



**PSGR  
Krishnammal College for Women**



**DEPARTMENT OF COMPUTER SCIENCE**

**CHOICE BASED CREDIT SYSTEM (CBCS)  
&  
LEARNING OUTCOMES BASED CURRICULUMFRAMEWORK (LOCF)**

**BACHELOR OF COMPUTER SCIENCE  
2022-2025 BATCH**



### Programme Learning Outcomes

After completion of the programme, the student will be able to

- PLO1** : Demonstrate a solid foundation in the discipline of computer science and computer based problem solving skills
- PLO2** : Formulate, model, design and solve real world problems by using software tools
- PLO3** : Apply cognitive, design thinking and critical problem solving skills to establish a productive career in industry, research and academia
- PLO4** : Meet the demands of IT industry with hands-on experience on current technological tools, effective communication skills and team work
- PLO5** : Pursue higher studies/ employ themselves either as software professionals or entrepreneurs through their technical competencies

### Programme Specific Outcomes

The students at the time of graduation will

- PSO1** : Apply domain knowledge and problem solving skills to solve real-time problems and to work independently on software projects as an effective team member
- PSO2** : Design and develop applications in the areas like artificial intelligence and machine learning algorithms, networking, web design, cloud computing, IoT and data analytics



Department of Computer Science  
Choice Based Credit System & Learning Outcomes Based Curriculum Framework  
Bachelor of Computer Science 2022- 2025Batch

Semester	Part	Subject Code	Title of Paper	Category	Instruction Hours / Week	Contact Hours	Tutorial Hours	Duration of Examination	Examination Marks			Credits
									CA	ESE	Total	
I	I	TAM2201/ HIN2201 / FRE2201	Language I	Language	6	86	4	3	50	50	100	3
I	II	ENG2101	English Paper I	English	6	86	4	3	50	50	100	3
I	III	PP22C01	<b>Core 1 : Programming in C</b>	CC	4	56	4	3	50	50	100	4
I	III	CS21CP1	<b>Programming Lab 1 : C Programming Lab</b>	CC	3	45	-	3	25	25	50	2
I	III	PC22C02	<b>Core 2: Computational and Algorithmic Thinking for Problem Solving</b>	CC	3	45	-	-	100#	-	100	3
I	III	TH22A03	<b>Allied A1 Numerical and Statistical Techniques</b>	GE	6	86	4	3	50	50	100	5
		NME21ES/	Introduction to Entrepreneurship	AEC	2	26	4	2	50	50	100	2
I	IV	NME22A1/ NME22B1	Advance Tamil / Basic Tamil	AEC	2	28	2	2	50	50	100	2
II	I	TAM2202/ HIN2202 / FRE2202	Language II	Language	6	86	4	3	50	50	100	3
II	II	ENG2102	English Paper II	English	5	71	4	3	50	50	100	3
II	III	CS21C03	<b>Core 3: Java Programming</b>	CC	5	71	4	3	50	50	100	5
II	III	CS22CP2	<b>Programming Lab 2: Java Programming Lab</b>	CC	5	75	-	3	25	25	50	3
II	III	TH22A06	<b>Allied A2 Discrete Mathematics</b>	GE	6	86	4	3	50	50	100	5
II	IV		<b>Open Course (Self-Study - Online )</b>	AEC	-	-	-	-	-	-	-	Grade
		NME22A2/ NME22B2	** Advanced Tamil / Basic Tamil	AEC	-	-	-	-	-	-	-	Grade
II	V	21PEPS1	Professional English for Physical Sciences	AEC	3	40	5	2	50	50	100	2



V	III	CS22C08	<b>Core 8:</b> Web Design and Development	CC	5	73	2	3	50	50	100	4
V	III	CS22C09	<b>Core 9:</b> Computer Graphics	CC	5	73	2	3	50	50	100	4
V	III	CS22C10	<b>Core 10:</b> Software Engineering	CC	5	73	2	3	50	50	100	4
V	III	CS21E01 CS21E02 CS21E03	<b>Elective1:</b> Parallel Computing Big Data Analytics Virtualization and Cloud Services	DSE	5	73	2	3	50	50	100	5
V	III	CS21CP5	<b>Programming Lab 5:</b> Web Design and Development Lab	CC	5	75	-	3	25 <sup>s</sup>	25 <sup>s</sup>	50	3
V / VI	III	CS20SBCE / CS21SBP3	<b>Coursera:</b> Data Visualization Tools/ <b>SBS III:</b> Software Testing Tools	SEC	3	45/ 41	- / 4	-	100	-	100	3
V	IV	NM21CS1	Cyber Security 1	AECC	2	30	-	-	100	-	100	Gr
V	III	CS20AC1 CS20AC2	<b>Advance Learner Course1</b> Multimedia Blockchain Technology	ACC	-	-	-	3	25	75	100 <sup>s</sup>	5 <sup>s</sup>
V	VI	CS22COM	Comprehensive Exam	GC	-	-	-	1	-	100	100	Gr
V	IV	CS22INST	Field work / Institutional training	DSE	-	-	-	-	100	-	100	2
V	VI	COM15SER	Community Services 30 Hours	GC	-	-	-	-	-	-	-	-
I – V	VI	16BONL1 16BONL2	Online Course – I Online Course – II	ACC	-	-	-	-	-	-	-	-
V			Personality Development		-	-	-	-	-	-	-	Gr

\*\* Outside Regular Class Hours. #Only internal assessment.

\*ESE conducted for 100 and converted into 25

CC : Core Course

GE : Generic Elective

AEC : Ability Enhancement Course

OT : Online Test

CA : Continuous Assessment

ESE : End Semester Examination

SEC- Skill Enhancement Course

AEC- Ability Enhancement Course

FSPA- Finishing School Part A

## Evaluation Pattern 22-23 Batch

### CA Question Paper Pattern and distribution of marks UG

#### Question Paper Pattern and distribution of marks UG Language and English

##### Language and English

Section A	6 x 2 (No choice)	:	12 Marks
Section B	4 x 6 (4 out of 6)	:	24 Marks (250 words)
Section C	2 x 12 (2 out of 3)	:	24 Marks (500 words)
<b>Total</b>			<b>: 60 Marks</b>

##### UG & PG- Core and Allied - (First 3 Units)

##### Question from each unit comprising of

One question with a weightage of 2 Marks : 2 x 3 = 6

One question with a weightage of 6 Marks (Internal Choice at the same CLO level) : 6 x 3 = 15

One question with a weightage of 12 Marks (Internal Choice at the same CLO level): 12x3=36

##### ALC

Section A (Paragraph answer) (4 out of 6)	4 x 4	:	16 Marks
Section B (Essay type)	1 out of 2	:	9 Marks
<b>Total</b>			<b>: 25 Marks</b>

##### End Semester Examination – Question Paper Pattern and Distribution of Marks

##### Language and English - UG

Section A	11 x 2 (11 out of 13)	:	22 Marks
Section B	5 x 6 (5 out of 7)	:	30 Marks (250 words)
Section C	4 x 12 (4 out of 6)	:	48 Marks (600 - 700 words)
<b>Total</b>			<b>: 100 Marks</b>

##### UG & PG - Core and Allied courses:

ESE Question Paper Pattern: 5 x 20 = 100 Marks

##### Question from each unit comprising of

One question with a weightage of 2 Marks : 2 x 5 = 10

One question with a weightage of 6 Marks (Internal Choice at the same CLO level) : 6 x 5 = 30

One question with a weightage of 12 Marks (Internal Choice at the same CLO level): 12x5=60

**Total :100 Marks**

## End Semester for UG / PG - Advance Learner Courses

Section A: 5 questions out of 8 - open choice 5x5 : 25 marks Section

B : 5 questions out of 8-open choice 5x10 : 50 marks **Total**

: **75 marks**

### CA pattern for 21-22 and 22-23

#### Batch Theory

#### **II & III Year UG / PG**

CIA Test	:	10 marks (Conducted for 60 marks after 50 days)
Model Exam	:	20 marks (Conducted for after 85 days 100 marks (Each Unit 20 Marks))
Seminar/Assignment/Quiz	:	10 marks
Class Participation	:	7 marks
Attendance	:	3 marks
<b>Total</b>	:	<b>50 Marks</b>

#### Skill Based Subject: 100 Marks

Test 1 (Theory / Practical)	:	50 marks
Test 2 (Theory / Practical / Project)	:	50 marks
<b>Total</b>	:	<b>100 Marks</b>

*Departments can plan the above pattern according to their course as Test 1 & 2- Theory /one theory and one practical / both as practical / one theory or practical with one project.*

#### Part IV

#### **Value education / Environmental Studies / Design Thinking**

Quiz	:	50 marks
Assignment	:	25marks
Project / Case study	:	25 marks
<b>Total</b>	:	<b>100 Marks</b>

#### Cyber Security I & II

Quiz	:	60 Marks
Case Study	:	20 Marks
Poster	:	20 Marks

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## Mapping with Programme Learning Outcomes

### Course 1 - PP22C01

<b>CLOs</b>	<b>PLO1</b>	<b>PLO2</b>	<b>PLO3</b>	<b>PLO4</b>	<b>PLO5</b>
<b>CLO1</b>	S	S	S	S	M
<b>CLO2</b>	S	S	S	M	S
<b>CLO3</b>	S	M	S	S	M
<b>CLO4</b>	S	S	S	S	S

### Course 2 - CS21CP1

<b>CLOs</b>	<b>PLO1</b>	<b>PLO2</b>	<b>PLO3</b>	<b>PLO4</b>	<b>PLO5</b>
<b>CLO1</b>	S	M	S	S	S
<b>CLO2</b>	S	S	S	M	S
<b>CLO3</b>	M	M	S	S	M
<b>CLO4</b>	S	S	M	M	S

### Course 3 - PC22C02

<b>CLOs</b>	<b>PLO1</b>	<b>PLO2</b>	<b>PLO3</b>	<b>PLO4</b>	<b>PLO5</b>
<b>CLO1</b>	M	S	S	S	S
<b>CLO2</b>	S	S	S	M	S
<b>CLO3</b>	S	M	S	S	S
<b>CLO4</b>	S	S	M	S	S

### Course 4 - CS21C03

<b>CLOs</b>	<b>PLO1</b>	<b>PLO2</b>	<b>PLO3</b>	<b>PLO4</b>	<b>PLO5</b>
<b>CLO1</b>	S	M	S	S	S
<b>CLO2</b>	S	S	S	M	S
<b>CLO3</b>	M	M	S	M	S
<b>CLO4</b>	S	S	S	M	S



**Course 5 - CS22CP2**

<b>CLOs</b>	<b>PLO1</b>	<b>PLO2</b>	<b>PLO3</b>	<b>PLO4</b>	<b>PLO5</b>
<b>CLO1</b>	S	M	S	S	S
<b>CLO2</b>	S	S	S	M	S
<b>CLO3</b>	M	M	S	M	S
<b>CLO4</b>	S	S	S	M	S

**Course 6 - CS22C04**

<b>CLOs</b>	<b>PLO1</b>	<b>PLO2</b>	<b>PLO3</b>	<b>PLO4</b>	<b>PLO5</b>
<b>CLO1</b>	S	M	M	M	S
<b>CLO2</b>	S	S	M	M	S
<b>CLO3</b>	S	S	S	S	M
<b>CLO4</b>	S	S	S	S	M

**Course 7 - CS22C05**

<b>CLOs</b>	<b>PLO1</b>	<b>PLO2</b>	<b>PLO3</b>	<b>PLO4</b>	<b>PLO5</b>
<b>CLO1</b>	M	S	S	S	S
<b>CLO2</b>	S	S	S	M	S
<b>CLO3</b>	M	S	S	M	S
<b>CLO4</b>	S	M	S	M	M

**Course 8 - CS22CP3**

<b>CLOs</b>	<b>PLO1</b>	<b>PLO2</b>	<b>PLO3</b>	<b>PLO4</b>	<b>PLO5</b>
<b>CLO1</b>	S	S	S	M	S
<b>CLO2</b>	S	S	S	S	S
<b>CLO3</b>	S	S	S	S	S
<b>CLO4</b>	S	S	S	S	M

**Course 9 - CS22SBP1**

<b>CLOs</b>	<b>PLO1</b>	<b>PLO2</b>	<b>PLO3</b>	<b>PLO4</b>	<b>PLO5</b>
<b>CLO1</b>	S	S	S	S	S
<b>CLO2</b>	S	S	S	M	S
<b>CLO3</b>	S	S	M	S	S
<b>CLO4</b>	S	S	S	S	S

**Course 10 - CS22C06**

<b>CLOs</b>	<b>PLO1</b>	<b>PLO2</b>	<b>PLO3</b>	<b>PLO4</b>	<b>PLO5</b>
<b>CLO1</b>	S	M	S	S	M
<b>CLO2</b>	S	M	S	S	M
<b>CLO3</b>	M	M	S	M	M
<b>CLO4</b>	S	S	M	S	S

