

M.Sc. Computer Science
(For those joined B.Sc. Computer Science on or after June 2019)

List of Electives

1. Computer Architecture and Parallel Processing
2. Artificial Neural Networks
3. Digital Image Processing
4. Bio-Informatics
5. Parallel Computing
6. Computer Simulation and Modeling
7. Software Project Management
8. Real Time and Embedded Systems
9. Soft Computing
10. Mobile Computing
11. Pervasive Computing
12. Bluetooth Technology
13. Wireless Sensor Networks
14. Virtual Reality
15. Internet Of Things
16. Green Computing

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(For those joined M.Sc. Computer Science on or after June 2019)

Course code	Course Title	Category	L	T	P	Credit
PCS19CE 21/31/41 (a)	Computer Architecture and Parallel Processing	Elective1	5	-	-	5
L – Lecture T – Tutorial P - Practical						
Year	Semester	Internal	External	Total		
I/II	II/III / IV	25	75	100		

Preamble:

This course is dedicated to logic design, and memory and processing. This course is concerned with the hardware of a computer, its logic design and organization and learn Multi processors and multicomputer and its Performance metrics and measures.

Prerequisite:

An understanding of modern computing technology through an in-depth study of the interface between hardware and software.

Course Outcomes:

#	Course Outcome	Knowledge Level (according to Bloom’s Taxonomy)
CO1	Explain the basic structure of computer and perform computer arithmetic operations	K1,K2
CO2	Compare the concept of cache mapping techniques and the concept of I/O organization	K2,K4
CO3	Relate the working principles of I/O interface and Priority interrupts.	K2,K4
CO4	Illustrate fundamental knowledge in the design principles for general-purpose parallel computers.	K1,K2
CO5	Examine current practical implementations of parallel architectures	K3,K4,K5

K1-Knowledge K2-Understand K3-Apply K4-Analyze K5-Evaluate Mapping

of COs with POs

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S				
CO2	S	M			
CO3	M	L	L		
CO4	S		M		
CO5				M	S

Blooms taxonomy

	CA		End of Semester
	First	Second	
Knowledge -K1	15% (9)	15% (9)	20% (30)
Understand -K2	15% (9)	15% (9)	20% (30)
Apply-K3	30% (18)	30% (18)	20% (30)
Analyze-K4	20% (12)	20% (12)	20% (30)
Evaluate-K5	20% (12)	20% (12)	20% (30)
Total Marks	60	60	150

UNIT-I

Basic Structure of Computers: Functional Units - Basic Operational Concepts- Bus Structures

Machine Instructions and Programs: Numbers, Arithmetic Operations, and Characters-Number Representation- Addition of Positive Numbers – Addition and Subtraction of Signed Numbers –Overflow in Integer Arithmetic- Characters.

UNIT-II

Central Processing Unit: General Register and Stack Organization - Instruction formats - Addressing Modes - Data Transfer and Manipulation - Program Control - RISC - Pipelining - Arithmetic, Instruction and RISC Pipelining - Vector Processing - Array Processor.

UNIT-III

Input-Output organization - Peripheral devices - I/O Interface - Asynchronous Data Transfer - Modes of Transfer - Priority Interrupt - DMA - I/O Processor - Serial Communication - Memory Organization - Memory Hierarchy - Auxiliary Memory - Associative Memory and Virtual Memory

UNIT-IV

Introduction to Parallel Processing: Trends towards parallel processing –Parallel Processing Mechanisms – Parallel Computer Structures-Architectural Classification Schemes-Parallel Processing Applications

UNIT-V

Structures and Algorithms for Array Processors: SIMD Array Processors –SIMD Interconnection Networks- Parallel Algorithms for Array Processors.

Multiprocessor Architecture and Programming: Functional Structures-Parallel Memory Organizations- Multiprocessing Control and Algorithms: Inter process Communication Mechanisms-Parallel Algorithms for Multiprocessors

Text Books

1. V.C. Hamacher, G. Vranesic, S.G. Zaky - Computer Organisation, TMG
2. Kai Hwang ,Faye A.Briggs-Computer Architecture and Parallel Processing ,MGH

Reference Books

1. Nicholas Carter, “Computer Architecture”, TMG.
- 2.J.P.Hayes, Computer Architecture, McGraw Hill
3. Selim G.AKL - The Design and Analysis of parallel Algorithms - PHI.

Web Resources:

1. <https://learn.saylor.org/course/view.php?id=71§ionid=679>
2. <https://www.btechguru.com/prepare--anna-university--electronics-and-communication-engineering--computer-architecture--parallel-processing--4--113>
3. <http://www.tutorialspoint.com/Computer-Architecture-And-Organization/05-What-Is-Parallel-Processing.aspx>

Course designers:

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Course code	Course Title	Category	L	T	P	Credit
PCS19CE 21/31/41 (b)	Artificial Neural Networks	Elective2	4	-	-	5

L – Lecture T – Tutorial P - Practical

Year	Semester	Internal	External	Total
I/II	II/III / IV	25	75	100

Preamble:

This paper is to demonstrate the neural networks, its algorithms, evaluation and its implementation

Prerequisite:

Require a solid mathematical background and familiar with at least one general-purpose programming language.

Course Outcomes:

#	Course Outcome	Knowledge Level (according to Bloom's Taxonomy)
CO1	Illustrate the Neural networks structure, architecture, evaluation and its implementations	K1,K2
CO2	Relate the supervised learning of neural networks algorithms and applications	K1,K3
CO3	Relate the unsupervised learning of neural networks and its analysis	K2,K4
CO4	Extent the concept of neural networks to Associative learning	K2,K4
CO5	Summarize the Architecture and Hybrid Evolutionary Approaches.	K2,K5

K1-Knowledge K2-Understand K3-Apply K4-Analyze K5-Evaluate

Mapping of COs with POs

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	L			
CO2		M	L		
CO3		S			S
CO4			S	M	
CO5		L	M		

Blooms taxonomy

	CA		End of Semester
	First	Second	
Knowledge -K1	15% (9)	15% (9)	20% (30)
Understand -K2	15% (9)	15% (9)	20% (30)
Apply-K3	30% (18)	30% (18)	20% (30)
Analyze-K4	20% (12)	20% (12)	20% (30)
Evaluate-K5	20% (12)	20% (12)	20% (30)
Total Marks	60	60	150

Unit I

INTRODUCTION: History of Neural Networks - Structure and Function of a single neuron - Neural Net Architectures – Neural Network Uses –Evaluation of Networks – Implementation.

Unit II

SUPERVISED LEARNING: Perceptrons – Linear Separability -Perception Training Algorithm –Support vector Classification. Multilevel Discrimination-Back propagation algorithm-Classification using backpropagation-Applications.

Unit III

UNSUPERVISED LEARNING: Winner-Take-All Networks-Counter propagation Networks-Topologically Organized Networks-Distance-based Learning-Principal Component Analysis Networks.

Unit IV

ASSOCIATIVE LEARNING: Non-iterative Procedures for Association-Hopfield Networks- Brain-State-in-a-Box Network – Hetero Associators.

Unit V

EVOLUTIONARY OPTIMIZATION: Optimization and Search –Evolutionary Computation-Evolutionary Algorithms for Training Neural Networks-Learning the Architecture –Hybrid Evolutionary Approaches.

Text Books:

1.Kishan Mehrotra , Chilukuri K.Mohan, Sanjay Ranka ,”Elements of Artificial Neural Networks”,RRIPenram International Publishing Pvt.Ltd.

Reference Books:

1.“Introduction to the theory of Neural Computation”, - J.Hertz, A.Krogh., and R.G. Palmer, Addison – Wesley

Web Resources:

1. http://www.dkriesel.com/_media/science/neuronalenetze-en-zeta2-1col-dkrieselcom.pdf

2. <http://dai.fmph.uniba.sk/courses/NN/haykin.neural-networks.3ed.2009.pdf>

3. http://pami.uwaterloo.ca/~karray/Fundamentals_of_ANN.pdf

Course designers:

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Course code	Course Title	Category	L	T	P	Credit
PCS19CE 21/31/41 (c)	Digital Image Processing	Elective3	4	-	-	5

L – Lecture T – Tutorial P - Practical

Year	Semester	Internal	External	Total
I/II	II/III / IV	25	75	100

Preamble:

To introduce the necessary background, the basic algorithms, and the applications of computer graphics and image processing.