**Course 11 - CS22C07**

<b>CLOs</b>	<b>PLO1</b>	<b>PLO2</b>	<b>PLO3</b>	<b>PLO4</b>	<b>PLO5</b>
<b>CLO1</b>	S	M	M	M	M
<b>CLO2</b>	S	S	M	M	S
<b>CLO3</b>	S	S	M	M	S
<b>CLO4</b>	S	S	M	M	S

**Course 12 - CS22CP4**

<b>CLOs</b>	<b>PLO1</b>	<b>PLO2</b>	<b>PLO3</b>	<b>PLO4</b>	<b>PLO5</b>
<b>CLO1</b>	S	S	S	S	S
<b>CLO2</b>	S	S	S	S	M

<b>CLO3</b>	S	S	M	S	S
<b>CLO4</b>	S	S	M	S	S

**Course 13 - CS22SBP2**

<b>CLOs</b>	<b>PLO1</b>	<b>PLO2</b>	<b>PLO3</b>	<b>PLO4</b>	<b>PLO5</b>
<b>CLO1</b>	S	S	S	S	S
<b>CLO2</b>	S	S	S	M	S
<b>CLO3</b>	S	S	S	S	M
<b>CLO4</b>	S	S	S	S	S

**Course 14- AP22A01**

<b>CLOs</b>	<b>PLO1</b>	<b>PLO2</b>	<b>PLO3</b>	<b>PLO4</b>	<b>PLO5</b>
<b>CLO1</b>	S	M	S	S	S
<b>CLO2</b>	S	S	M	S	M
<b>CLO3</b>	S	S	S	M	M
<b>CLO4</b>	S	S	S	M	S

**Course 15 - CS22A02**

<b>CLOs</b>	<b>PLO1</b>	<b>PLO2</b>	<b>PLO3</b>	<b>PLO4</b>	<b>PLO5</b>
<b>CLO1</b>	S	M	S	S	S
<b>CLO2</b>	S	S	M	S	M
<b>CLO3</b>	S	S	S	S	M
<b>CLO4</b>	S	S	S	M	S

**Course 16 - CS22C08**

<b>CLOs</b>	<b>PLO1</b>	<b>PLO2</b>	<b>PLO3</b>	<b>PLO4</b>	<b>PLO5</b>
<b>CLO1</b>	S	S	S	S	S
<b>CLO2</b>	S	S	S	S	M
<b>CLO3</b>	S	S	M	S	S
<b>CLO4</b>	S	S	S	S	S

**Course 17 - CS22C09**

<b>CLOs</b>	<b>PLO1</b>	<b>PLO2</b>	<b>PLO3</b>	<b>PLO4</b>	<b>PLO5</b>
<b>CLO1</b>	S	S	S	S	S
<b>CLO2</b>	S	S	S	S	S
<b>CLO3</b>	S	S	M	S	S
<b>CLO4</b>	S	S	S	M	S

**Course 18 - CS22C10**

<b>CLOs</b>	<b>PLO1</b>	<b>PLO2</b>	<b>PLO3</b>	<b>PLO4</b>	<b>PLO5</b>
<b>CLO1</b>	S	S	S	S	S
<b>CLO2</b>	S	S	S	S	S
<b>CLO3</b>	S	S	M	S	S
<b>CLO4</b>	S	S	S	M	S

**Course 19 - CS21E01**

<b>CLOs</b>	<b>PLO1</b>	<b>PLO2</b>	<b>PLO3</b>	<b>PLO4</b>	<b>PLO5</b>
<b>CLO1</b>	S	M	S	S	M
<b>CLO2</b>	S	M	S	S	M
<b>CLO3</b>	M	M	S	M	M
<b>CLO4</b>	S	S	M	S	S

**Course 20 - CS21E02**

<b>CLOs</b>	<b>PLO1</b>	<b>PLO2</b>	<b>PLO3</b>	<b>PLO4</b>	<b>PLO5</b>
<b>CLO1</b>	S	S	S	S	M
<b>CLO2</b>	S	S	S	S	S
<b>CLO3</b>	S	S	M	S	S
<b>CLO4</b>	S	S	S	S	S

**Course 21 - CS21E03**

<b>CLOs</b>	<b>PLO1</b>	<b>PLO2</b>	<b>PLO3</b>	<b>PLO4</b>	<b>PLO5</b>
<b>CLO1</b>	S	S	M	S	S
<b>CLO2</b>	S	S	S	M	S
<b>CLO3</b>	M	S	S	S	S
<b>CLO4</b>	S	M	S	S	S

**Course 22 - CS21CP5**

<b>CLOs</b>	<b>PLO1</b>	<b>PLO2</b>	<b>PLO3</b>	<b>PLO4</b>	<b>PLO5</b>
<b>CLO1</b>	S	S	S	S	S
<b>CLO2</b>	S	S	S	M	S
<b>CLO3</b>	S	S	S	S	S
<b>CLO4</b>	S	M	S	S	S

**Course 23 - CS21SBP3**

<b>CLOs</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CLO1</b>	S	S	S	M	S
<b>CLO2</b>	M	S	S	S	M
<b>CLO3</b>	S	S	M	S	S
<b>CLO4</b>	S	M	S	M	S

Course Number	Course Name	Category	L	T	P	Credit
PP22C01	Programming in C	Theory	56	4	-	4

### Preamble

This course introduces fundamental programming constructs in C. It covers the concepts such as arrays, functions, structures, pointers and file handling. It provides comprehensive coverage on industry 4.0.

### Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the programming constructs and structure of C programming and Industry 4.0 technologies	K1
CLO2	Understand the purpose of arrays, strings, structures, pointers and files to solve problems	K2
CLO3	Apply functions to solve problems using procedure oriented approach	K3
CLO4	Analyze the problems and solve it by applying appropriate logic	K4

### Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	S	S	S	M
CLO2	S	S	S	M	S
CLO3	S	M	S	S	M
CLO4	S	S	S	S	S

S-Strong; M-Medium; L-Low

**Programming in C - PP22C01**

**(56 Hrs)**

### Syllabus

#### Unit I

**12 Hrs**

Overview of C - Constants, Variables and Data Types - Operators and Expressions - Managing Input and Output Operations - Decision Making and Branching - Decision Making and Looping.

#### Unit II

**11 Hrs**

Arrays: One-Dimensional - Two Dimensional - Multidimensional Arrays. Character Arrays and Strings : Declaring and Initializing String Variables - Reading Strings from Terminal - Writing Strings to Screen - String Handling Functions.

#### Unit III

**11 Hrs**

User-Defined Functions: Need -Return Values and Types - Function Calls - Function Declaration - Category of Functions - No Arguments and No Return Values - Arguments but No Return Values -

Arguments with Return Values - Recursion - Scope Visibility and Life Time of Variables. Structure Definition: Structure Initialization - Comparison of Structure Variables - Arrays of Structures - Arrays within Structures.

#### **Unit IV**

**12 Hrs**

Pointers: Understanding Pointers - Accessing the Address of a Variable - Declaring and Initializing Pointers - Accessing a Variable through its Pointers - Pointers and Arrays - Pointers and Character Strings - Pointers and Functions.

File Management in C: Defining and Opening a File - Closing File - I/O Operations on Files - Error Handling during I/O Operations - Command Line Arguments.

#### **Unit V**

**10 Hrs**

Introduction to Industry 4.0 - Need - Reasons for Adopting Industry 4.0 - Definition - Goals and Design Principles - Technologies of Industry 4.0- Skills required for Industry 4.0 - Advancements in Industry 4.0 - Impact of Industry 4.0 on Society, Business, Government and People - Introduction to 5.0.

#### **Text Book**

<b>S. No</b>	<b>Author</b>	<b>Title of the Book</b>	<b>Publisher</b>	<b>Year of Publication</b>
<b>1</b>	E. Balagurusamy	Programming In ANSI C	Tata Mc Graw Hill	8 <sup>th</sup> Edition, 2019
<b>2</b>	P.Kaliraj, T. Devi	Higher Education for Industry 4.0 and Transformation to Education 5.0	CRC Press - Taylor & Francis Group	1 <sup>st</sup> Edition, 2021

#### **Reference Books**

<b>S. No</b>	<b>Author</b>	<b>Title of the Book</b>	<b>Publisher</b>	<b>Year of Publication</b>
<b>1</b>	Byron Gottfried	Programming with C	Tata McGraw Hill	4 <sup>th</sup> Edition, 2018
<b>2</b>	Yashwvant Kanetkar	Let Us C: Authentic Guide To C Programming Language	BPB Publications	17 <sup>th</sup> Edition, 2020

#### **Pedagogy**

- Lectures, Group discussions, Demonstrations

#### **Course Designer**

- Dr.C. Arunpriya
- Dr. S. Sindhuja

Course Number	Course Name	Category	L	T	P	Credit
CS21CP1	C Programming Lab	Practical	-	-	45	2

### Preamble

The lab course provides a way to explore the C programming constructs. It enables to experience pointers, structures and file handling techniques through simple programs.

### Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Understand the basic programming in C language	K1
CLO2	Differentiate built-in functions and apply user defined functions to solve problems	K2
CLO3	Demonstrate the concepts of arrays, strings, pointers, structures	K3
CLO4	Design and develop the programs to solve real-world problems	K4

### Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	M	S	S	S
CLO2	S	S	S	M	S
CLO3	M	M	S	S	M
CLO4	S	S	M	M	S

S- Strong; M-Medium; L-Low

### C Programming Lab -CS21CP1

(45 Hrs)

#### List of Programs

- Exercise using different data types
- Exercise using different operators
- Exercise to implement control structures
- Exercise using loop statements
- Exercise using arrays
- Exercise to explore built-in functions
- Exercise to create user defined function
- Exercise using structures
- Exercise using pointers
- Exercise to work with files

#### Pedagogy

- Demonstration of working environment / Tools / Software / Program



**Course Designer**

- Dr.S. Sindhuja

Course Number	Course Name	Category	L	T	P	Credit
PC22C02	Computational and Algorithmic Thinking for Problem Solving	Theory	45	-	-	3

### Preamble

This course aims to kindle the young minds to think like a computer scientist, with the idea that Computing and computers will enable the spread of computational thinking. Computational thinking is thinking recursively, reformulating a seemingly difficult problem into one which we know how to solve and taking an approach to solving problems, designing systems, and understanding human behaviour that draws on concepts fundamental to computer science.

### Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Define the basic principles of logical reasoning, problem solving in computational thinking	K1
CLO2	Understanding the applications of propositional logic, problem representation and techniques	K2
CLO3	Apply algorithmic thinking to problem solving using tools	K3
CLO4	Apply and analyze to solve domain specific problems using computational thinking concepts	K4

### Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	M	S	S	S	S
CLO2	S	S	S	M	S
CLO3	S	M	S	S	S
CLO4	S	S	M	S	S

S-Strong; M-Medium; L- Low

### Computational and Algorithmic Thinking for Problem Solving

(45 Hrs)

#### Syllabus

#### Unit I

7 Hrs

33Basics: Introduction to Computational Thinking - Data Logic - History of Computational Thinking- Applications of Computational Thinking.

#### Unit II

8 Hrs

Data- Information and Data - Data Encoding - Logic - Boolean logic - Applications of simple Propositional Logic. Tool: Flowgorithm and Scratch.

**Unit III****10 Hrs**

Problem Solving and Algorithmic Thinking: Problem definition- Logical reasoning- Problem decomposition- Abstraction- Problem representation via Algorithmic thinking: Name binding- Selection-Repetition and Control Abstraction - Simple Algorithms - Comparison of performance of Algorithms.

**Unit IV****8 Hrs**

Activities in Class: Sudoku-Towers of Hanoi- Graph Coloring-Geographical Map reading- Poem reading-Novel reading- Data analysis on news.

**Unit V****12 Hrs**

Problem Solving Techniques- Factoring and Recursion Techniques- Greedy Techniques-Divide and Conquer- Search and Sort Algorithms- Text Processing and Pattern matching. Tool: iPython

**Text Book**

S. No	Author	Title of the Book	Publisher	Year of Publication
1	David Riley and Kenny Hunt	Computational Thinking for Modern Solver	Chapman & Hall/CRC	2014
2	Paolo Ferragina, FabrizioLuccio	Computational Thinking First Algorithms	Springer	2018
3	Karl Beecher	Computational Thinking - A beginner's guide to problem solving	BSC publication	2017

**Pedagogy**

- Lectures, Group discussions, Demonstrations, Case studies

**Course Designer**

- Mrs. V. Deepa

**Evaluation Pattern**

Assessment	Number	Marks
Quiz (online or offline)	5	50
Class Activity	5	25
Group Project (Domain Specific)	1	25
Total		100

Course Number	Course Name	Category	L	T	P	Credit
CS22C03	Java Programming	Theory	71	4	-	5

### Preamble

The course introduces object-oriented programming concepts and it covers arrays, strings, threads, interfaces, files and exceptions. It introduces collection framework and database connectivity.

### Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the object oriented concepts, programming constructs in Java	K1
CLO2	Understand the usage of various packages, classes and collections in Java to solve problems	K2
CLO3	Apply Java APIs to solve problems using object oriented approach	K3
CLO4	Analyze the problems and solve it by applying appropriate logic using Java language	K4

### Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	M	S	S	S
CLO2	S	S	S	M	S
CLO3	M	M	S	M	S
CLO4	S	S	S	M	S

S- Strong; M-Medium; L-Low

### Java Programming - CS22C03

(71 Hrs)

#### Syllabus

#### Unit I

14 Hrs

Introduction to Java - Naming conventions and data types - Literals - Operators in Java -Control statements in Java -Classes and objects- Instance variables, *set* Methods and *get* methods - Initializing objects with constructors.

#### Unit II

15 Hrs

Arrays - String, StringBuffer and StringBuilder Class - Inheritance: Inheritance - super keyword - Protected Specifier - Types of Inheritance - Polymorphism - Type Casting - Abstract Classes.

#### Unit III

14Hrs

Interface: Interface -Multiple Inheritance using Interfaces - Abstract Classes Vs Interfaces. Packages: Package - Different Type of Package - JAR files -Creating Sub-Package - Exception Handling - Wrapper Classes- Streams and Files -Threads.

**Unit IV****15Hrs**

CollectionFramework: Collection Objects -Retrieving Elements From Collections - HashSet-LinkedList- ArrayList- Vector -HashMap-Hashtable- Arrays - String Tokenizer - Calendar -Date Class.

**Unit V****13 Hrs**

Java Database Connectivity: Database Server - Database Clients - JDBC - Working with Oracle DB - Registering the Driver - Connecting to a Database - Preparing SQL Statements - Using jdbc- odbc Bridge Driver to Connect to Oracle Database - Types of ResultSets.

**Text Book**

S. No	Author	Title of the Book	Publisher	Year of Publication
1	R.Nageswara Rao	Core Java - An Integrated Approach	Dream Tech	2016
2	Paul Deitel and Harvey Deitel	Java How to Program	PHI Learning Pvt Ltd	2017

**Reference Books**

S. No	Author	Title of the Book	Publisher	Year of Publication
1	Herbert Schildt	Java: The complete Reference	McGraw Hill Professional	2017
2	Robert Sedgewick & Kevin Wayne	Introduction to Programming in Java	Addison Wesley	2017
3	Y. Daniel Liang	Introduction to Java Programming	Pearson Education	2017

**Pedagogy**

- Lectures, Group discussions, Demonstrations

**Course Designer**

- Dr. S. Karpagavalli
- Mrs. M. Sowmya

Course Number	Course Name	Category	L	T	P	Credit
CS22CP2	Java Programming Lab	Practical	-	-	75	3

#### Preamble

The lab course is intended to explore object oriented concepts through Java programming language. Make the students to perform data manipulation operations, database connectivity and to analyze the biological sequence database using tools.

#### Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Understand the object-oriented concepts through java programming constructs	K2
CLO2	Demonstrate principle of inheritance, interface, file and exception handling	K3
CLO3	Implement data structures using Java collection framework	K3
CLO4	Construct database connectivity applications	K4

#### Mapping with Programme Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	M	S	S	S
CLO2	S	S	S	M	S
CLO3	M	M	S	M	S
CLO4	S	S	S	M	S

S- Strong; M-Medium; L-Low

Java Programming and Bio Informatics Lab - CS22CP2

(75 Hrs)

#### List of Programs

- Exercises using classes and objects
- Exercises using a string
- Exercises using inheritance
- Exercises using interfaces
- Exercises using packages
- Exercises to implement built-in and user defined exception handling
- Exercises using streams and files
- Exercises using collection framework - Stack class
- Exercises using collection framework - LinkedList and ArrayList
- Exercises using collection framework - HashMap and Hashtable
- Exercises using collection framework - Date and Calendar class
- Exercises using JDBC

#### Pedagogy

- Demonstration of working environment / Tools / Software / Programs

#### Course Designers

- Dr. S. Karpagavalli
- Mrs. M. Sowmya

Course Number	Course Name	Category	L	T	P	Credit
CS21C03	Java Programming	Theory	71	4	-	5

### Preamble

The course introduces object-oriented programming concepts and it covers arrays, strings, threads, interfaces, files and exceptions. It introduces collection framework and database connectivity.

### Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the object oriented concepts, programming constructs in Java	K1
CLO2	Understand the usage of various packages, classes and collections in Java to solve problems	K2
CLO3	Apply Java APIs to solve problems using object oriented approach	K3
CLO4	Analyze the problems and solve it by applying appropriate logic using Java language	K4

### Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	M	S	S	S
CLO2	S	S	S	M	S
CLO3	M	M	S	M	S
CLO4	S	S	S	M	S

S- Strong; M-Medium; L-Low

### Java Programming - CS21C03 Syllabus

(71 Hrs)

#### Unit I

14 Hrs

Introduction to Java - Naming conventions and data types - Literals - Operators in Java -Control statements in Java -Classes and objects- Instance variables, *set* Methods and *get* methods - Initializing objects with constructors.

#### Unit II

15 Hrs

Arrays - String, StringBuffer and StringBuilder Class - Inheritance: Inheritance - super keyword - Protected Specifier - Types of Inheritance - Polymorphism - Type Casting - Abstract Classes.

**Unit III****14 Hrs**

Interface: Interface -Multiple Inheritance using Interfaces - Abstract Classes Vs Interfaces. Packages: Package - Different Type of Package - JAR files -Creating Sub-Package - Exception Handling - Wrapper Classes- Streams and Files -Threads.

**Unit IV****15 Hrs**

CollectionFramework: Collection Objects -Retrieving Elements FromCollections – HashSet-LinkedList- ArrayList- Vector –HashMap-Hashtable- Arrays - String Tokenizer - Calendar -Date Class.

**Unit V****13 Hrs**

Java Database Connectivity: Database Server - Database Clients - JDBC - Working with Oracle DB - Registering the Driver - Connecting to a Database - Preparing SQL Statements - Using JDBC- ODBC Bridge Driver to Connect to Oracle Database - Types of ResultSets.

**Text Book**

S. No	Author	Title of the Book	Publisher	Year of Publication
1	R.Nageswara Rao	Core Java - An Integrated Approach	Dream Tech	2016
2	Paul Deitel and Harvey Deitel	Java How to Program	PHI Learning Pvt Ltd	2017

**Reference Books**

S. No	Author	Title of the Book	Publisher	Year of Publication
1	Herbert Schildt	Java: The complete Reference	McGraw Hill Professional	2017
2	Robert Sedgewick & Kevin Wayne	Introduction to Programming in Java	Addison Wesley	2017
3	Y. Daniel Liang	Introduction to Java Programming	Pearson Education	2017

**Pedagogy**

- Lectures, Group discussions, Demonstrations

**Course Designer**

- Dr. S. Karpagavalli
- Mrs. M. Sowmya



Course Number	Course Name	Category	L	T	P	Credit
CS22CP2	Java Programming Lab	Practical	-	-	75	3

#### Preamble

The lab course is intended to explore object oriented concepts through Java programming language. Make the students to perform data manipulation operations, database connectivity and to analyze the biological sequence database using tools.

#### Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Understand the object-oriented concepts through java programming constructs	K2
CLO2	Demonstrate principle of inheritance, interface, file and exception handling	K3
CLO3	Implement data structures using Java collection framework	K3
CLO4	Construct database connectivity applications	K4

#### Mapping with Programme Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	M	S	S	S
CLO2	S	S	S	M	S
CLO3	M	M	S	M	S
CLO4	S	S	S	M	S

S- Strong; M-Medium; L-Low

#### Java Programming and Bio Informatics Lab - CS22CP2

(75 Hrs)

#### List of Programs

- Exercises using classes and objects
- Exercises using a string
- Exercises using inheritance
- Exercises using interfaces
- Exercises using packages
- Exercises to implement built-in and user defined exception handling
- Exercises using streams and files
- Exercises using collection framework - Stack class
- Exercises using collection framework – LinkedList and ArrayList
- Exercises using collection framework - HashMap and Hashtable
- Exercises using collection framework - Date and Calendar class
- Exercises using JDBC

#### Pedagogy

- Demonstration of working environment / Tools / Software / Programs

#### Course Designers

- Dr. S. Karpagavalli
- Mrs. M. Sowmya

Course Number	Course Name	Category	L	T	P	Credit
CS22C04	Operating System	Theory	58	2	-	3

### Preamble

This course provides the basic operating system functionalities. The course covers deadlock, storage management, file system, and I/O systems. It also introduces Linux commands and shell programming.

### Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the fundamental operating system abstractions such as processes, resources, threads, semaphores, memory files and Linux operating system	K1
CLO2	Understand the basic functionality of operating system like process, resource, memory, disk management	K2
CLO3	Apply the various operating system algorithms and techniques in solving problems	K3
CLO4	Analyse the abstractions of operating system in solving problems	K4

### Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	M	M	M	S
CLO2	S	S	M	M	S
CLO3	S	S	S	S	M
CLO4	S	S	S	S	M

S- Strong; M-Medium; L-Low

### Operating System- CS22C04

(58 Hrs)

#### Syllabus

##### Unit I

12 Hrs

**Introduction: Operating Systems** - Operating-System Structure -**Operating System operations**. Operating System Structures: Operating System Services - User and Operating System Interface - System Calls - System Programs - Operating System Design and Implementation - **Operating System Generation**.

##### Unit II

12 Hrs

Process Management: Process Concept - **Process Scheduling** - Operations on Processes. Threads: Overview - Multicore Programming - Multithreading Models. **Process Synchronization: Synchronization Hardware** - Mutex Locks - **Semaphores**. CPU Scheduling: Basic Concepts - Scheduling Criteria - **Scheduling Algorithms**.

**Unit III****12 Hrs**

Deadlock: System Model - Deadlock Characterization - **Methods for Handling Deadlocks** - Deadlock Prevention- Deadlock Avoidance- **Deadlock Detection- Recovery from Deadlock**. Storage Management: Overview of Mass Storage Structure -**Disk Structure** - Disk Attachment - Disk Scheduling - Disk Management.

**Unit IV****12 Hrs**

File System Interface: File Concept- Access Methods -**Directory and Disk Structure- File-System Mounting** - File Sharing - Protection. I/O Systems: Overview- I/O Hardware - **Application I/O Interface- Kernel I/O Subsystem**.

**Unit V****10 Hrs**

**Linux System: Introduction** - Programming Linux. **Shell Programming: Shell Introduction** - Pipes and Redirection – The Shell as a Programming Languages- Shell Syntax - Working with Files: Linux File Structure -**The Standard i/o Library** - Formatted Input Output - File and Directory Maintenance.

**Text Book**

S. No	Author	Title of the Book	Publisher	Year of Publication
1	Abraham G Silberschatz	Operating System	Wiley Publisher	10 <sup>th</sup> Edition, 2017
2	Richard Stones, Neil Matthew	Beginning: Linux Programming	Wiley Publisher	4 <sup>th</sup> Edition, 2007.

**Reference Books**

S. No	Author	Title of the Book	Publisher	Year of Publication
1	Andrew.S. Tannenbaum	Modern operating System	Pearson Education	2014
2	Abraham Silberschatz, PeterB.Galvin, GregGane	Operating System Concepts	Wiley Global Education	9 <sup>th</sup> Edition, 2012
3	Mark G. Sobell	A Practical Guide to Linux commands, Editors, and Shell Programming	Addison wesley	2nd Edition, Pearson, 2011

**Note**

- Blended mode topics are highlighted. Links will be provided.

**Pedagogy**

- Lectures, Demonstration, Case studies

**Course Designer**

- Mrs. M. Dhivya

Course Number	Course Name	Category	L	T	P	Credit
CS22C05	Data Structures	Theory	58	2	-	3

### Preamble

This course covers the basic concepts, terminologies in data structure. It provides knowledge on data representation, storage and retrieval in various data structures as well as sorting and searching techniques.

### Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the basic data structures and data representations	K1
CLO2	Understand different data structures, operations and applications	K2
CLO3	Apply specific data structures like stack, queue, linked list, trees, and graph to solve problems	K3
CLO4	Analyze and evaluate the use of data structures in computerized problem solving	K4

### Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	M	S	S	S	S
CLO2	S	S	S	M	S
CLO3	M	S	S	M	S
CLO4	S	M	S	M	M

S-Strong; M-Medium; L-Low.

Data Structures- CS22C05

(58 Hrs)

### Syllabus

#### Unit I

12 Hrs

**Introduction and Overview: Introduction** - Basic Terminology; Elementary Data Organisation - **Data structures** - Data structure operations - **Algorithms**: Complexity, Time- Space Trade-off. Preliminaries: **Algorithmic Notation** - Control Structures- **Variables, Data Types. Arrays, Records and Pointers: Introduction - Linear Arrays** – Operations in Linear Arrays.