Prerequisite:

Familiarity with basics of mathematics and basic programming skills.

Course Outcomes:

#	Course Outcome	Knowledge Level (according to Bloom’s Taxonomy)
CO1	Explain the fundamental steps in Image Processing.	K1,K2
CO2	Translate an image into digital form and perform some operations on it	K2,K3
CO3	Demonstrate with image restoration and compression techniques	K3,K4
CO4	Explain Image Segmentation and Representation.	K2,K3,K4
CO5	Interpret the Image Recognition and Interpretation.	K2,K3,K5

K1-Knowledge K2-Understand K3-Apply K4-Analyze K5-Evaluate

Mapping of COs with POs

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S				
CO2		M	L		
CO3				S	
CO4				M	
CO5			L	M	S

Blooms taxonomy

	CA		End of Semester
	First	Second	
Knowledge -K1	15% (9)	15% (9)	20% (30)
Understand -K2	15% (9)	15% (9)	20% (30)
Apply-K3	30% (18)	30% (18)	20% (30)
Analyze-K4	20% (12)	20% (12)	20% (30)
Evaluate-K5	20% (12)	20% (12)	20% (30)
Total Marks	60	60	150

Unit – I:

Digital Image Fundamentals

Introduction – Digital Image Representation – Fundamental Steps in Image Processing – Element of Digital Image Processing Systems – Elements of Visual Perception – A Simple Image Model – Sampling and Quantization – Basic Relationships Between Pixels – Imaging Geometry – Photographic Film.

Unit – II:

Image Transformation and Enhancement

Image Transformations – Fourier Transform – Discrete Fourier Transform – Properties of Two Dimensional Fourier Transform – Fast Fourier Transform Spatial Domain Methods – Frequency Domain Methods – Enhancement by Point Processing – Spatial Filtering – Enhancement in Frequency Domain.

Unit – III:

Image Restoration and Compression

Degradation Model – Algebraic Approach to Restoration – Least Mean Square Filter – Restoration in Spatial Domain – Geometric Transformation.

Fundamentals of Image Compression – Image Compression Models – Error-free Compression – Lossy Compression – Image Compression Standards.

Unit – IV:

Image Segmentation and Representation

Detection of Discontinuities – Edge Linking and Boundary Detection – Thresholding – Region Oriented Segmentation – Use of Motion in Segmentation – Representation Schemes – Boundary Description – Regional Descriptors.

Unit –V:

Image Recognition and Interpretation

Elements of Image Analysis – Patterns and Pattern Classes – Neural Networks – Structural Methods – Interpretation – Semantic Networks – Production (Expert) Systems.

Text Book:

1. Digital Image Processing -- Rafael C. Gonzalez, Richard E. Woods (Addison–Wesley)

Reference Book:

1. Digital Image Processing -- Kenneth R. Castleman (PHI)

Web Resources:

1. <https://lecturenotes.in/subject/89/digital-image-processing-dip>
2. <http://www.alphace.ac.in/downloads/notes/ece/10EC763.pdf>
3. <https://nptel.ac.in/courses/106105032/>

Course designers:

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Course code	Course Title	Category	L	T	P	Credit
PCS19CE 21/31/41 (d)	Bio Informatics	Elective4	4	-	-	5
L – Lecture T – Tutorial P - Practical						
Year	Semester	Internal	External	Total		
I/II	II/III / IV	25	75	100		

Preamble:

Provide an understanding of Bio Informatics concepts and applications.

Prerequisite:

Knowledge in Mathematics, Computer Science and Biology

Course Outcomes:

#	Course Outcome	Knowledge Level (according to Bloom’s Taxonomy)
CO1	Explain the Molecular Biology and bioinformatics approaches and its applications	K1,K2
CO2	Outline about the information molecules & information flow	K2, K3
CO3	Use Perl programming in implementing Bioinformatics applications.	K3,K5
CO4	Analyze the Alignment of Pairs of Sequence with the use of sequence tools	K3,K4
CO5	Demonstrate the Phylogenetic Analysis and Proteomics	K1,K3,K5

K1-Knowledge K2-Understand K3-Apply K4-Analyze K5-Evaluate

Mapping of COs with POs

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1		S			
CO2			M		
CO3				L	M
CO4			M	S	
CO5	S		L		S

Blooms taxonomy

	CA		End of Semester
	First	Second	
Knowledge -K1	15% (9)	15% (9)	20% (30)
Understand -K2	15% (9)	15% (9)	20% (30)
Apply-K3	30% (18)	30% (18)	20% (30)
Analyze-K4	20% (12)	20% (12)	20% (30)
Evaluate-K5	20% (12)	20% (12)	20% (30)
Total Marks	60	60	150

Unit – I:

Introduction:

Objectives – Kinds of Data – Multiplicity of Data & Redundancy – Databases – Data Integration & Analysis.

Molecular Biology & Bioinformatics:

Molecular Biology – Systems Approach in Biology – Central Dogma of Molecular Biology – Definitions – Problems in Molecular & Bioinformatics Approach – Applications.

Unit – II:

Information Molecules & Information Flow:

Basic Components – Basic Chemistry of Nucleic Acids – Structure of DNA – Structure of RNA – DNA Replication is Semi-Conservative – Denaturation & Renaturation of DNA – Functional Elements in DNA – Eukaryotic Chromosomes – Structure of Bacterial Chromosome – Analysis DNA – Cloning Methodology – DNA Sequencing & PCR.

Proteins – Profiles & Properties:

Amino Acids – Protein Structure – Secondary Structure Elements – Tertiary Structure – Quaternary Structure – Protein Folding – Protein function – Purification and Characteristics.

Unit – III:

Programming with Perl:

Introduction – Programming – Illustrations – Associative Arrays – File Input and Output – Applications for Bioinformatics – Bioperl.

Understanding & Using Biological Databases:

Introduction – Types of Databases – Networks and Databases – Introduction to Java Clients – CORBA – Using MYSQL – Introduction to Biostatistics.

Unit – IV:

Alignment of Pairs of Sequence:

Sequence Analysis of Biological Data – Model & Biological Motivation – Methods of Alignment – Application of Dot Matrices – Methods of Optical Alignments – Using Gap Penalties and Scoring Matrices – Sensitivity and Specificity.

Tools for Sequence Alignment:

FASTA – BLAST - Filtering and Gapped Blast – PSI – Blast – Comparison.

Alignment of Multiple Sequences:

Tools for MSA – Considerations – Applications – Viewing MSA.

Unit – V:

Phylogenetic Analysis:

Concepts of Trees – Phylogenetic Trees & Multiple Alignments – Distance Matrix Methods – Character Based Methods – Evaluating Phylogenies.

Proteomics:

Proteome Analysis – Tools – Metabolic Pathways – Genetic Networks – Network Properties & Analysis – Complete Pathway Simulation: E-Cell.

Text Book:

1. Bioinformatics Concepts, Skills & Applications -- S. C. Rastogi, NamitaMendiratta, Parag Rastogi
(CBS Publishers & Distributors)

Reference Book:

1. Intelligent Bioinformatics
- Edward Keedwell, Ajit Narayanan (Wiley)

Web Resources:

1. <https://www.cl.cam.ac.uk/teaching/1213/Bioinfo/Bioinformatics2012.pdf>
2. http://www.iasri.res.in/ebook/CAFT_sd/Concepts%20of%20Bioinformatics.pdf
3. https://www.iscb.org/cms_addon/online_courses/index.php

Course designers:

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Course code	Course Title	Category	L	T	P	Credit
PCS19CE 21/31/41 (e)	Parallel Computing	Elective -5	4	-	-	5

L – Lecture T – Tutorial P – Practical

Year	Semester	Internal	External	Total
I/II	II/III / IV	25	75	100

Preamble:

Develop an understanding of various basic concepts associated with parallel computing environments.

Prerequisite:

Students are expected to know the **C language**, data structures, and know basics on computer architecture.

Course Outcomes:

#	Course Outcome	Knowledge Level (according to Bloom’s Taxonomy)
CO1	Explain the principles of Multiprocessors and Multicomputer	K2
CO2	Demonstrate a detailed understanding of the Processor Technology and memory hierarchy	K1,K2
CO3	Summarize the concept of Pipelining and scalar techniques	K2,K4
CO4	Compare Parallel and Multi-vector processing	K3,K4
CO5	Explain the Techniques for Multithreaded and its Data flow	K2,K5

K1-Knowledge K2-Understand K3-Apply K4-Analyze K5-Evaluate

Mapping of COs with POs

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	s				
CO2	s	l			
CO3		s	m		
CO4	m	s	l		
CO5			s		

Blooms taxonomy

	CA		End of Semester
	First	Second	
Knowledge -K1	15% (9)	15% (9)	20% (30)
Understand -K2	15% (9)	15% (9)	20% (30)
Apply-K3	30% (18)	30% (18)	20% (30)
Analyze-K4	20% (12)	20% (12)	20% (30)
Evaluate-K5	20% (12)	20% (12)	20% (30)
Total Marks	60	60	150

Unit – I:

Parallel Computer Models

Multiprocessors and Multi computers – Multi vector and SIMD Computers – PRAM and VLSI Models.

Program and Network Properties

Program Flow Mechanisms – System Inter Connect Architectures.

Principles of Scalable Performance

Parallel Processing Application – Speedup Performance Laws.

Unit – II:

Processors and Memory Hierarchy

Advanced Processor Technology – Super Scalar and Vector Processors – Memory Hierarchy Technology – Virtual Memory Technology

Bus, Cache and Shared memory

Back Plane Bus Systems – Cache Memory Organizations – Shared Memory Organizations.

Unit – III:

Pipelining and Super scalar Techniques

Linear Pipeline Processors – Nonlinear Pipeline Processors – Instruction Pipeline Design – Arithmetic Pipeline Design – Super Scalar and Super Pipeline Design.

Unit – IV:

Parallel and Scalable Architecture

Multiprocessor System Interconnects – Cache Coherence – Message Passing Mechanisms.

Multivector and SIMD Computer:

Vector Processing Principles – Multivector Multiprocessors – Compound Vector Processing – SIMD Computer Organization.

Unit – V:

Scalable, Multithreaded and Data flow Architecture:

Latency Hiding Technique -Principles of Multithreading – Fine Grain Multi computers.

Text Book:

1. Advanced Computer Architecture Parallelism, Scalability, Programmability
- Kai Hwang (Tata McGraw-Hill)

Reference Book:

1. Parallel Processing: Principles and Practice
- E. V. Krishnamurthy (Addison-Wesley)

Web Resources:

1. https://computing.llnl.gov/tutorials/parallel_comp/
2. <http://www.cse.unt.edu/~tarau/teaching/parpro/papers/Parallel%20computing.pdf>
3. <https://nptel.ac.in/courses/106102114/>

Course designers: Mrs.N.Hemavathi

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Course code	Course Title	Category	L	T	P	Credit
PCS19CE 21/31/41 (f)	Computer Simulation and Modeling	Elective6	4	-	-	5

L – Lecture T – Tutorial P - Practical

Year	Semester	Internal	External	Total
I/II	II/III / IV	25	75	100

Preamble:

To provide a detailed understanding of the system models.

Prerequisite:

Knowledge about computer programs and its functional relationship within the real systems.

Course Outcomes:

#	Course Outcome	Knowledge Level (according to Bloom’s Taxonomy)
CO1	Explain the various types of system models and segment management.	K2
CO2	Summarize the Techniques of simulation.	K2,K4
CO3	Explain the various system models the various of numerical computation technique for discrete models.	K2
CO4	Extent the concepts in Analog Simulators to Continuous System Simulation Languages.	K3,K4
CO5	Examine the discrete system simulation.	K3,K5

K1-Knowledge K2-Understand K3-Apply K4-Analyze K5-Evaluate

Mapping of COs with POs

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S				
CO2		M			
CO3				S	
CO4	M			L	
CO5	S	L			M

Blooms taxonomy

	CA		End of Semester
	First	Second	
Knowledge -K1	15% (9)	15% (9)	20% (30)
Understand -K2	15% (9)	15% (9)	20% (30)
Apply-K3	30% (18)	30% (18)	20% (30)
Analyze-K4	20% (12)	20% (12)	20% (30)
Evaluate-K5	20% (12)	20% (12)	20% (30)
Total Marks	60	60	150

Unit – I: System Models:

Concepts of a System-system Environment-stochastic activities-continuous and discrete system-system modeling-types of models-static physical models –dynamic physical models-static mathematical models-principles used in modeling.

System Studies:

Subsystems-Corporate Model-environment segment-production segment-management segment-full corporate model-types of system study-system analysis-system design-system postulation.

Unit – II:**System simulation:**

Techniques of simulation-Monte Carlo Method-Comparison of simulation and analytical methods-experimental nature of simulation-types of system simulation-numerical computation technique for continuous models-numerical computation technique for discrete models-distributed log models-progress of simulation study.

Unit – III:**Continuous system simulation:**

Continuous System Models-Differential Equations-Analog Computers-Analog Methods-Hybrid Computers-Digital-Analog Simulators-Continuous System Simulation Languages-CSMP III-Hybrid simulation-Feedback Systems-Simulation of an Autopilot-Interactive Systems-Real-Time Simulation.

Unit – IV:**System Dynamics:**

Historical Background-Exponential Growth Models-Exponential Decay Models-Modified Exponential Growth Models-Logistic Curves-Generalization of Growth Models-System Dynamics Diagrams-Simple System Dynamics Diagrams-Multi-segment Models-Representation of Time Delays-Feedback in Socio-Economic Systems-Biological Example-World Models-Dynamo language.

Unit – V:**Discrete system simulation:**

Discrete events-representation of time- Generation of Arrival patterns- simulation of a telephone system- delayed calls-simulation programming tasks- gathering statistics-counters and summary statistics-measuring utilization and occupancy- recording distributions and transit times-discrete simulation languages.

Text Book:

1. System Simulation-GEOFFREY GORDON, PHI, Second Edition.

References:

1. Bernard Zeigler, Herbert Praehofer, Tag Gon Kim, *Theory of Modeling and Simulation.*, Academic Press
2. NarsingDeo, *System Simulation with Digital Computer.*, PHI Donald W. Body, *System Analysis and Modeling.*, Academic Press Harcourt India

Web Resources:

1. <http://openaccess.uoc.edu/webapps/o2/bitstream/10609/57344/1/Computer%20Modeling%20%26%20Simulation.pdf>
2. https://www.tutorialspoint.com/modelling_and_simulation/
3. <https://ntrs.nasa.gov/archive/nasa/casi.ntrs.nasa.gov/20030025366.pdf>

Course designers: Mrs.L.Krishnaveni

THIAGARAJAR COLLEGE – AUTONOMOUS MADURAI – 625 009.
(Re-Accredited With ‘A’ Grade by NAAC)
Department of Computer Science
 (For those joined M.Sc. Computer Science on or after June 2019)

Course code	Course Title	Category	L	T	P	Credit
PCS19CE 21/31/41 (g)	Software Project Management	Elective7	4	-	-	5

L – Lecture T – Tutorial P - Practical

Year	Semester	Internal	External	Total
I/II	II/III / IV	25	75	100

Preamble:

This paper is to demonstrate the Software project management concepts and process models and resource allocation techniques.

Prerequisite:

Knowledge about the types of project and its basic requirements.