#### Unit II

12 Hrs

**Stack, Queues, Recursion: Introduction -Stacks** - Array Representation of Stacks - Linked Representation of Stacks - Arithmetic Expressions - Polish Notation - **Recursion**- Towers of Hanoi - Implementation of Recursive Procedures by Stacks -**Queues** - Linked Representation of Queues – Circular Queue - Dequeue – Priority Queue.

#### Unit III

11 Hrs

**Linked Lists: Introduction - Linked Lists** - Representation of Linked Lists in Memory- Traversing a Linked List - Memory Allocation-**Garbage Collection**–Insertion in Linked List- Deletion from a Linked List - Header Linked Lists– Circular Linked List.

**Unit IV****12 Hrs**

**Trees: Introduction - Binary Trees** - Representing Binary Trees in Memory - traversing binary trees - AVL Tree - B Tree - **Graphs: Terminology and Representations**- Sequential Representation of Graphs- Adjacency Matrix, Path Matrix – Graph Traversal – Shortest Path Problems - **Spanning Trees**.

**Unit V****11 Hrs**

**Sorting and Searching: Introduction - Sorting** - Insertion Sort - Selection Sort - Merging - Merge Sort - **Radix Sort** -Bubble Sort-Quick Sort. Searching and Data Modification – **Hashing** - Linear Search – Binary Search.

**Text Book**

S. No	Author	Title of the Book	Publisher	Year of Publication
1	Seymour Lipschutz	Data Structures	Tata Mc-Graw Hill	5 <sup>th</sup> Edition, 2014

**Reference Books**

S. No	Author	Title of the Book	Publisher	Year of Publication
1	Ellis Horowitz SartajSahni	Fundamentals of Data Structures	Galgotia Book House	2014
2	HarryHariom Choudhary	Data Structures	Create Space Independent Publishing Platform	2014
3	Rajdev Tiwari and Nagesh Sharma	Designand Analysis of Algorithms	Pearson Education	2014

**Note**

- Blended mode topics are highlighted. Links will be provided.

**Pedagogy**

- Lectures, Demonstration, Case studies

**Course Designer**

- Dr. J. Viji Gripsy

Course Number	Course Name	Category	L	T	P	Credit
CS22CP3	DBMS Lab	Practical	-	-	75	4

### Preamble

The lab course provides a way to explore storing and accessing data in database through query languages and PL/SQL programming language. It enables to give systematic database design approaches and project oriented learning through real time applications.

### Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Understand basic SQL query statements	K2
CLO2	Gain knowledge on various constraints	K2
CLO3	Apply functions, packages, views, joins and Exception handling on data	K3
CLO4	Demonstrate PL/SQL programming on real time applications	K4

### Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	S	S	M	S
CLO2	S	S	S	S	S
CLO3	S	S	S	S	S
CLO4	S	S	S	S	M

S - Strong; M - Medium; L - Low.

### DBMS Lab - CS22CP3

(75 Hrs)

#### List of Programs

- Exercise using different data types and operators
- Exercise to implement database schema using constraints
- Exercise to implement queries using DDL and DML
- Exercise to implement built-in functions
- Exercise to implement views
- Exercise to implement PL/SQL basics
- Exercise to implement PL/SQL table and record
- Exercise to implement joins
- Exercise using Functions
- Exercise using Packages
- Exercise using Cursors
- Exercise using Triggers
- Exercise using Exception Handling

**Pedagogy**

- Demonstration of working environment/Tools/Software/Program

**Course Designer**

- Mrs. J. Gayathri
- Mrs. M. Dhivya

Course Number	Course Name	Category	L	T	P	Credit
CS22SBP1	SBS I: Robotic Process Automation Tools	Practical	-	4	41	3

### Preamble

This course provides hands-on training on bot development using UiPath. It provides exposure on components of UiPath, workflow and business process automation.

### Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Understand the basic elements of UiPath for bot development	K2
CLO2	Apply UiPath components to automate the business process	K3
CLO3	Illustrate the sequence of activities in business process automation	K3
CLO4	Demonstrate the steps to automate real world business processes	K4

### Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	S	S	S	S
CLO2	S	S	S	M	S
CLO3	S	S	M	S	S
CLO4	S	S	S	S	S

**S-Strong; M-Medium; L-Low**

**Robotic Process Automation Tools - CS22SBP1**

**(41Hrs)**

### List of Programs

- Check whether the number given by the user is even or odd
- Notepad Automation
- Basic and Desktop Recording
- Amazon Data Scrapping in Excel
- Google Form Filling Automation
- Email Automation
- Attendance Automation
- Files Handling

### Pedagogy

- Demonstration of working environment / Tools / Software / Program

### Course Designer

- Mrs. S. Ponmalar



Course Number	Course Name	Category	L	T	P	Credit
CS22C06	Data Mining	Theory	58	2	-	4

### Preamble

This course covers the basic concepts of data mining principles and methods. It provides insight on classification, and clustering techniques and focuses on applications like web mining, text mining and biological data mining.

### Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the basic concepts of data mining and applications	K1
CLO2	Understand the algorithms and techniques in data mining	K2
CLO3	Apply data mining algorithms in solving real world problems	K3
CLO4	Analyze various data mining concepts to work with different kind of data	K4

### Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	M	S	S	M
CLO2	S	M	S	S	M
CLO3	M	M	S	M	M
CLO4	S	S	M	S	S

S- Strong; M-Medium; L-Low

**Data Mining - CS22C06**

**(58 Hrs)**

### Syllabus

#### Unit I

**11 Hrs**

Introduction: Data Mining - **KDD vs Data mining**-DBMS vs Data mining-Other areas-Data mining techniques-Issues and challenges-**Application areas**.

#### Unit II

**12 Hrs**

Association Rule: Introduction-Methods in association rule- **Apriori algorithm**. Clustering: Introduction- Clustering paradigms -**K-medoid algorithms**- CLARA- CLARANS - Hierarchical clustering-**DBSCAN**.

**Unit III** **12 Hrs**

**Classification: Decision Tree**-Tree construction principles-Best split-splitting indices-splitting criteria- Tree construction algorithms: **CART-ID3-C4.5**.

**Unit IV** **12 Hrs**

**Neural Networks - Introduction** -Learning in NN-Unsupervised Learning-Genetic Algorithm-**Support Vector Machine**.

**Unit V** **11 Hrs**

Data Mining for Bioinformatics: Introduction-Bio medical data analysis. Web Mining: Introduction-**Web mining**-content mining- structure mining-usage mining-**Text mining**-unstructured text-Episode rule discovery for texts- hierarchy of categories-**Text clustering**.

#### **Text Book**

<b>S. No</b>	<b>Author</b>	<b>Title of the Book</b>	<b>Publisher</b>	<b>Year of Publication</b>
<b>1</b>	Arun K Pujari	Data Mining Techniques	University Press	4 <sup>th</sup> Edition, 2016

#### **Reference Books**

<b>S. No</b>	<b>Author</b>	<b>Title of the Book</b>	<b>Publisher</b>	<b>Year of Publication</b>
<b>1</b>	Yi Ping Phoebe Chen	Bio Informatics Technologies	Springer	2 <sup>nd</sup> reprint, 2014
<b>2</b>	Pang-Ning Tan, Michael Steinbach and Vipin Kumar.	Introduction to Data Mining	Pearson Education	2016
<b>3</b>	Max Barmer	Principles of Data Mining	Springer	3 <sup>rd</sup> Edition,2016

#### **Pedagogy**

- Lectures, Demonstration, Case studies

#### **Course Designer**

- Mrs. J. Gayathri

Course Number	Course Name	Category	L	T	P	Credit
CS22C07	Computer Networks	Theory	58	2	-	3

### Preamble

The course is designed to provide in depth knowledge of the various network types, protocols, components, security and basics of data communication.

### Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the basic network terminologies, hardware, architectures and security	K1
CLO2	Understand various reference models, protocols, functioning of layers and cryptography algorithms	K2
CLO3	Apply the network concepts in problem solving	K3
CLO4	Analyze the characteristics of networks, routing protocols and security techniques	K4

### Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	M	M	M	M
CLO2	S	S	M	M	S
CLO3	S	S	M	M	S
CLO4	S	S	M	M	S

S- Strong; M-Medium; L-Low

Computer Networks -CS22C07

(58 Hrs)

### Syllabus

#### Unit I

12 Hrs

Data Communications: **Components**- data representation- Dataflow Networks: Distributed processing-network criteria -physical structures -network models-**categories of networks**- Interconnection of Networks: **Internetwork**- Protocols and Standards: protocols – standards - internet standards the OSI model- layers in the OSI model-TCP/IP protocol suite.

#### Unit II

12 Hrs

Guided Media: **Twisted-pair cable-coaxial cable** - fibre-optic cable- unguided media: - Telephone Network: Major components - Latas -signalling services provided by telephone

networks dial-up modems: Modem standards digital subscriber line- cable TV networks. Wireless LANS: **Bluetooth- connecting devices.**

**Unit III** **11 Hrs**

Data Link Layer: Introduction- block coding-framing- **flow and error control**- protocols- noiseless channels- noisy channels. Network Layer: IPV4 addresses- IPV6 addresses-delivery-forwarding- **unicast routing protocols.**

**Unit IV** **11 Hrs**

Transport layer: **Process-to-Process delivery**- user datagram protocol - TCP- congestion control and quality a TCP connection- **congestion control** - quality of service.

**Unit V** **12 Hrs**

Application Layer: **Name space- domain name space**- distribution of name space- DNS in the internet- resolution- remote logging - cryptography: Introduction- symmetric-key cryptography- **asymmetric-key cryptography.**

**Text Book**

S. No	Author	Title of the Book	Publisher	Year of Publication
1	Behrouz A Forouzan	Data communications and networking	Tata McGraw Hill	4 <sup>th</sup> Edition, 2017

**Reference Books**

S. No	Author	Title of the Book	Publisher	Year of Publication
1	Robert Orfali, Dan Harkey, Jerry Edwards	Client/Server Survival Guide	John Wiley & sons	3rdEdition,2008
2	Larry L Peterson, Bruce S Davie	Computer Networks - A systems approach	Elsevier Press	5 <sup>th</sup> Edition, 2012
3	Andrew S Tanenbaum	Computer Networks	Pearson education	5 <sup>th</sup> Edition, 2011
4	William Stallings	Data and Computer Communications	Prentice Hall of India Private Limited, NewDelhi	8 <sup>th</sup> Edition, 2011

**Pedagogy**

- Lecture, Demonstration, Case Studies

**Course Designer**

- Mrs. S. Kavitha

Course Number	Course Name	Category	L	T	P	Credit
CS22CP4	Python Programming Lab	Practical	-	-	75	4

### Preamble

This course includes a practice in the use of basic techniques of Python programming and to implement in real time environment. It enriches the knowledge in programming techniques using pattern matching concepts. It enables to understand object oriented programming concepts.

### Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Understand python programming structure	K1
CLO2	Classify different functions in python programming	K2
CLO3	Apply files for data processing	K3
CLO4	Illustrate pattern matching and extra action using regular expression	K4

### Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	S	S	S	S
CLO2	S	S	S	S	M
CLO3	S	S	M	S	S
CLO4	S	S	M	S	S

S- Strong; M-Medium; L-Low

### Python Programming and Bio Informatics Lab - CS22CP4

(75 Hrs)

### List of Programs

- Exercises using conditionals and loops.
- Exercises for implementing functions.
- Exercises using list and their built-in functions.
- Exercises by implementing tuples.
- Exercises by implementing dictionary.
- Exercises using apply (), filter (), map () and reduce () functions.
- Exercises by implementing Modules.
- Exercises by implementing classes and instances.
- Exercises by illustrating regular expression.
- Exercises for implementing files concept.
- Exercises using strings and their built-in functions.
- Exercises for implementing database concepts.

**Pedagogy**

- Demonstration of working environment / Tools / Software / Program

**Course Designer**

- Dr. J. Viji Gripsy

Course Number	Course Name	Category	L	T	P	Credit
CS22SBP2	SBS II - Data Mining Tools Lab	Practical	-	4	41	3

### Preamble

This lab course provides hands on training to understand data mining techniques and machine learning algorithms using any one data mining tool.

### Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Understand the datamining concepts using a data mining tool	K1
CLO2	Apply machine learning algorithms on data sets	K2
CLO3	Analyze the results of machine learning algorithms using different parameters	K3
CLO4	Illustrate real world problem solving using data mining algorithms	K4

### Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	S	S	S	S
CLO2	S	S	S	M	S
CLO3	S	S	S	S	M
CLO4	S	S	S	S	S

S - Strong; M-Medium; L-Low

### Data Mining Tools Lab - CS21SBP2

(45 Hrs)

#### List of Exercises

- Exercise to load data, attributes and visualization
- Exercise to pre-processing data
- Exercise to implement association rule mining
- Exercise to implement classification - Decision Tree, MLP, Naïve Bayes
- Exercise to implement clustering - K-means, K-medoids, DBSCAN
- Exercise to implement regression - Linear, non-linear and muti variate
- Exercise to select attributes

#### Pedagogy

- Demonstration of working environment / Tools / Software / Program

#### Course Designer

- Mrs. D. Suganthi
- Mrs. J. Gayathri

Course Number	Course Name	Category	L	T	P	Credit
AP22A01	Digital Marketing	Theory	58	2	-	3

### Preamble

This course provides an overall understanding of the various digital marketing platforms and tools available for creating an effective digital marketing strategy. It provides technical skills to design and develop an integrated digital marketing plan for an organization.

### Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the role of digital marketing in marketing strategy	K1
CLO2	Understand the key elements of a digital marketing strategy	K2
CLO3	Apply the role that social marketing plays in the digital marketing	K3
CLO4	Analyze common digital marketing tools such as SEO and social media and apply conceptual frame works of digital marketing	K4

### Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	M	S	S	S
CLO2	S	S	M	S	M
CLO3	S	S	S	M	M
CLO4	S	S	S	M	S

S- Strong; M-Medium; L- Low

### Digital Marketing - AP22A01 Syllabus

(58 Hrs)

#### Unit I

12 Hrs

Introduction to Digital Marketing: **Introduction - Original and Development of Digital Marketing** - Internet Users: Penetration and Kind of Internet Use - Digital Marketing strategy - Digital Advertising Marketing Plan - Ethical and legal of framework of Digital Marketing - **Skills Required in Digital Marketing** - Digital Advertising: Introduction - Concept of display advertising - Digital Metrics - Types of Digital Ad - Targeting in digital marketing - Challenges faced by display marketing.

#### Unit II

11 Hrs

Search Engine Advertising: Introduction - **Why pay for search advertising?** - Understanding Ad Placement - Understanding Ad Ranks - **Why is the Ad rank important?** - Create your first Ad Campaign - Google Ads Account - Best practices for creating effective Ads - Enhance your Ad Campaign - Performance Reports - E-Commerce.

#### Unit III

12 Hrs

Face book Marketing : Introduction - **Organic Marketing** - Paid Marketing - Facebook Insights LinkedIn: Introduction - LinkedIn Strategy - Content Strategy - LinkedIn Native Videos -



LinkedIn Analytics - Asset Copying - LinkedIn Sales Navigator - **Emerging Platforms: Instagram.**

#### **Unit IV**

**12 Hrs**

Search Engine Optimization: Introduction - **Search Engine - The Concept of SEO** - SEO Phases - Website Audit - Content - Social Media Reach – Maintenance - Local Search SEO - SEO Visual Search - Voice Change will change the SEO Industry - Sub domains vs Subfolders - SEO - Website Navigation - External Links - Pop-ups - **Advanced Website Features.**

#### **Unit V**

**11 Hrs**

Mobile Marketing: Introduction - **Mobile Advertising** - Mobile Marketing Toolkit - Mobile Marketing Features - Mobile Analytics. Digital Analytics: Introduction - **Data Collection** - Key Metrics - Experience Analysis - Making Web Analytics Actionable - **Types of Tracking Code** - Competitive Intelligence.

#### **Text Book**

<b>S. No</b>	<b>Author</b>	<b>Title of the Book</b>	<b>Publisher</b>	<b>Year of Publication</b>
<b>1</b>	Seema Gupta	Digital Marketing	McGraw Hill Education	2 <sup>nd</sup> Edition, 2018

#### **Reference Books**

<b>S. No</b>	<b>Author</b>	<b>Title of the Book</b>	<b>Publisher</b>	<b>Year of Publication</b>
<b>1</b>	Simon Kingsnorth	Digital Marketing Strategy: An Integrated Approach to Online Marketing	Kogan Page	2 <sup>nd</sup> Edition, 2019
<b>2</b>	Dave Chaffey	Digital Marketing	Pearson	7 <sup>th</sup> Edition, 2019
<b>3</b>	Stephanie Diamond	Digital Marketing All-in-One for Dummies	For Dummies	1 <sup>st</sup> Edition, 2019
<b>4</b>	Kevin Hartman	Digital Marketing Analytics: In Theory and In Practice	Ostmen Bennett Bridge Publishing Services	2 <sup>nd</sup> Edition, 2020

#### **Pedagogy**

- Lectures, Group discussions, Demonstrations, Case studies

#### **Course Designer**

- Mrs. S. Kavitha

Course Number	Course Name	Category	L	T	P	Credit
CS22A02	M-Commerce	Theory	58	2	-	3

### Preamble

This course provides an insight on M-Commerce principles and business models. It also explores the concept of mobile commerce technologies, applications, mobile payment methods, security, and ethics.

### Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the fundamental concept of E- commerce and process of business models	K1
CLO2	Understand the architecture and applications of M- Commerce	K2
CLO3	Illustrate the risks, issues, legal and security aspects in M-Commerce	K3
CLO4	Analyze the infrastructure, fraud prevention and payment methodologies and examine the legal and ethical issues in mobile commerce	K4

### Mapping with Programme Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	M	S	S	S
CLO2	S	S	M	S	M
CLO3	S	S	S	S	M
CLO4	S	S	S	M	S

S-Strong; M-Medium; L-Low.

### M-Commerce - CS22A02

(58 Hrs)

### Syllabus

#### Unit I

12 Hrs

Introduction to E- commerce: Introduction - **E-commerce** - E-business - Categories of E-commerce applications - Traditional and Electronic commerce - Advantages and disadvantages of E-commerce. **Business Models of E-commerce:** Introduction - Business models of E-commerce- Business to Consumer (B2C) - Business to Business (B2B) - Difference between B2C and B2B - C2C: Definition - **Characteristics and Applications of C2C EC**

#### Unit II

11 Hrs

Mobile commerce and WAP: Introduction to Mobile commerce - Application - Advantages of M-commerce - **Wireless Application Protocol** - WAP Browser - Features of WAP 2.0 - **Technologies of M- commerce**

#### Unit III

12 Hrs

Mobile commerce Risk, Security and Payment Methods: Introduction - Security and Payment Methods - **Mobile Commerce Security** - Security Mechanism - Mobile Security - Network

Infrastructure and Security- **WLAN and Security** - WAP and Security - Mobile commerce payment methods - **Mobile payment operations**

**Unit IV**

**12 Hrs**

Mobile Money Infrastructure and Fraud Prevention for M- Payment: Introduction - **Requirement for authentication infrastructure for M-commerce** - Trust relationship - Requirement for Mobile commerce - Password based authentication for mobile users with support for public key technology - **M - payment value chain** - Life cycle - Operational Issues in M-Commerce payment - **Mobile payment systems** - General analysis of the payment solutions

**Unit V**

**11 Hrs**

Legal and Ethical Issues: Introduction - **Issues related to E- commerce** - Legal issues - Taxation and E-commerce - Cyber Laws: Introduction - **Cyber laws in India** - Salient Provisions of Cyber Law - Contracting and contract Enforcement - **IT act 2000**

**Text Book**

S. No	Author	Title of the Book	Publisher	Year of Publication
1	Dr. U.S. Pandey & Er. Saurabh Shukla	E- Commerce and Mobile Commerce Technologies	S. Chand & Company Pvt. Ltd	2 <sup>nd</sup> Revised Edition, 2014

**Reference Books**

S. No	Author	Title of the Book	Publisher	Year of Publication
1	Karabi Bandyopadhyay	Mobile Commerce	Prentice Hall India Learning Private Limited	2013
2	Paul May	Mobile Commerce: Opportunities, Applications, and Technologies of Wireless Business	Cambridge University Press;	1 <sup>st</sup> Edition, 2001
3	Norman Sadeh	M-Commerce: Technologies, Services, and Business Models	John Wiley & Sons,	2003

**Pedagogy**

- Lectures, Group discussions, Demonstrations, Case studies

**Course Designer**

- Ms. P. Parvathi

## JOB ORIENTED COURSE

**Title** : **Amazon Web Services**

**Duration** : **60 Hrs**

**Introduction to Cloud Computing:** Overview of Cloud Computing - Types of Cloud Computing - Advantages of Cloud Computing - Characteristics of Cloud Computing – Cloud Computing Terminology - Overview of Amazon Web Services (AWS) AWS Architecture Fundamentals - AWS Global Infrastructure - AWS Regions and Availability Zones – AWS Services Overview -AWS Management Console

**Compute Services:** Amazon Elastic Compute Cloud (EC2)-Amazon Elastic Container Service (ECS) - Amazon Elastic Load Balancing (ELB) -Auto Scaling Amazon Lightsail -AWS Lambda  
**Storage Services:** Amazon Simple Storage Service (S3) – Amazon Elastic Block Storage (EBS) - Amazon Glacier - Amazon Elastic File System (EFS) – Amazon Storage Gateway

**Networking Services:** Amazon Virtual Private Cloud (VPC)- Amazon Direct Connect-AWS Elastic Load Balancing (ELB)-Amazon Route53- Amazon Cloud Front- AWS Web Application Firewall (WAF) **Database Services:** Amazon Relational Database Service (RDS) –Amazon DynamoDB -Amazon Redshift –Amazon Aurora

**Security & Identity Services:** Amazon Identity and Access Management (IAM) -Amazon Cognito -AWS Certificate Manager -AWS Key Management Service (KMS) – Amazon Cloud HSM AWS Shield Management & Developer Tools- AWS Cloud Formation – AWS Cloud Trail-AWS Command Line Interface (CLI)-AWS Systems Manager-AWS Code Commit - AWS Code Build - AWS Code Deploy - AWS Code Pipeline Amazon Kinesis –Amazon EMR – Amazon Athena -Amazon Redshift- Amazon Quick Sight

**Analytics Services: Application Services:** Amazon Simple Queue Service (SQS) –Amazon Simple Notification Service (SNS)-Amazon Simple Workflow Service (SWF)-Amazon API Gateway - Amazon MQ - Amazon AppStream 2.0 **AWS Best Practices:** Cost Optimization - Security - Performance & Scalability - High Availability & Disaster Recovery –Operational Excellence -Automation & Continuous Delivery-Monitoring& Logging.

**Title** : **Cisco Certified Network Associate**

**Duration** : **60 Hrs**

**Network Devices** - Routers - Layer 2 and Layer 3 switches - Next-generation firewalls and IPS - Access points - Controllers (Cisco DNA Center and WLC) – Endpoints –Servers – PoE - Network Topologies – Cabling – Connections and it types – Communication Protocols – Casting – Wireless Principles – Frames and Switching – MAC Tables.

**Configuring VLAN** – CDP and LLDP – LACP – Rapid PVST – Spanning Tree protocols – Port Forward and Block – Wireless Architectures and AP Modes - WLC, access/trunk ports, and LAG - Telnet, SSH, HTTP, HTTPS, console, and TACACS+/RADIUS –IP Connectivity - Components of routing table - Routing protocol metric - Configure

**IPv4 and IPv6 static routing** - Configure single area OSPFv2 - Concepts of first hop redundancy protocols -NAT using static and pools - NTP operating in a client and server mode – Configure DHCP & DNS - SNMP - Syslog - Configure and verify DHCP client and relay - per-hop behavior (PHB) - Remote access using SSH - TFTP/FTP in the network

**Concepts of Security threats, vulnerabilities, exploits, and mitigation** - security program elements - Configure and verify device access control using local passwords - security password policies elements - IPsec remote access and site-to-site VPNs - Configure and verify access control lists - Configure and verify Layer 2 security features DHCP snooping, dynamic ARP inspection, and port security - wireless security protocols WPA, WPA2, and WPA3 - Configure and verify WLAN within the GUI using WPA2 PSK

**Automation and Programmability** - Control plane and Data plane - Northbound and Southbound APIs - REST-based APIs (CRUD, HTTP verbs, and data encoding) - Puppet, Chef, and Ansible - Recognize components of JSON-encoded data

**Title : Microsoft Windows Server Administration**

**Duration : 60 Hours**

**Manage Microsoft Entra users and groups** - Create users and groups -Manage user and group properties -Manage licenses in Microsoft Entra ID -Manage external users -Configure self-service password reset (SSPR) -Manage access to Azure resources -Manage built-in Azure roles -Assign roles at different scopes - Interpret access assignments

**Manage Azure subscriptions and governance:** Implement and manage Azure Policy -Configure resource locks - Apply and manage tags on resources -Manage resource groups -Manage subscriptions -Manage costs by using alerts, budgets, and Azure Advisor recommendations - Configure management groups -Implement and manage storage (15–20%) -Configure access to storage -Configure Azure Storage firewalls and virtual networks - Create and use shared access signature (SAS) tokens -Configure stored access policies -Manage access keys -Configure identity-based access for Azure Files

**Configure and manage storage accounts:** Create and configure storage accounts -Configure Azure Storage redundancy -Configure object replication -Configure storage account encryption - Manage data by using Azure Storage Explorer and AzCopy - Configure Azure Files and Azure Blob Storage -Create and configure a file share in Azure Storage -Create and configure a container in Blob – Storage - Configure storage tiers - Configure snapshots and soft delete for Azure Files - Configure blob lifecycle management - Configure blob versioning