#	Course Outcome	Knowledge Level (according to Bloom’s Taxonomy)
CO1	Explain the various Software project Management concepts.	K2
CO2	Compare the various process models, and study of various cost estimation models.	K2,K3
CO3	Summarize the appropriate project approach and Risk management techniques	K2,K4
CO4	Demonstrate the resource allocation techniques.	K3,K4,K5
CO5	Explain the Managing people and Organizing terms.	K2,K3

K1-Knowledge K2-Understand K3-Apply K4-Analyze K5-Evaluate

Mapping of COs with POs

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S				
CO2	M				
CO3			S		
CO4	S			M	
CO5				M	L

Blooms taxonomy

	CA		End of Semester
	First	Second	
Knowledge -K1	15% (9)	15% (9)	20% (30)
Understand -K2	15% (9)	15% (9)	20% (30)
Apply-K3	30% (18)	30% (18)	20% (30)
Analyze-K4	20% (12)	20% (12)	20% (30)
Evaluate-K5	20% (12)	20% (12)	20% (30)
Total Marks	60	60	150

Unit I:

Introduction – Importance of Software Project Management – Project – Software project Vs Other types of Project – Contract Management and Technical Project Management – Activities covered by Software Project Management – Plans, Methods and methodologies – Categorizing Software Projects – Setting Objectives – Stake holders - Business Case –Requirement specification – Management control. Programme management and project evaluation: Introduction – Programme management – Managing the allocation of resources within programmes – Strategic Programme management – Creating a programme – Aids to Programme management – Benefits Management – Evaluation of individual projects – Technical Assessment – Cost Benefit Analysis – Cash Flow forecasting – Cost Benefit Evaluation Techniques – Risk Evaluation.

Unit II:

Selection of an appropriate project approach: Introduction – Choosing technologies – Technical plan contents list – Choice of process models – Structure Vs Speed of delivery – The Waterfall model – The V-Process Model – The Spiral Model – Software prototyping – Other ways of categorizing prototypes – Incremental Delivery- Dynamic Systems Development method – Extreme programming – Managing iterative process – Selecting the most appropriate process model.

Software Cost Estimation: Introduction – Where are estimates done? – Problems with over and under estimates – Basis for software estimating – Software effort estimation techniques – Expert Judgement – Estimating by analogy – Albrecht function point analysis – Function points Mark II - COSMIC Full function points – A Procedure code oriented approach – COCOMO: a Parametric model.

Unit III

Activity Planning: An Introduction – Objectives of Activity Planning – When to plan – Project Schedules – Projects & Activities – Sequencing and scheduling activities – Network planning models – Formulating a network model – Adding the time dimension – The forward pass – The backward pass – Identifying the critical path – Activity float – Shortening the project duration – Identifying critical activities – Activity on arrow networks.

Risk Management: Introduction – Risk – Categories of Risk – A framework for dealing with this – Risk Identification – Risk Assessment – Risk Planning – Risk Management – Evaluating risks to the schedule – Applying the PERT Technique – Monte Carlo simulation – Critical chain concepts.

Unit IV:

Resource Allocation: Introduction – The Nature of Resource – Identifying resource requirements – Scheduling resources – Creating Critical paths – Counting the cost – Being specific – Publishing the resource schedule – Cost Schedule – The Scheduling Sequence.

Monitoring and Control: Introduction – Creating the framework – Collecting the data – Visualizing Progress – Cost Monitoring – Earned Value Analysis – Prioritizing monitoring – Getting the project back to target – Change control.

Unit V:

Managing Contracts: Introduction – ISO 12207 approach to the acquisition and supply of software – The supply process – Type of contract – Stages in Contract placement – Typical terms of a contract – Contract Management – Acceptance.

Managing people and Organizing terms: Introduction – Understanding Behavior – Organizational Behavior: a background – Selecting the right person for the job – Instruction in the best methods – Motivation – The Oldham-Hackman job characteristics model – Working in groups – Working in groups – Becoming a team – Decision making – Leadership – Organizational Structures – Dispersed and Virtual team – The influence of culture – Stress – Health & Safety.

Text Book:

1. Software Project Management,

Author: Bob Hughes and mike Cotterell, Tata Mc Grawhill Fourth edition.

References:

1. Software Project Management, A Concise Study, S.A. Kelkar, PHI.
2. Software Project Management, Robert Bruce measure for improving performance, PHI Kelsey, Ph.D.

Web Resources:

1. https://www.tutorialspoint.com/software_engineering/software_project_management.htm
2. <https://www.scribd.com/doc/7150545/Software-Project-Study-Material>
3. <http://ebooks.bharathuniv.ac.in/gdlc1/gdlc1/Computer%20Science%20Books/Software%20Project%20Management%20.pdf>

Course designers:

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Course code	Course Title	Category	L	T	P	Credit
PCS19CE 21/31/41 (h)	Real Time and Embedded Systems	Elective -8	4	-	-	4

L – Lecture T – Tutorial P - Practical

Year	Semester	Internal	External	Total
I/II	II/III/IV	25	75	100

Preamble:

This paper is to demonstrate the Embedded system and Processor and memory management and RTOS and Embedded Software Development Processes and Tools.

Prerequisite:

Basic knowledge of electronics, software functionality, hardware use and mainly understanding of programming.

#	Course Outcome	Knowledge Level (according to Bloom's Taxonomy)
CO1	Demonstrate the Embedded systems and memory organization	K1,K2
CO2	Explain the device Network and servicing mechanism.	K1,K2
CO3	Build the Embedded Programming and Modeling concepts.	K2,K3
CO4	Summarize the Real time Operating System Programming	K3,K4
CO5	Build the Embedded Software Development Process and Tools.	K3,K4,K5

K1-Knowledge K2-Understand K3-Apply K4-Analyze K5-Evaluate

Mapping of COs with POs

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	s				
CO2		m	l		
CO3			s		
CO4				m	
CO5				l	s

Blooms taxonomy

	CA		End of Semester
	First	Second	
Knowledge -K1	15% (9)	15% (9)	20% (30)
Understand -K2	15% (9)	15% (9)	20% (30)
Apply-K3	30% (18)	30% (18)	20% (30)
Analyze-K4	20% (12)	20% (12)	20% (30)
Evaluate-K5	20% (12)	20% (12)	20% (30)
Total Marks	60	60	150

Unit -I :

INTRODUCTION: Introduction to Embedded systems – Processor and memory organization

Unit- II :

Devices and Networks: Devices and buses for Device Networks – Device drivers and Interrupt servicing mechanism.

Unit-III :

Embedding and Modeling Concepts: Programming Concepts and Embedded Programming in C,C++ and java -
Program Modeling Concepts.

Unit-IV:

RTOS: Real-Time Operating Systems –Real time Operating System Programming-I: Microc/OS-II and VxWorks

Unit V

Embedded Software Development Process and Tools: Introduction to Embedded software development process and Tools –Host and Target Machines-Linking and Locating Software-Getting Embedded Software into the Target System-Issues in Hardware-software Design and Co-design.

Text Book(s)

1. Raj Kamal, 'Embedded Systems Architecture, Programming and Design', Tata Mc-Graw-Hill.

References

1. R.J.A.Buhr, D.L.Bailey, "An Introduction to Real Time Systems: Design to Networking with C/C++", Prentice- Hall, International.
2. Grehan Moore and Cyliax, "Real Time Programming: A guide to 32 Bit Embedded Development Reading: Addison- Wisley-Longman”.

Web Resources:

1. <https://lecturenotes.in/subject/456/embedded-and-real-time-systems-erts>
2. <https://nptel.ac.in/downloads/108105057/>
3. [https://www.iitg.ac.in/pbhaduri/cs522-13/Introduction%20to%20Embedded%20Systems%20\(ver%200.5,%20Aug%202010\).pdf](https://www.iitg.ac.in/pbhaduri/cs522-13/Introduction%20to%20Embedded%20Systems%20(ver%200.5,%20Aug%202010).pdf)

Course designers:

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Department of Computer Science

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Course code	Course Title	Category	L	T	P	Credit
PCS19CE 21/31/41 (i)	Soft Computing	Elective - 9	4	-	-	4

L – Lecture

T – Tutorial

P - Practical

Year	Semester	Internal	External	Total
I/II	II/III/IV	25	75	100

Preamble:

To Provide and Understand the knowledge of Soft Computing on Genetic Algorithms, Neural Networks and Fuzzy Logic along with its models.

Prerequisite:

Familiarity with linear algebra, calculus and probability theory. knowledge of a programming language.