**Automate deployment of resources by using Azure Resource Manager (ARM) templates or Bicep files:** Interpret an Azure Resource Manager template or a Bicep file - Modify an existing Azure Resource Manager template - Modify an existing Bicep file - Deploy resources by using an Azure Resource Manager template or a Bicep file - Export a deployment as an Azure Resource Manager template or convert an Azure Resource Manager template to a Bicep file

**Create and configure virtual machines:** Create a virtual machine - Configure Azure Disk Encryption - Move a virtual machine to another resource group, subscription, or region - Manage virtual machine sizes - Manage virtual machine disks - Deploy virtual machines to availability zones and availability sets - Deploy and configure an Azure Virtual Machine Scale Sets

**Provision and manage containers in the Azure portal:** Create and manage an Azure container registry - Provision a container by using Azure Container Instances - Provision a container by using Azure Container Apps - Manage sizing and scaling for containers, including Azure Container Instances and Azure Container Apps

**Create and configure Azure App Service:** Provision an App Service plan - Configure scaling for an App Service plan - Create an App Service - Configure certificates and Transport Layer Security (TLS) for an App Service - Map an existing custom DNS name to an App Service - Configure backup for an App Service - Configure networking settings for an App Service - Configure deployment slots for an App Service - Implement and manage virtual networking (15–20%)

**Configure and manage virtual networks in Azure:** Create and configure virtual networks and subnets - Create and configure virtual network peering - Configure public IP addresses - Configure user-defined network routes - Troubleshoot network connectivity

**Configure secure access to virtual networks:** Create and configure network security groups (NSGs) and application security groups - Evaluate effective security rules in NSGs - Implement Azure Bastion - Configure service endpoints for Azure platform as a service (PaaS) - Configure private endpoints for Azure PaaS

**Configure name resolution and load balancing:** Configure Azure DNS - Configure an internal or public load balancer - Troubleshoot load balancing - Monitor and maintain Azure resources (10–15%)

**Monitor resources in Azure:** Interpret metrics in Azure Monitor - Configure log settings in Azure Monitor - Query and analyze logs in Azure Monitor - Set up alert rules, action groups, and alert processing rules in Azure Monitor -Configure and interpret monitoring of virtual machines, storage accounts, and networks by using Azure Monitor Insights - Use Azure Network Watcher and Connection Monitor

**Implement backup and recovery:** Create a Recovery Services vault -Create an Azure Backup vault -Create and configure a backup policy -Perform backup and restore operations by using Azure Backup - Configure Azure Site Recovery for Azure resources - Perform a failover to a secondary region by using Site Recovery - Configure and interpret reports and alerts for backups

**Provision and manage containers in the Azure portal:** Create and manage an Azure container registry - Provision a container by using Azure Container Instances - Provision a container by using Azure Container Apps -Manage sizing and scaling for containers, including Azure Container Instances and Azure Container Apps

**Create and configure Azure App Service:** Provision an App Service plan -Configure scaling for an App Service plan -Create an App Service -Configure certificates and Transport Layer Security (TLS) for an App Service -Map an existing custom DNS name to an App Service - Configure backup for an App Service - Configure networking settings for an App Service - Configure deployment slots for an App Service

**Monitor resources in Azure:** Interpret metrics in Azure Monitor - Configure log settings in Azure Monitor -Query and analyze logs in Azure Monitor -Set up alert rules, action groups, and alert processing rules in Azure Monitor - Configure and interpret monitoring of virtual machines, storage accounts, and networks by using Azure Monitor Insights -Use Azure Network Watcher and Connection Monitor

**Configure and manage virtual networks in Azure:** Create and configure virtual networks and subnets - Create and configure virtual network peering -Configure public IP addresses -Configure user-defined network routes -Troubleshoot network connectivity

**Implement backup and recovery:** Create a Recovery Services vault -Create an Azure Backup vault -Create and configure a backup policy -Perform backup and restore operations by using Azure Backup -Configure Azure Site Recovery for Azure resources -Perform a failover to a secondary region by using Site Recovery -Configure and interpret reports and alerts for backups

**Title** : **Microsoft Power BI**  
**Duration** : **60 Hrs**

**Introduction to Power BI and Data Analysis:** Introduction to Power BI: Overview of Power BI features and capabilities- Importance of data visualization in decision-making - Fundamentals of Data Analysis - Roles in Data Analysis - Tasks of a Data Analyst: Data collection, cleaning, and transformation - Creation of meaningful visualizations and reports - Extracting actionable insights from data. CRISP DM FRAMEWORK. Using Power BI - Building Blocks of Power BI- Understanding Power BI Desktop and Power BI Service - Differentiating between datasets, reports, and dashboards Collaborative aspects of Power BI, including sharing and collaboration.

**Data Cleaning and Transformation in Power BI :** Data Acquisition in Power BI - Importing data from various sources - Data transformation and cleaning techniques - Connecting Power BI to relational databases - Importing and querying data from SQL Server and other relational databases.

**Data Modelling and DAX Functions: Creating** Calculated Columns - Understanding the need for calculated columns - Hands-on exercises on creating and using calculated columns - Exploring Time-Based Data - Handling date and time data in Power BI - Time-based calculations and analysis. DAX Calculations in Data Analysis - Guidelines for choosing and implementing DAX calculations - Practical applications and examples. Star Schema Design - Understanding star schema and its advantages - Implementing star schema in Power BI data models.

**Data Visualization in Power BI:** Writing DAX Formulas - In-depth exploration of DAX syntax and functions - Advanced DAX calculations for complex data analysis. Designing Detailed Reports - Advanced report design techniques - Utilizing features like tooltips and drill-throughs. Statistical Analysis in Power BI- Advanced statistical functions in DAX - Use of advanced visuals for statistical insights. Creating Dashboards in Power BI - Detailed steps for creating interactive dashboards.

**Power BI Services vs Desktop:** Configuring Row-Level Security - Implementing security measures at the row level - Best practices for securing sensitive data. Setting Up Data Alerts - Configuring alerts for monitoring changes - Troubleshooting common alert issues. Preparing for PL-300 - Model the Data - Overview of PL-300 exam and key concepts - Practical exercises and scenarios for data modelling.



Course Number	Course Name	Category	L	T	P	Credit
CS22C08	Web Design and Development	Theory	73	2	-	4

### Preamble

This course provides the basics of web page design using PHP / MySQL. It focuses on architecture and built-in components for design and development of dynamic websites.

### Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the basic constructs of PHP Scripting Language and MySQL	K1
CLO2	Understand the web design elements, functions, files, data connections and MVC architecture	K2
CLO3	Apply web design methods to solve problems	K3
CLO4	Analyze the web page design requirements and design web pages using PHP / MySQL	K4

### Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	S	S	S	S
CLO2	S	S	S	S	M
CLO3	S	S	M	S	S
CLO4	S	S	S	S	S

S- Strong; M-Medium.

### Web Design and Development - CS22C08

(73 Hrs)

#### Syllabus

#### Unit I

14 Hrs

Introduction: **Basics of HTML, CSS**, Server - Side Web Scripting - Syntax and Variables - Control and Functions. Passing Information between Pages: GET Arguments - POST Arguments - Formatting Form Variables - **String: Strings in PHP - String Functions.**

#### Unit II

15 Hrs

**Arrays and Array Functions:** Creating Arrays - Retrieving Values - Multidimensional Arrays - Inspecting Arrays - Deleting from Arrays - Iteration. **Number Handling:** Numerical Types - Mathematical Operators - Simple Mathematical Functions - Randomness - **Regular Expressions:** Tokenizing and parsing Functions.

#### Unit III

15 Hrs

Working with the File system: PHP File Permissions - **File Reading and Writing Functions** - File system and Directory Functions - Network Functions - Date and time Functions - Calendar Conversion Functions. Working with Sessions and Cookies: Sessions work in PHP - **Session Functions** - Configuration Issues - **Cookies** - Sending HTTP Headers.

#### Unit IV

15 Hrs

Structured Query Language (SQL): **Relational Database and SQL**-SQL standards - The Workhorses of SQL-Database Design-Privileges and Security. PHP and MYSQL: **Connecting to MySQL** -

Making MySQL Queries - Fetching Data Sets - Multiple Connections - Error Checking - Creating MySQL Databases with PHP - **MySQL Functions.**

### Unit V

14 Hrs

Understanding the core concepts of Laravel 5 - Setting up the environment - **Basic Architecture of Laravel Applications** - Laravel Application Life cycle - Artisan command-line interface - **MVC and routes** - Connecting with a database.

### Text Books

S.No	Author	Title of the book	Publisher	Year and Edition
1	Steve Suehring Tim Converse and Joyce Park	PHP 6.0 and MySQL Bible	Wiley	2009, 1 <sup>st</sup> Edition
2	Fernando Monteiro	Hands-On Full-Stack Web Development with Angular 6 and Laravel 5	Packt Publisher	2018, 1 <sup>st</sup> Edition

### Reference Books

S.No	Author	Title of the book	Publisher	Year and Edition
1	Jon Ducket	PHP & MySQL	Wiley	2014, 1 <sup>st</sup> Edition
2	Luke Welling and Laura Thomson	PHP and MySQL Web Development	Pearson Education	2016, 5 <sup>th</sup> Edition
3	Martin Bean	Laravel 5 Essentials	Packt Publishing Limited	2015, 1 <sup>st</sup> Edition

### Pedagogy

- Lectures, Group discussions, Demonstrations, Case studies.

### Course Designer

- Mrs. S. Ponmalar

Course Number	Course Name	Category	L	T	P	Credit
CS22C09	Computer Graphics	Theory	73	2	-	4

### Preamble

This course provides the fundamentals of computer graphics and Augmented Reality (AR). It also focuses on 2D & 3D transformations & viewing and applications of AR Technology.

### Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the fundamentals of computer graphics and augmented reality	K1
CLO2	Understand the working principle of display devices, 2D & 3D transformations & viewing and AR technology	K2
CLO3	Apply computer graphic algorithms to solve problems	K3
CLO4	Illustrate the steps to perform 2D & 3D graphic representation in applications	K4

### Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	S	S	S	S
CLO2	S	S	S	S	S
CLO3	S	S	M	S	S
CLO4	S	S	S	M	S

**S-Strong; M-Medium.**

### Computer Graphics - CS22C09 (73 Hrs)

#### Syllabus

#### Unit I

**14 Hrs**

Basic Concepts: **Uses of computer graphics** - Display devices - **Color CRT Monitors** - Direct view storage tube - Flat panel displays - Raster scan systems - Random scan system - **Input and Hard copy Devices.**

#### Unit II

**15 Hrs**

Line drawing algorithms: **DDA Algorithm** - Bresenham's Line Drawing Algorithm - Circle Generating Algorithms: Properties of circles - **Midpoint circle algorithm.** Two dimensional transformations: **Basic transformations** - Composite transformation of translation - Rotation - Scaling - Other transformations: Reflection - Shear.

#### Unit III

**15 Hrs**

Two dimensional viewing: **Clipping Operations** - Point clipping - Line clipping: Cohen Sutherland line clipping - Curve clipping - Text clipping - Exterior clipping. Three dimensional concepts: **Three dimensional display methods** - **Three dimensional geometric and modeling transformations:** Translation, Rotation and Scaling.

**Unit IV****15 Hrs**

Augmented Reality: Definition - Components of Augmented Reality - History of Augmented Reality - **Augmented Reality** - Differences between Augmented Reality and Virtual Reality - **Difference between AR and QR Codes** - Challenges with AR - Opportunities for Augmented Reality - Types of Augmented Reality - Augmented Reality Working - Augmented Reality Methods - **AR Display Technology** - **Interaction in AR Applications.**

**Unit V****14 Hrs**

Value of Augmented Reality: **Next User Interface** - Uses of Augmented Reality: Sports, Gaming, and Entertainment, Education - Maintenance and Repair - Medicine - Business and Commerce - AR Tools: **Unity** - **Vuforia** - Introduction - Big Trends - Technical Trends - Future Concepts for Augmented Reality - **AR Contact Lenses.**

**Text Books**

S.No	Author	Title of the Book	Publishers	Year and Edition
1	Donald Hearn, M. Pauline	Computer Graphics	Pearson	2012, 2 <sup>nd</sup> Edition
2	Gregory Kipper, Joseph Rampolla	Augmented Reality	O'Reilley	2012, 1 <sup>st</sup> Edition

**Reference Books**

S.No	Author	Title of the book	Publisher	Year and Edition
1	Steve Marschner, Peter Shirley	Fundamentals of Computer Graphics	Taylor & Francis Group	2021, 5 <sup>th</sup> Edition
2	Jay David Bolter, Morya Engberg, Blair MacIntyre	Reality Media Augmented & Virtual Reality	The MIT Press, Cambridge	2021, 1 <sup>st</sup> Edition
3	Jonathan Linowes	Augmented Reality with Unity AR Foundations	Packt Publishing	2021, 1 <sup>st</sup> Edition

**Pedagogy**

- Lectures, Group discussions, Demonstrations, Case studies.