#	Course Outcome	Knowledge Level (
CO1	Explain the Computational Intelligence and Machine Learning Basics.	K1,K2
CO2	Demonstrate Machine Learning Using Neural Network.	K1,K2
CO3	Build the Genetic Algorithms (GA) in Machine Learning	K1,K2
CO4	Explain the Fuzzy Set, Fuzzy Relations and Fuzzy Expert Systems.	K2,K5
CO5	Illustrate the Neuro-Fuzzy modelling, Classification and Data clustering algorithms.	K3,K4, K5

K1-Knowledge

K2-Understand

K3-Apply

K4-Analyze

K5-Evaluate

Mapping of COs with POs

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	L				
CO2		S	M		
CO3	S				
CO4	M				
CO5			M	L	S

Blooms taxonomy

	CA		End of Semester
	First	Second	
Knowledge -K1	15% (9)	15% (9)	20% (30)
Understand -K2	15% (9)	15% (9)	20% (30)
Apply-K3	30% (18)	30% (18)	20% (30)
Analyze-K4	20% (12)	20% (12)	20% (30)
Evaluate-K5	20% (12)	20% (12)	20% (30)
Total Marks	60	60	150

UNIT I : INTRODUCTION TO SOFT COMPUTING AND NEURAL NETWORKS

Evolution of Computing - Soft Computing Constituents – From Conventional AI to Computational Intelligence - Machine Learning Basics

UNIT II : GENETIC ALGORITHMS

Introduction to Genetic Algorithms (GA) – Applications of GA in Machine Learning - Machine Learning Approach to Knowledge Acquisition.

UNIT III: NEURAL NETWORKS

Machine Learning Using Neural Network, Adaptive Networks – Feed forward Networks – Supervised Learning Neural Networks – Radial Basis Function Networks -Reinforcement Learning – Unsupervised Learning Neural Networks – Adaptive Resonance architectures – Advances in Neural networks.

UNIT IV : FUZZY LOGIC

Fuzzy Sets – Operations on Fuzzy Sets – Fuzzy Relations – Membership Functions-Fuzzy Rules and Fuzzy Reasoning – Fuzzy Inference Systems – Fuzzy Expert Systems – Fuzzy Decision Making.

UNIT V : NEURO-FUZZY MODELING

Adaptive Neuro-Fuzzy Inference Systems – Coactive Neuro-Fuzzy Modeling –Classification and Regression Trees – Data Clustering Algorithms – Rulebase Structure Identification – Neuro-Fuzzy Control – Case studies.

TEXT BOOKS:

- 1.Jyh-Shing Roger Jang, Chuen-Tsai Sun, Eiji Mizutani, “Neuro-Fuzzy and Soft Computing”, Prentice-Hall of India.
- 2.George J. Klir and Bo Yuan, “Fuzzy Sets and Fuzzy Logic-Theory and Applications”, Prentice Hall.
- 3.James A. Freeman and David M. Skapura, “Neural Networks Algorithms, Applications, and Programming Techniques”, Pearson Edn.

REFERENCES:

1. Mitchell Melanie, “An Introduction to Genetic Algorithm”, Prentice Hall.
2. David E. Goldberg, “Genetic Algorithms in Search, Optimization and Machine Learning”, Addison Wesley.
3. S. N. Sivanandam, S. Sumathi and S. N. Deepa, “Introduction to Fuzzy Logic using MATLAB”, Springer.
4. S.N.Sivanandam · S.N.Deepa, “ Introduction to Genetic Algorithms”, Springer.
5. Jacek M. Zurada, “Introduction to Artificial Neural Systems”, PWS Publishers.

Web Resources:

1. <https://lecturenotes.in/subject/124/soft-computing-sc>
2. <https://nptel.ac.in/courses/106105173/>
3. <https://bookboon.com/en/introduction-to-soft-computing-ebook>
- 4.

Course designers

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(For those joined M.Sc. Computer Science on or after June 2019)

Course code	Course Title	Category	L	T	P	Credit
PCS19CE 21/31/41 (j)	Mobile Computing	Elective10	4	-	-	5

L – Lecture T – Tutorial P - Practical

Year	Semester	Internal	External	Total
I/II	II/III/IV	25	75	100

Preamble:

To Provide and Understand the knowledge of wireless and mobile communications systems and be able to choose an appropriate mobile system from a set of requirements.

Prerequisite:

Knowledge of computer networks and able to do some basic programming, read pseudo codes, and interpret algorithms.

#	Course Outcome	Knowledge Level (according to Bloom's Taxonomy)
CO1	Explain the mobile computing system and its Architecture	K1
CO2	Build the Mobile access procedures and the technologies used.	K2,K3
CO3	Analyse the Program applications on a mobile computing system and interact with servers and database systems.	K4
CO4	Adopt with WAP and Packet Radio Services.	K4,K5
CO5	Explain the important issues and concerns on security and privacy	K2,K3

K1-Knowledge K2-Understand K3-Apply K4-Analyze K5-Evaluate

Mapping of COs with POs

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	s	l			
CO2		s	l		
CO3		m	l		
CO4	l		m	s	
CO5			m	m	l

Blooms taxonomy

	CA		End of Semester
	First	Second	
Knowledge -K1	15% (9)	15% (9)	20% (30)
Understand -K2	15% (9)	15% (9)	20% (30)
Apply-K3	30% (18)	30% (18)	20% (30)
Analyze-K4	20% (12)	20% (12)	20% (30)
Evaluate-K5	20% (12)	20% (12)	20% (30)
Total Marks	60	60	150

Unit I:

Introduction – Mobility of Bits and Bytes -Wireless The beginning – Mobile computing –Dialogue Control – Networks – Middleware and Gateways – Applications and Services – Developing Mobile Computing Applications – Security in Mobile Computing

Mobile computing Architecture: History of computers – History of Internet – Internet - The Ubiquitous Network – Architecture for Mobile computing – Three-tier Architecture – Design consideration for mobile

Unit II:

Mobile Computing through Telephony – Evolution of Telephony – Multiple Access Procedures – mobile computing through telephone – Developing an IVR Application – voice XML – Telephony Application Programming Interface.

Emerging Technologies: Introduction – Bluetooth – radio Frequency Identification - wireless broadband – mobile IP – Internet Protocol version 6 – Java card.

Unit III:

Global System for Mobile communication – Global System for Mobile communication – GSM Architecture – GSM entities – call routing in GSM – PLMN Interfaces – GSM address and Identifiers – Network aspects in GSM

General Packet Radio Service: Introduction – GPRS and packet Data Network – GPRS Network Architecture – GPRS Network operations – Data Services in GPRS – Application for GPRS – Limitations of GPRS

Unit IV:

Wireless Application Protocol – Introduction – WAP – MMS – GRPS applications. CDMA and 3G:Introduction – Spread spectrum technology – IS95 – CDMA versus GSM – Wireless Data – Third Generation Networks – Application on 3 G

Unit V:

Wireless LAN: Introduction – wireless LAN advantages – IEEE 802.11 standards – wireless LAN architecture – mobility in wireless - wireless LAN Security – WiFi versus 3G Internet networks and Internetworking :Introduction – fundamentals of call processing – Intelligence in the networks – soft switch – programmable networks – technologies and Interfaces for IN 360.

Text Book:

1. Mobile computing, Technology applications and Service creation,
Asoke K TalukderRoopa R Yavagal, TMH publishing company New Delhi.

Reference Books:

1. Mobile computing-Tomasz imielinski, Henry F.Korthkluwer Academic Publishers.
2. Mobile Computing-CSR Prabhu, Universities Press.

Web Resources:

1. <https://lecturenotes.in/subject/122/mobile-computing-mc>
2. <https://www3.nd.edu/~cpoellab/teaching/cse40814/Lecture1-Handouts.pdf>
3. https://books.google.co.in/books/about/Mobile_Computing.html?id=St6Vmf2OU7YC

Course designers:

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Course code	Course Title	Category	L	T	P	Credit
PCS19CE 21/31/41 (k)	Pervasive Computing	Elective11	4	-	-	5
			L – Lecture	T – Tutorial	P - Practical	
Year	Semester	Internal	External	Total		
I/II	II/III/IV	25	75	100		

Preamble:

To describe the concept of ubiquitous/pervasive computing and mobile wireless networks

Prerequisite:

There are no formal requirements for the specialization, but students are expected to know basic programming skills in Java and object-oriented programming in general.