**Course Designer**

- Dr. S. Karpagavalli

Course Number	Course Name	Category	L	T	P	Credit
CS22C10	Software Engineering	Theory	73	2	-	4

### Preamble

This course provides the fundamentals of software engineering process in software development. It also covers software process models, requirement analysis, design, testing and quality assurance.

### Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the basic concepts of software engineering in software development life cycle	K1
CLO2	Understand common lifecycle processes to plan and deliver an effective Software engineering Process	K2
CLO3	Apply software engineering principles to develop software systems	K3
CLO4	Demonstrate the concepts of software engineering by solving software design based problems	K4

### Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	S	S	S	S
CLO2	S	S	S	S	S
CLO3	S	S	M	S	S
CLO4	S	S	S	M	S

S-Strong; M-Medium.

### Software Engineering - CS22C10

(73 Hrs)

#### Syllabus

#### Unit I

14 Hrs

Software and Software Engineering: Nature of software - Software myths Process Models: **Generic process model** - Process assessment and improvement - Prescriptive process models- Specialized process models - Unified process - **Personal and team process models** - Process technology - Product and process.

#### Unit II

15 Hrs

Agile Development: Agility - Agility and the cost of change - Agile process - Extreme programming (XP) - **Agile process models** -Tool set for the agile process. DevOps: **Introduction to DevOps - Getting started with DevOps** - Continuous Integration and Continuous Delivery - The CI/CD principles - Using a package manager - Using Jenkins.

#### Unit III

15 Hrs

Understanding Requirements: Requirements engineering- Establishing the groundwork - Eliciting requirements - **Developing use cases** - Building the requirements model - Negotiating requirements

- Validating requirements. Requirements modeling: Scenarios, Information and Analysis Classes  
Requirements analysis - **Scenario - based modeling.**

**Unit IV**

**15 Hrs**

Design Concepts: Design within the context of software engineering - **Design process** - Design concepts - Design model Architectural design: Software architecture - Architectural genres - **Architectural styles.**

**Unit V**

**14 Hrs**

Software Quality Assurance: Background issues - **Elements of software quality assurance** - SQA tasks, goals and metrics - Formal approaches to SQA - Statistical software quality assurance - Software reliability - The ISO 9000 quality standards - SQA plan. Software Testing Strategies: Strategic Approach to software testing - **Verification and validation** - Organizing for software testing - **Software testing strategy - Criteria for completion of testing.** Software Process Improvement: SPI - SPI process - CMMI - People CMM.

**Text Books**

S.No	Author	Title of the book	Publisher	Year and Edition
1	Roger S. Pressman	Software Engineering - A Practitioner's Approach	Mc-Graw Hill Education	2017, 7 <sup>th</sup> Edition
2	Mikael Krief	Learning DevOps (Unit II)	Packt Publishing Ltd.	2019, 1 <sup>st</sup> Edition

**Reference Books**

S.No	Author	Title of the book	Publisher	Year and Edition
1	Ian Sommerville	Software Engineering	Pearson Education	2017, 10 <sup>th</sup> Edition
2	Richard Fairley	Software Engineering Concepts	Mc-Graw Hill Education	2017, 1 <sup>st</sup> Edition
3	Rajib Mall	Fundamentals of Software Engineering	Prentice Hall India Learning Private Limited	2014, 4 <sup>th</sup> Edition

**Pedagogy**

- Lectures, Group discussions, Demonstrations, Case studies.

**Course Designer**

- Mrs. M. Dhivya

Course Number	Course Name	Category	L	T	P	Credit
CS21E01	Parallel Computing	Theory	73	2	-	5

### Preamble

This course provides knowledge on hardware and the software work, starting from simple systems to complex shared resource architectures and shared memory programming paradigm.

### Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the concepts of parallel computing and architectures	K1
CLO2	Understand the architecture of future multi- and many-core processor systems	K2
CLO3	Apply serial programs and algorithms to solve problems	K3
CLO4	Illustrate the pragmatic approach of parallel computing	K4

### Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	M	S	S	M
CLO2	S	M	S	S	M
CLO3	M	M	S	M	M
CLO4	S	S	M	S	S

S- Strong; M-Medium.

Parallel Computing - CS21E01

(73 Hrs)

### Syllabus

#### Unit I

15 Hrs

Introduction: Why do we need High speed computing? - How do we increase the speed of computers? - History of parallel computers - Some interesting features of parallel computers. Instruction Level parallel processing: some example commercial processors - multithreaded processors - Proposed future processor architectures

#### Unit II

14 Hrs

Structure of parallel computers: A generalized structure of a parallel computer - Shared memory parallel computers - interconnection networks - Distributed shared memory parallel computers

#### Unit III

15 Hrs

Introduction: Computational demands of modern science - Advent of practical parallel processing - Parallel processing terminology - The sieve of Eratosthenes. PRAM Algorithms: A model of serial computation - The PRAM model of parallel computation. PRAM algorithms: Parallel reduction - merging two sorted lists.

**Unit IV****15 Hrs**

Processor Arrays, Multiprocessors and Multicomputer: Processor organizations - Processor arrays - Multiprocessors - multicomputer - Flynn's taxonomy - speedup, scaled speedup and parallelizability

**Unit V****14 Hrs**

Parallel programming languages & algorithms: Parallel language & algorithm design for the array processor - other von Neumann - type languages - C, C++ & parallel C++ - Non-von Neumann - type languages

**Text Books**

S. No	Author	Title of the Book	Publisher	Year and Edition
1	Michael J Quinn	Parallel Computing	Tata Mc-Graw Hill	2008, 2 <sup>nd</sup> Edition
2	V. Rajaraman, C. Siva Ram Murthy	Parallel Computers Architecture and Programming	Prentice Hall of India Pvt. Ltd	2008, 1 <sup>st</sup> Edition

**Reference Books**

S. No	Author	Title of the Book	Publisher	Year and Edition
1	MichealMcCool, ArchD.Robinson, JamesReindres	Structured Parallel Programming	Morgan Kaufmann Publishers	2012, 1 <sup>st</sup> Edition
2	Wilkinson Barry, Michael Allen	Parallel and Concurrent Programming	Pearson Education	2012, 1 <sup>st</sup> Edition
3	Peter Pacheco	Introduction to Parallel Programming	Morgan Kaufmann Publishers	2011, 1 <sup>st</sup> Edition

**Pedagogy**

- Lecture, Group Discussion, Case Studies

**Course Designer**

- Dr. K. Padmavathi



Course Number	Course Name	Category	L	T	P	Credit
CS21E02	Big Data Analytics	Theory	73	2	-	5

### Preamble

The course provides an introduction to big data analytics, tools and techniques. It introduces Hadoop architecture and map reduce programming model. It also provides knowledge on NoSQL databases, querying model and applications in big data.

### Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the basics of big data, tools and techniques in big data analytics	K1
CLO2	Understand the programming models, data storage and querying models and data visualization in big data analytics	K2
CLO3	Apply the big data analytics methods and tools for solving real-world problems	K3
CLO4	Analyze the specific business case and apply appropriate data analytic tools and methods	K4

### Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	S	S	S	M
CLO2	S	S	S	S	S
CLO3	S	S	M	S	S
CLO4	S	S	S	S	S

S- Strong; M-Medium.

### Big data analytics - CS21E02

(73 Hrs)

#### Syllabus

#### Unit I

15 Hrs

Overview of Big Data: Defining Big Data - Big Data Types - Big Data Analytics - Industry Examples of Big Data - Big Data and Data Risk - Big Data Technologies - Benefits of Big Data - Basics of Hadoop: BigData and Hadoop - Hadoop Architecture -Main Components of Hadoop Framework – AnalysingBigData with Hadoop - Benefits of Distributed Applications - Hadoop Distributed File System - Advantages of Hadoop - Ten Big Hadoop Platforms

#### Unit II

15 Hrs

Hadoop Distributed File System: Architecture of APACHE Hadoop HDFS - File Systems - HDFS File Blocks - HDFS File Commands. Map Reduce: Introduction to Map Reduce - Working of Map Reduce - Map operations - Map Reduce Program - Map Reduce User Interfaces.

#### Unit III

15 Hrs

NoSQL Databases: NoSQL Data Management - Types of NoSQL Databases - Query Model for Big Data - Benefits of NoSQL. HBase, CASSENDRA and JAQL: Introduction to HBase - Row-oriented and Column-oriented Data Stores - HDFS Vs HBase - HBase Architecture - HBase Data Model - Understanding HBase Data Model - Introduction to Cassandra - Features - Data Replication -

Components - Cassandra Query Language - Data Model - Data models of Cassandra and RDBMS. Introduction to JAQL - JSON - Components of JAQL.

#### Unit IV

14 Hrs

HIVE: Introduction to Hive - Data Models - Building Blocks - Data file formats - Hive for Data warehousing - HiveQL - Data Manipulation - Queries - Hive - Built in Functions. PIG: Introduction - Components - PIG Program Execution Modes - Data formats and Models - Pig vs SQL - Pig Vs Map Reduce - Difference between Hive and Pig - Apache Pig history

#### Unit V

14 Hrs

Data Visualization Tools: Tableau - Advantages - Creating Visualization - Text Table - Heat Maps - Maps with calculated Colours - Creating Maps - Dashboard. Applications:WALMART: How Big Data is used to Drive Supermarket Performance - NETFLIX: How Netflix Used Big Data to Give Us the Programmes We Want - FACEBOOK: How Facebook Use Big Data to Understand Customers

#### Text Book

S. No	Author	Title of the Book	Publisher	Year and Edition
1	V.K. Jain	Big Data and Hadoop	Khanna Book Publishing	2017, 1 <sup>st</sup> Edition
2	Chandraish Sinha	Tableau 10 for Beginners	Createspace Independent Pub	2018, 1 <sup>st</sup> Edition
3	Bernard Marr	Big Data in Practice	Wiley Publications	2016, 1 <sup>st</sup> Edition

#### Reference Books

S. No	Author	Title of the Book	Publisher	Year and Edition
1	G. SudhaSadasivam and R. Thirumahal	Big Data Analytics	Oxford University Press	2020, 1 <sup>st</sup> Edition
2	ArshdeepBahga and Vijay Madisetti	Big Data Analytics: A Hands-On Approach	VPT	2018, 1 <sup>st</sup> Edition
3	Paul Zikopoulos and Chris Eaton	Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data	Tata McGraw Hill	2011, 1 <sup>st</sup> Edition

#### Pedagogy

- Lecture, Demonstration, Group Discussion

#### Course Designer

- Dr. S. Karpagavalli

Course Number	Course Name	Category	L	T	P	Credit
CS21E03	Virtualization and Cloud Services	Theory	73	2	-	5

### Preamble

This course provides an insight on virtualization, cloud services and data centers. It also emphasizes on various cloud service providers, cloud deployment models and hypervisors.

### Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the fundamentals of cloud, essentials of virtualization and datacenters	K1
CLO2	Understand the cloud services, service models and virtualization types	K2
CLO3	Apply cloud services and virtualization for effective use of resources	K3
CLO4	Analyze different cloud services, security threats, virtualization and data centers for various business categories	K4

### Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	S	M	S	S
CLO2	S	S	S	M	S
CLO3	M	S	S	S	S
CLO4	S	M	S	S	S

**S-Strong; M-Medium.**

**Virtualization and Cloud Services - CS21E03**

**(73 Hrs)**

### Syllabus

#### Unit I

**15 Hrs**

Computing Paradigms - Cloud Computing Fundamentals: Motivation for Cloud Computing- Defining Cloud Computing - Principles of Cloud computing- Cloud Ecosystem - Requirements for Cloud Services - Cloud Application - Benefits and Drawbacks. Cloud Computing Architecture and Management: Introduction - Cloud Architecture - Anatomy of the Cloud - Network Connectivity in Cloud Computing - Applications on the Cloud - Managing the Cloud - Migrating Application to Cloud.

#### Unit II

**15 Hrs**

Cloud Deployment Models: Introduction - Private Cloud - Public Cloud - Community Cloud - Hybrid Cloud. Cloud Service Models: Introduction - Infrastructure as a Service - Platform as a Service - Software as a Service - Web2.0 and Cloud Computing - Components of Web 3. 0 –Other CloudService Models.

#### Unit III

**15 Hrs**

Virtualization: Introduction - Approaches in Virtualization - Hypervisors - Types of virtualization - Multi-core Technology - Memory and Storage Technology. Security in Cloud: Introduction - Security Aspects - Platform-Related Security - Audit and Compliance.

**Unit IV****14 Hrs**

Cloud Service Providers: Introduction - EMC - Google - Sales force - Amazon Web Services: S3 - EBS - EC2 -Dynamo DB - Microsoft - IBM

**Unit V****14 Hrs**

Data Centers: Overview of data centers – Data center goals – Data center facilities - Role of data centers in the enterprise - Role of data centers in the service provider environment - Application architecture models - Data center architecture - Data center services.

**Text Books**

<b>S. No</b>	<b>Author</b>	<b>Title of the Book</b>	<b>Publisher</b>	<b>Year and Edition</b>
<b>1</b>	K. Chandrasekaran	Essentials of Cloud Computing (Unit I, II, III & IV)	CRC Press	2015, 1 <sup>st</sup> Edition
<b>2</b>	Mauricio Arregoces, MaurizioPortolani	Data Center Fundamentals (Unit V)	Cisco press	2003, 1 <sup>st</sup> Edition

**Reference Books**

<b>S. No</b>	<b>Author</b>	<b>Title of the Book</b>	<b>Publisher</b>	<b>Year and Edition</b>
<b>1</b>	Ray Rafaels	Cloud Computing	Create Space Independent Publishing Platform	2018, 2 <sup>nd</sup> Edition
<b>2</b>	Curtis Franklin Jr. and Brian Chee	Securing the Cloud: Security Strategies for the Ubiquitous Data Center	Auerbach Publications	2019, 1 <sup>st</sup> Edition
<b>3</b>	Dinseh G. Dutt	Cloud Native Data Center Networking: Architecture, Protocols, and Tools	O'Reilly Media	2019, 1 <sup>st</sup> Edition

**Pedagogy**

- Lectures, Group discussions, Demonstrations

**Course Designers**

- Mrs. S. Kavitha

Course Number	Course Name	Category	L	T	P	Credit
CS21CP5	Web Design and Development Lab	Practical	-	-	75	3

### Preamble

This course provides a hands-on training in web page design using PHP / MySQL. It focuses on architecture and built-in components of PHP / MySQL for design and development of dynamic websites.

### Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Understand the installation of PHP / MySQL	K2
CLO2	Apply PHP / MySQL, MVC architecture in web development	K3
CLO3	Apply the components of PHP / MySQL for web development	K3
CLO4	Demonstrate the steps in building dynamic website using PHP / MySQL	K4

### Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	S	S	S	S
CLO2	S	S	S	M	S
CLO3	S	S	S	S	S
CLO4	S	M	S	S	S

S- Strong; M-Medium.

**Web Designing and Development Lab - CS21CP5**

**(75 Hrs)**

#### List of Exercises

- Simple web page using html
- Design web page using CSS
- Control Structure & Loops in PHP
- String Functions in PHP
- Array and Function in PHP
- Form handling in PHP
- Server-Side Validation and Page Redirection in PHP
- Cookies and Sessions in PHP
- File / Image Uploading in PHP
- PHP Data Base Connectivity with MYSQL
- MySQL functions
- Develop a web application using Laravel framework

#### Pedagogy

- Demonstration of working environment / Tools / Software / Program

#### Course Designer

- Mrs. S. Ponmalar

<b>Course Number</b>	<b>Course Name</b>	<b>Category</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credit</b>
<b>CS20SBCE</b>	<b>Coursera: Data Visualization Tools</b>	<b>Theory</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>3</b>

### **Course Contents**

**(45Hrs)**

- Fundamentals of Visualization with Tableau (11Hrs)
- Visual Analytics with Tableau (9 Hrs)
- Creating Dashboards and Storytelling with Tableau (13Hrs)
- Data Visualization with Tableau Project (12 Hrs)

Course Number	Course Name	Category	L	T	P	Credit
CS21SBP3	SBS III - Software Testing Tools	Practical	-	4	41	3

### Preamble

The objective of this course is to understand the importance of test automation and to impart the features of selenium web driver tool and to develop automated tests for web applications

### Course Learning Outcomes

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

CLO Number	CLO Statement	Knowledge Level
CLO1	Understand the features & components Selenium Web Driver Tool	K2
CLO2	Explore to design and implement test automation framework for a software project	K3
CLO3	Apply the knowledge to adapt and develop automated tests for web applications	K3
CLO4	Demonstrate the steps to develop automated tests for web applications	K4

### Mapping with Programme Outcomes

CLOs	PO1	PO2	PO3	PO4	PO5
CLO1	S	S	S	M	S
CLO2	M	S	S	S	M
CLO3	S	S	M	S	S
CLO4	S	M	S	M	S

**S- Strong; M-Medium.**

**SBS III: Software Testing Tools – CS21SBP3**

**(45 Hrs)**

### List of Programs

- Write a test case based on controls
- Test data in a flat file
- Manual test case to verify student grade
- Write and test a program to select the number of students who have scored more than 60 in any one subject (or all Subjects)
- Write and test a program to login a specific web page.
- Write and test a program to get the number of list items in a list / combo box.
- Test a HTML file
- Test a program in MS Excel for Data Driven Wizard
- Test the addition of two values in C++Program
- Write a test suite containing minimum 4 test cases

### Pedagogy

- Demonstration of working environment / Tools / Software / Program

### Course Designer

- Mrs. S. Ponmalar

Course Number	Course Name	Category	L	T	P	Credit
NM21CS1	Cyber Security 1	Theory	30	-	-	Grade

### Objective

This course introduces fundamental concepts of Cyber Security in the digital era. It provides the knowledge of cybercrimes, cyber laws and also the security of digital devices. It helps to do secure digital transactions and safe usage of social media.

### Cyber Security - NM21CS1

(30 Hrs)

### Syllabus

#### Unit I

6 Hrs

**Principles of Cyber security:** Introduction to Cyber security - Defining cyberspace - Architecture of cyberspace - Communication and web technology - Internet infrastructure for data transfer and governance - Regulation of cyberspace - Concept of Cyber security - Issue and challenges of cyber security.

#### Unit II

6 Hrs

**Cyber Crime:** Introduction to Cybercrime - Classification of Cyber-crimes – Cyber-crime against women and children – Financial frauds - Social engineering attacks – Malware - Zero day and zero click attacks.

#### Unit III

6 Hrs

**Cyber Law:** Cyber Criminals modus-operandi – Reporting of cybercrimes – remedial and mitigation measures – Legal perspective of cybercrime– IT Act 2000 and its amendments – Organization dealing with cybercrimes and cyber security in India.

#### Unit IV

6 Hrs

**Social Media Security:** Introduction to social network – Types of social media – Social media platform – Hashtag – Viral content – Security issues related to social media. – **Cyber Security tools:** Nmap – Introduction to Nmap – Nmap scan types- Nmap command list.

**Digital Transaction:** Introduction to digital payments – Components of digital payments – Modes of digital payments – Banking cards – UPI (Unified Payment Interface) – e-Wallets.

#### Unit V

6 Hrs

**Digital Devices Security:** End point device and Mobile phone security – Password policy – Security patch management – Data backup – Device security policy – Cyber security best practices. Installation and configuration of Computer Anti-Virus.

**Case studies:** Illustrations of Financial frauds – Digital Signature. Prepare a checklist for secure net banking

\*e-Content will be provided



\*This course is for all final year students of all streams from 2023-24 year onwards.

**Reference books:**

1. Raef Meeuwisse, Cybersecurity for Beginners, Lulu Publishing Services, 2<sup>nd</sup> Edition, 2017
2. Scott Augenbaum, The Secret to Cybersecurity-A Simple Plan to Protect Your Family and Business from Cybercrime, Forefront Books Publisher, 2019
3. Sunit Belapure and Nina Godbole, Cyber security understanding cybercrimes computer forensics and Legal perspectives, Wiley India Pvt Ltd, 2011
4. Christopher Hadnagy, Social Engineering: The Science of Human Hacking, Wiley Publisher, 2<sup>nd</sup> Edition, 2018
5. Pavan Duggal, Artificial Intelligence, Cybercrimes & Cyberlaw, 2018
6. Joe Gray, Practical Social Engineering: A Primer for the Ethical Hacker, 2022
7. Henry A. Oliver, Security in the digital age: social media security threats and vulnerabilities, Create Space Independent publishing platform, 2015.

**Evaluation Pattern**

Quiz	60 Marks
Case Study	20 Marks
Poster	20 Marks
Total	100 Marks

Course Number	Course Name	Category	L	T	P	Credit
CS20AC1	Multimedia	Theory	Self-Study			5

### Preamble

This course provides basic concepts in multimedia and devices, systems, tools and techniques. It also focuses on animation, distributing multimedia in networks, art, design and digital cinematography.

### Multimedia - CS20AC1

#### Syllabus

#### Unit I

Multi Media Fundamentals: History of Multimedia - Multimedia Objects - Multimedia in business and work- Multimedia hardware - Memory & Storage devices - Communication devices.

#### Unit II

Multimedia Presentation tools- Tool Features - object generation with video sound - image capturing- Authoring tools - card and page-based authoring tools - Digital Audio / Video: Perception of sound-hearing sensitivity - frequency range – sound - wavelength - Speed of sound- Measuring the sound - Noise Signal - Video Signal - Video Format - Video Lights-Types and Functions.

#### Unit III

Graphics/Image: Image file format-Principles of animation: 2D and 3D animation - Morphing - Kinematics, Tweening - Motion capture - Character animation – Modeling - Special effects and Video Conferencing - Web Streaming - Video Streaming - Internet Telephony.

#### Unit IV

Multimedia Networking - Applications - streamed stored and audio-making - Protocols for real time interactive Applications - Distributing multimedia - Secluding and Policing Mechanisms -Integrated services - Design Consideration for Web pages.

#### Unit V

Motion Picture: Analogue and Digital camera, lenses-viewing and monitoring - Types of Films - various storage media - Types of lights - video lights - cine lights - reflectors - Digital Video Camera.

#### Text Book

S.No	Author	Title of The Book	Publishers	Year and Edition
1	Tay Vaughan	Multimedia: Making it Work	Tata Mc-Graw Hill Education	2017, 9 <sup>th</sup> Edition

#### Reference Books

S.No	Author	Title of The Book	Publishers	Year and Edition
1	Sreeparna Banerjee	Elements of Multimedia	Chapman and Hall/CRC	2018, 1 <sup>st</sup> Edition
2	Prabhat K.Andleighand Kiran Thakrar	Multimedia Systems Design	Pearson Education	2015, 1 <sup>st</sup> Edition
3	Ze - Nian Li & Mark S Drew	Fundamentals Of Multimedia	Pearson Education	2004, 1 <sup>st</sup> Edition

#### Course Designer

- Mrs. A. Priyadharshini

Course Number	Course Name	Category	L	T	P	Credit
CS20AC2	Blockchain Technology	Theory	Self-Study			5

### Preamble

This course provides conceptual understanding of block chain technology and how it can be used in Industry 4.0 It covers the technological underpinning of block chain operations using Ethereum.

### Blockchain Technology - CS20AC2

#### Syllabus

##### Unit I

Introduction: Overview of Block chain - History of Blockchain - Peer to Peer Network - Smart Contract - Wallet - Digital Currency - Ledgers - Types of Blockchain - Platform.

##### Unit II

Consensus Mechanism: Permissioned Blockchain - Permissionless Blockchain - Different Consensus Mechanism - Proof of Work - Proof of Stake - Proof of Activity - Proof of Burn - Proof of Elapsed Time - Proof of Authority - Proof of Importance.

##### Unit III

Distributed Consensus: Nakamoto consensus - Proof of Work - Proof of Stake - Proof of Burn, Difficulty Level - Sybil Attack - Energy utilization and alternate.

##### Unit IV

Smart contract and Ethereum: Overview of Ethereum - Writing Smart Contract in Solidity - Remix IDE - Different networks of Ethereum - understanding blocks practically at blockhcain.com - how to compile and deploy smart contract in remix.

##### Unit V

Understanding Hyper ledger Fabric: Overview of Open-source Hyper ledger project - Hyper ledger Fabric - Architecture - Identities and Policies - Membership and Access Control - Channels-Transaction Validation - Writing smart contract using Hyper ledger Fabric. Enterprise application of Blockchain: Cross border payments - Know Your Customer (KYC).

#### Text Books

S. No	Author	Title of The Book	Publishers	Year and Edition
1	Melanie Swan	Blockchain	O'Reilly Media	2015, 1 <sup>st</sup> Edition
2	Imran Bashier	Mastering Blockchain	Packt	2020, 1 <sup>st</sup> Edition
3	Andreas M. Antonopoulos & Gavin Wood	Mastering Ethereum: Building Smart Contracts and DApps	O'Reilly Media	2018, 1 <sup>st</sup> Edition

#### Reference Books

S. No	Author	Title of The Book	Publishers	Year and Edition
1	EladElrom	The Blockchain Developer	Apress	2019, 1 <sup>st</sup> Edition
2	Daniel Drescher	Blockchain Basics	Apress	2017, 1 <sup>st</sup> Edition
3	Don Tapscott & Alex Tapscott	Blockchain Revolution	Portfolio Penguin	2016, 1 <sup>st</sup> Edition

#### Course Designer

- Mrs. J. Gayathri