#	Course Outcome	Knowledge Level (according to Bloom’s Taxonomy)
CO1	Explain the different application development platforms for mobile and wearable devices and the particularities of programming context- and situation-aware applications	K1,K2
CO2	Analyze the device technologies used	K2,K4
CO3	Enable with various device technology and connectivity	K3,K4
CO4	Illustrate the WAP technology.	K4,K5
CO5	Explain the PDA Services for pervasive applications	K2,K3

K1-Knowledge K2-Understand K3-Apply K4-Analyze K5-Evaluate

Mapping of COs with POs

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	s	l			
CO2		s	m		
CO3	m		l		
CO4			s		
CO5			s	m	m

Blooms taxonomy

	CA		End of Semester
	First	Second	
Knowledge -K1	15% (9)	15% (9)	20% (30)
Understand -K2	15% (9)	15% (9)	20% (30)
Apply-K3	30% (18)	30% (18)	20% (30)
Analyze-K4	20% (12)	20% (12)	20% (30)
Evaluate-K5	20% (12)	20% (12)	20% (30)
Total Marks	60	60	150

Unit- I: Pervasive Computing: Past, Present and Future Pervasive Computing-Pervasive Computing Market-m-Business-Application examples: Retail, Airline check-in and booking-Sales force automation-Health care-Tracking-Car information system-E-mail access via WAP

Unit –II: Device Technology: Hardware-Human Machine Interfaces-Biometrics-Operating Systems-Java for Pervasive devices

Unit-III: Device Connectivity: Protocols-Security-Device Management Web Application Concepts: WWW architecture-Protocols-Transcoding-Client authentication via internet

Unit- IV: WAP and Beyond: Components of the WAP architecture-WAP infrastructure-WAP security issues-WML-WAP push-Products-i-Mode-Voice Technology: Basics of Speech recognition- Voice Standards-Speech applications-Speech and Pervasive Computing

Unit –V: PDA: Device Categories-PDA operation Systems-Device Characteristics-Software Components-Standards-Mobile Applications-PDA Browsers Pervasive Web Application architecture: Background-Scalability and availability-Development of Pervasive Computing web applications-Pervasive application architecture

Text Book(s)

1. Pervasive Computing, Technology and Architecture of Mobile Internet Applications, Jochen Burkhardt, Horst Henn, Stefan Hepper, Thomas Schaech & Klaus Rindtorff, Pearson Education.

References Books:

1. Fundamentals of Mobile and Pervasive Computing, Frank Adelstein, Sandeep KS Gupta, Golden Richard III, Loren Schwiebert, McGraw Hill edition.

Web Resources:

WEB RESOURCES:

1.[HTTPS://NPTEL.AC.IN/COURSES/108102045/37](https://nptel.ac.in/courses/108102045/37)

2.[HTTPS://LECTURENOTES.IN/SUBJECT/105/UBIQUITOUS-COMPUTING-UC](https://lecturenotes.in/subject/105/ubiquitous-computing-uc)

3.[HTTP://CITSEERX.IST.PSU.EDU/VIEWDOC/DOWNLOAD?DOI=10.1.1.457.2732&REP=REP1&TYPE=PDF](http://citseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.457.2732&rep=rep1&type=pdf)

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Course code	Course Title	Category	L	T	P	Credit
PCS19CE 21/31/41 (I)	Bluetooth Technology	Elective12	4	-	-	5

L – Lecture T – Tutorial P - Practical

Year	Semester	Internal	External	Total
I/II	II/III/IV	25	75	100

Preamble:

Describe the concept of Bluetooth Technology, the various profiles and the security mechanisms

Prerequisite:

#	Course Outcome	Knowledge Level (according to Bloom’s Taxonomy)
CO1	Explain the basic concepts of Bluetooth technology and its advantages	K2
CO2	Compare the different protocol architectures and its general profile principles	K3,K5
CO3	Learn the different profiles used in the usage models.	K1
CO4	Illustrate the security modes, links and its services	K2,K4
CO5	Summarize the emerging technologies adopted in bluetoothtechnology	K2, K3

K1-Knowledge K2-Understand K3-Apply K4-Analyze K5-Evaluate

Mapping of COs with POs

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	s				
CO2	m	s			
CO3		s	m		
CO4		l	m		
CO5					s

Blooms taxonomy

	CA		End of Semester
	First	Second	
Knowledge -K1	15% (9)	15% (9)	20% (30)
Understand -K2	15% (9)	15% (9)	20% (30)
Apply-K3	30% (18)	30% (18)	20% (30)
Analyze-K4	20% (12)	20% (12)	20% (30)
Evaluate-K5	20% (12)	20% (12)	20% (30)
Total Marks	60	60	150

Unit – I:

Introduction

Origin of Bluetooth – Advantage – Bluetooth Technology – PAN – Topology – Security – Applications – Java and Bluetooth – Jini and Bluetooth.

Basic Concepts

Serial Vs Parallel Transmission – Asynchronous Vs Synchronous – Spread Spectrum – Circuit and Packet Switching – TDD – Physical Links – Bluetooth Packets.

Unit – II:

Bluetooth Protocol Architecture

Bluetooth Protocol Stack – Core Protocols – Cable Replacement Protocols– Adopted Protocols – Usage Models and Profiles.

Bluetooth General Profile

Generic Access Profile – Serial Port Profile – Service Discovery Application Profile – GOEP.

Unit – III:

Bluetooth Profiles for Usage Model

Cordless Telephony Profile – Dialup Networking Profile – Fax Profile – LAN Access Profile – File Transfer Profile – Object Push Profile – Synchronization Profile.

Unit – IV:

Bluetooth Security

Security Modes – Link Level Security – Flexible Access – Implementation – Architecture Overview – Security Level of Services – Connection Setup – Connectionless L2CAP – Interface to Other Multiplexing Protocols – Interface to ESCE – Interface to HCI / LINK Manager.

Unit – V:

Bluetooth in the Global Scheme of 3G Wireless

The IMT-2000 Vision – Spanning the Generations – Current 2G Networks-Global 3G Initiative – Role of Bluetooth.

Text Book:

1. Bluetooth Demystified - Nathan J. Muller (Tata McGraw-Hill).

Reference Book:

1. Getting Started With Bluetooth -MadhushreeGanguli(Thomson Course Technology)

Web Resources:

1. <https://en.wikipedia.org/wiki/Bluetooth>
2. https://books.google.co.in/books?id=O9_xowxLNbOC&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false
3. <http://h10032.www1.hp.com/ctg/Manual/c00186949.pdf>

Course designers:

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Course code	Course Title	Category	L	T	P	Credit
PCS19CE 21/31/41 (m)	WIRELESS SENSOR NETWORKS	Elective13	4	-	-	5

L – Lecture T – Tutorial P - Practical

Year	Semester	Internal	External	Total
I/II	II/III/IV	25	75	100

Preamble:

Describe the concept of wireless sensor networks and their capabilities

Prerequisite:

Knowledge in C-programming and basic electronic circuit theory

#	Course Outcome	Knowledge Level (according to Bloom’s Taxonomy)
CO1	Illustrate the Challenges and Technologies in Wireless sensor networks	K1,K2
CO2	Explain the medium access control protocols and address physical layer issues.	K2
CO3	Explain the Sensor management, sensor network middleware, operating systems.	K2,K4
CO4	Explain the infrastructure establishment.	K2,K5
CO5	Teach the network platform and its tools.	K1,K4

K1-Knowledge K2-Understand K3-Apply K4-Analyze K5-Evaluate

Mapping of COs with POs

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	s				
CO2		s			
CO3	m	l	m		
CO4		m	l		
CO5			m	l	s

Blooms taxonomy

	CA		End of Semester
	First	Second	
Knowledge -K1	15% (9)	15% (9)	20% (30)
Understand -K2	15% (9)	15% (9)	20% (30)
Apply-K3	30% (18)	30% (18)	20% (30)
Analyze-K4	20% (12)	20% (12)	20% (30)
Evaluate-K5	20% (12)	20% (12)	20% (30)
Total Marks	60	60	150

UNIT I - OVERVIEW OF WIRELESS SENSOR NETWORKS:

Challenges for Wireless Sensor Networks, Enabling Technologies for Wireless Sensor Networks.

UNIT II - ARCHITECTURES:

Single-Node Architecture - Hardware Components, Energy Consumption of Sensor Nodes , Operating Systems and Execution Environments, Network Architecture - Sensor Network Scenarios, Optimization Goals and Figures of Merit, Gateway Concepts.

UNIT III- NETWORKING SENSORS:

Physical Layer and Transceiver Design Considerations, MAC Protocols for Wireless Sensor Networks, Low Duty Cycle Protocols And Wakeup Concepts - S-MAC , The Mediation Device Protocol, Wakeup Radio Concepts, Address and Name Management, Assignment of MAC Addresses, Routing Protocols- Energy-Efficient Routing, Geographic Routing.

UNIT IV - INFRASTRUCTURE ESTABLISHMENT:

Topology Control, Clustering, Time synchronization, Localization and Positioning, Sensor Tasking and Control.

UNIT V -SENSOR NETWORK PLATFORMS AND TOOLS:

Sensor Node Hardware – Berkeley Motes, Programming Challenges, Nodelevel software platforms, Node-level Simulators, State-centric programming.

TEXT BOOKS

1. Holger Karl & Andreas Willig, "Protocols And Architectures for Wireless Sensor Networks" , John Wiley.
2. Feng Zhao & Leonidas J. Guibas, "Wireless Sensor Networks- An Information Processing Approach", Elsevier.

REFERENCES

1. KazemSohraby, Daniel Minoli, &TaiebZnati, "Wireless Sensor Networks-Technology, Protocols, And Applications", John Wiley.
2. Anna Hac, "Wireless Sensor Network Designs", John Wiley.

Web Resources:

1. <https://nptel.ac.in/courses/114106035/37>
2. <https://lecturenotes.in/subject/106/wireless-sensor-network-wsn>
3. <http://www.tfb.edu.mk/amarkoski/WSN/Kniga-w02>

Course designers

Mrs. N.Hemavathi

THIAGARAJAR COLLEGE – AUTONOMOUS MADURAI – 625 009.
(Re-Accredited With ‘A’ Grade By NAAC)
Department of Computer Science
 (For those joined M.Sc. Computer Science on or after June 2019)

Course code	Course Title	Category	L	T	P	Credit
PCS19CE 21/31/41 (n)	Virtual Reality	Elective	4	-	-	4

L – Lecture T – Tutorial P - Practical

Year	Semester	Internal	External	Total
I/II	II/III/IV	25	75	100

Preamble:

To describe the familiarity with virtual reality, 3D Computer graphics, and simulation.

Prerequisite:

Knowing the most important aspects in terms of design/user experience.

#	Course Outcome	Knowledge Level (according to Bloom’s Taxonomy)
CO1	Illustrate the Virtual Reality and its benefits.	K1,K2
CO2	Analyse 3D Computer Graphics and 3D modelling.	K3,K4
CO3	Teach the Virtual Environment and VR technology	K1
CO4	Demonstrate the Physical Simulation and human factors.	K2,K3
CO5	Summarize the VR hardware and software, and the future of VR.	K2, K3,K5

K1-Knowledge K2-Understand K3-Apply K4-Analyze K5-Evaluate

Mapping of COs with POs

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S				
CO2		S	M		
CO3				M	
CO4			S		
CO5				M	L

Blooms taxonomy

	CA		End of Semester
	First	Second	
Knowledge -K1	15% (9)	15% (9)	20% (30)
Understand -K2	15% (9)	15% (9)	20% (30)
Apply-K3	30% (18)	30% (18)	20% (30)
Analyze-K4	20% (12)	20% (12)	20% (30)
Evaluate-K5	20% (12)	20% (12)	20% (30)
Total Marks	60	60	150

Unit – I Virtual Reality and Virtual Environments: Introduction – Computer Graphics – Real-time computer Graphics – Flight Simulation – Virtual Environment – Benefits of Virtual Reality – Historical Development of VR: Scientific Landmarks.

Unit - II 3D Computer Graphics: Virtual world Space – Positioning the Virtual Observer – The Perspective Projection – Human Vision – Stereo Perspective Projection – 3D Clipping – Color Theory – Simple 3D Modeling – illumination, reflection Models- Shading Algorithms – Radiosity – Hidden surface removal – realism- stereographic Images Geometric Modeling: 3D Space Curves – 3D boundary representation – other modeling strategies – Geometrical Transformations: Frames of reference – Modeling – Instances – Picking, Flying, scaling – Collision detection.

Unit - III Generic VR System: Virtual Environment – computer Environment – VR technology – Models of Interaction – VR Systems – Animating the Virtual Environment: The Dynamics of numbers – animation of objects – Shape and object in between – Free-form deformation – Particle Systems

Unit - IV Physical Simulation: Objects Falling in a gravitational field – Rotating wheels – Elastic Collisions – Projectiles – Simple Pendulums – Springs – Flight dynamics of an aircraft. Human Factors: The eye – the ear – The Somatic senses – Equilibrium.

Unit - V VR Hardware: Sensor Hardware – Head-Coupled displays – Acoustic Hardware – Integrated VR Systems – VR Software: Modeling Virtual World – Physical Simulation – VR Tool Kits – VR Applications: Engineering – Entertainment – Science – training – The Future: Virtual Environments – Modes of Interaction.

Text Books:

1. John Vince - Virtual Reality Systems, Pearson Education Asia.

Reference:

1. Tony Parisi - Learning Virtual Reality: Developing Immersive Experiences and Applications for Desktop, Web, and Mobile - 2015.
2. Howard Rheingold -Virtual Reality

Web Resources:

1. <https://slideplayer.com/slide/6639099/>
2. <http://www.cs.tut.fi/kurssit/SGN-5406/lectures/VR1-introduction.pdf>
3. <https://zreviewitlove.ml/books/google-e-books-download-virtual-reality-technology-by-grigore-c-burdea-philippe-coiffet-pdf-9781118014806.html>

Course designers:

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Course code	Course Title	Category	L	T	P	Credit
PCS19CE 21/31/41 (o)	Internet Of Things	Elective	4	-	-	4

L – Lecture T – Tutorial P - Practical

Year	Semester	Internal	External	Total
I/II	II/III/IV	25	75	100

Preamble:

To provide and Understand the communication technologies in IoT

Prerequisite:

Basic knowledge on operating system network protocols, electronic circuits, programming skills.

#	Course Outcome	Knowledge Level (according to Bloom’s Taxonomy)
CO1	Explain the IoT and Functional Requirements, Four Pillars and DNA of IoT.	K1,K2
CO2	Illustrate the IoT protocols, Network layer and its Security	K2,K3
CO3	Demonstrate the web of things and cloud of things.	K2,K4
CO4	Integrating IoT and Network Dynamics.	K4,K5
CO5	Analyse the various applications of IoT	K3,K4,K5

K1-Knowledge K2-Understand K3-Apply K4-Analyze K5-Evaluate

Mapping of COs with POs

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S				
CO2		S	M		
CO3		M			
CO4			S		
CO5				M	S

Blooms taxonomy

	CA		End of Semester
	First	Second	
Knowledge -K1	15% (9)	15% (9)	20% (30)
Understand -K2	15% (9)	15% (9)	20% (30)
Apply-K3	30% (18)	30% (18)	20% (30)
Analyze-K4	20% (12)	20% (12)	20% (30)
Evaluate-K5	20% (12)	20% (12)	20% (30)
Total Marks	60	60	150

Unit - I Introduction: Internet Layers - Protocols - Packets - Services - Performance parameters - Peer-to-peer networks - Sensor networks - Multimedia - IOT Definitions and Functional Requirements –Motivation – Architecture - Web 3.0 View of IoT– Ubiquitous IoT Applications – Four Pillars of IoT – DNA of IoT - The Toolkit Approach for End-user Participation in the Internet of Things. Middleware for IoT: Overview – Communication middleware for IoT –IoT Information Security.

Unit - II IoT protocols : Protocol Standardization for IoT – Efforts – M2M and WSN Protocols – SCADA and RFID Protocols – Issues with IoT Standardization – Unified Data Standards – Protocols – IEEE 802.15.4 – BACNet Protocol – point-to-point protocols - Ethernet protocols - cellular Internet access protocol - Machine-to-machine protocol - Modbus – KNX – Zigbee Architecture – Network layer – APS layer – Security.

Unit - III Web of Things: Web of Things versus Internet of Things – Two Pillars of the Web – Architecture Standardization for WoT– Platform Middleware for WoT – Unified Multitier WoT Architecture – WoT Portals and Business Intelligence. Cloud of Things: Grid/SOA and Cloud Computing – Cloud Middleware – Cloud Standards – Cloud Providers and Systems – Mobile Cloud Computing – The Cloud of Things Architecture.

Unit - IV Integrating IOT: Integrated Billing Solutions in the Internet of Things Business Models for the Internet of Things - Network Dynamics: Population Models – Information Cascades - Network Effects - Network Dynamics: Structural Models - Cascading Behavior in Networks - The SmallWorld Phenomenon.

Unit - V Applications: The Role of the Internet of Things for Increased Autonomy and Agility in Collaborative Production Environments - Resource Management in the Internet of Things: Clustering, Synchronization and Software Agents. Applications - Smart Grid – Electrical Vehicle Charging - Case studies: Sensor body-area-network and Control of a smart home.

Text Books:

1. The Internet of Things in the Cloud: A Middleware Perspective-Honbo Zhou–CRC Press 2012.
2. Architecting the Internet of Things - Dieter Uckelmann; Mark Harrison; Florian Michahelles- (Eds.) – Springer – 2011

Reference Books:

1. Networks, Crowds, and Markets: Reasoning about a Highly Connected World - David Easley and Jon Kleinberg, Cambridge University Press.
2. The Internet of Things: Applications to the Smart Grid and Building Automation by - Olivier Hersent, Omar Elloumi and David Boswarthick - Wiley -2012
3. Olivier Hersent, David Boswarthick, Omar Elloumi , “The Internet of Things – Key applications and Protocols”, Wiley, 2012.

Web Resources:

1. <http://www.buyya.com/papers/IoT-Book2016-C1.pdf>
2. https://www.tutorialspoint.com/internet_of_things/internet_of_things_tutorial.pdf
3. <https://www.ericsson.com/en/books/internet-of-things>

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Course code	Course Title	Category	L	T	P	Credit
PCS19CE 21/31/41 (p)	Green Computing	Elective16	4	-	-	5

L – Lecture T – Tutorial P - Practical

Year	Semester	Internal	External	Total
I/II	II/III/IV	25	75	100

Preamble:

To graduate students with an understanding of the role of ICTs and impact on the global carbon footprint.

Prerequisite:

The students should know the knowledge about ICT designing, manufacturing, using, and disposing of computers, servers, and associated subsystem

#	Course Outcome	Knowledge Level (according to Bloom’s Taxonomy)
CO1	Explain the fundamentals of Green IT.	K1,K2
CO2	Demonstrate the Green Assets and Modeling for Green Computing.	K2,K3
CO3	Summarize framework of Grid.	K3,K4
CO4	Estimate the carbon footprint of the ICT operations of an organization and access ways to reduce the carbon footprint by changes to policies for procurement of ICT, changes.	K4,K5
CO5	Demonstrate the ICT operations and revising business processes by adopting different case studies.	K3,K4

K1-Knowledge K2-Understand K3-Apply K4-Analyze K5-Evaluate

Mapping of COs with POs

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S				
CO2	S	M			
CO3		S	M		
CO4			L	M	S
CO5	M			S	

Blooms taxonomy

	CA		End of Semester
	First	Second	
Knowledge -K1	15% (9)	15% (9)	20% (30)
Understand -K2	15% (9)	15% (9)	20% (30)
Apply-K3	30% (18)	30% (18)	20% (30)
Analyze-K4	20% (12)	20% (12)	20% (30)
Evaluate-K5	20% (12)	20% (12)	20% (30)
Total Marks	60	60	150

UNIT I Fundamentals of Green IT : Business, IT, and the Environment – Green computing: carbon foot print, scoop on power – Green IT Strategies: Drivers, Dimensions, and Goals – Environmentally Responsible Business: Policies, Practices, and Metrics - Approaches to green computing - Middleware Support - Compiler Optimization - Product longevity - Software induced energy consumption - its measurement and rating.

UNIT II Green Assets and Modeling : Green Assets: Buildings, Data Centers, Networks, and Devices – Green Business Process Management: Modeling, Optimization, and Collaboration – Green Enterprise Architecture – Environmental Intelligence – Green Supply Chains – Green Information Systems: Design and Development Models.

UNIT III Grid Framework : Virtualizing of IT systems – Role of electric utilities, Telecommuting, teleconferencing and teleporting – Materials recycling – Best ways for Green PC – Green Data center – Green Grid framework.

UNIT IV Green Compliance and Green Mobile : Socio-cultural aspects of Green IT – Green Enterprise Transformation Roadmap – Green Compliance: Protocols, Standards, and Audits – Emergent Carbon Issues: Technologies and Future - Green mobile - optimizing for minimizing battery consumption - Web, Temporal and Spatial Data Mining Materials recycling.

UNIT V Case Studies : The Environmentally Responsible Business Strategies (ERBS) – Case Study Scenarios for Trial Runs – Case Studies – Applying Green IT Strategies and Applications to a Home, Hospital, Packaging Industry and Telecom Sector.

Text Books:

1. BhuvanUnhelkar, “Green IT Strategies and Applications-Using Environmental Intelligence”, CRC Press, June 2011.
2. Woody Leonhard, Katherrine Murray, “Green Home computing for dummies”,

REFERENCES:

1. Alin Gales, Michael Schaefer, Mike Ebbers, “Green Data Center: steps for the Journey”, Shoff/IBM rebook
2. John Lamb, “The Greening of IT”, Pearson Education.
3. Green Computing and Green IT Best Practices on Regulations and Industry Initiatives, Virtualization, Power Management, Materials Recycling and Telecommuting by Jason Harris, Emereo Publishing

Web Resources:

1. <https://www.slideshare.net/neenasahni/green-computing-ppt>
2. https://books.google.co.in/books/about/Green_Computing_and_Green_IT_Best_Practi.html?id=a-7n-9HyqfsC&redir_esc=y
3. https://en.wikipedia.org/wiki/Green_computing

Course designers:

Mrs.N.Hemavathi

M.Sc. Computer Science

Assessment values of course learning outcomes and their mapping with program specific outcomes (PSOs)

Major papers

Title of the courses	PSO1	PSO2	PSO3	PSO4	PSO5
Python Programming	4	5	2	6	3
Distributed Operating Systems	8	3	1	1	3
Advanced DBMS	6	1	2	8	3
Discrete Mathematics	8	2	5	1	3
Lab in Python Programming	8	2	1	1	3
Lab in Advanced DBMS	9	3	4	0	6
Compiler Design	8	5	4	0	2
Network Security	9	2	2	0	5
Advanced Java	4	4	5	2	3
Lab in Dot Net Programming	8	2	2	6	6
Lab in Java Programming	7	3	2	3	9
Data Mining Techniques	8	4	3	6	2
Web Technologies	5	3	3	3	3
Big Data Analytics	7	4	4	5	2
Lab in Open Source Technology	9	6	5	5	9
Lab in Web Technology	8	6	2	6	8
Mini Project	-	-	-	-	-
Multimedia Technology	2	2	3	6	3
Cloud Computing	5	8	2	6	3
Project Work & Viva Voce Elective-IV	-	-	-	-	-

Elective Papers

Title of the courses	PSO1	PSO2	PSO3	PSO4	PSO5
Computer Architecture and Parallel Processing	11	3	3	2	3
Artificial Neural Networks	3	7	6	2	3
Digital Image Processing	3	2	2	7	3
Bio-Informatics	3	3	5	4	5
Parallel Computing	8	7	6	0	0
Computer Simulation and Modeling	8	3	0	4	2
Software Project Management	8	0	3	4	1
Real Time and Embedded Systems	3	2	4	3	3
Soft Computing	6	3	4	1	3
Mobile Computing	4	6	6	5	1
Pervasive Computing	5	4	9	2	2
Bluetooth Technology	5	7	4	0	3
Wireless Sensor Networks	5	6	5	1	3
Virtual Reality	3	3	5	4	1
Internet Of Things	3	5	5	2	3
Green Computing	8	5	4	5	3