



## **DEPARTMENT OF BCA**

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

**BACHELOR OF COMPUTER APPLICATIONS**

**2024-2027 Batch**



## **PROGRAMME LEARNING OUTCOMES (PLO's)- UG**

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

**PLO1:** Design and Develop computer based systems with strong foundation in fundamentals and clarity on both conceptual and application oriented skills of various domains.

**PLO2:** Spark the reflective thinking process in various areas like information computing sectors, teaching and innovative researches.

**PLO3:** Work independently on a substantial software projects and as an effective team member.

**PLO4:** Inculcate the self directed learning in emerging technologies to upgrade them.

**PLO5:** Engaged in lifelong learning to equip them to the changing environment and be prepared to take up mastering programmes.

## **PROGRAMME SPECIFIC OUTCOMES (PSO's)**

**PSO1:** The students will obtain an attitude to understand the societal issues and apply the acquired programming skills to develop system-based application.

**PSO2:** Students are capable to comprehend the technological advancements in the usage of modern tools to satisfy industry needs.

**PSO3:** A strong foundation to pursue higher education in the fields of teaching and research.

Department of BCA

Choice Based Credit System & Learning Outcomes Based Curricular Framework

Bachelor of Computer Applications - 2024-2027 Batch and Onwards

Semester I

| Semester                        | Part | Course Code                          | Title of Course                                            | Course Type | Instruction Hours / Week | Contact Hours | Tutorial Hours | Duration of Examination | Examination Marks |     |       | Credits |
|---------------------------------|------|--------------------------------------|------------------------------------------------------------|-------------|--------------------------|---------------|----------------|-------------------------|-------------------|-----|-------|---------|
|                                 |      |                                      |                                                            |             |                          |               |                |                         | CA                | ESE | Total |         |
| I                               | I    | TAM2301A /<br>HIN2301A /<br>FRE2301A | Language I -T/H/F                                          | L           | 4                        | 58            | 2              | 3                       | 25                | 75  | 100   | 3       |
| I                               | II   | ENG2301A                             | English Paper I                                            | E           | 4                        | 58            | 2              | 3                       | 25                | 75  | 100   | 3       |
| I                               | III  | CY24C01                              | Programming in C                                           | CC          | 4                        | 58            | 2              | 3                       | 25                | 75  | 100   | 3       |
| I                               | III  | PP22C02                              | Computational and Algorithmic Thinking For Problem Solving | CC          | 3                        | 45            | -              | -                       | 100               | -   | 100   | 3       |
| I                               | III  | AP24C03                              | Operating Systems Fundamentals –Linux                      | CC          | 4                        | 58            | 2              | 3                       | 25                | 75  | 100   | 3       |
| I                               | III  | TH24A03                              | Numerical and statistical Techniques                       | GE          | 6                        | 88            | 2              | 3                       | 25                | 75  | 100   | 5       |
| I                               | III  | AP24CP1                              | Programming in C Lab                                       | CC          | 3                        | 45            | -              | 3                       | 15                | 35  | 50*   | 2       |
| Non – Tamil Students            |      |                                      |                                                            |             |                          |               |                |                         |                   |     |       |         |
| I                               | IV   | NME23B1/<br>NME23A1                  | Basic Tamil /<br>Advanced Tamil                            | AEC         | 2                        | 28            | 2              | -                       | 100               | -   | 100   | 2       |
| Students with Tamil as Language |      |                                      |                                                            |             |                          |               |                |                         |                   |     |       |         |
| I                               | IV   | NME23ES                              | Introduction to Entrepreneurship                           | AEC         | 2                        | 30            | -              | -                       | 100               | -   | 100   |         |
| I-IV                            | VI   | COM15SER                             | Community Services 30 Hours                                | GC          | -                        | -             | -              | -                       | -                 | -   | -     |         |
|                                 |      |                                      |                                                            |             |                          |               |                |                         |                   |     |       |         |
| I - V                           | VI   | 24BONL1<br>24BONL2<br>24BONL3        | Online Course I<br>Online Course II<br>Online Course III   | ACC         | -                        | -             | -              | -                       | -                 | -   | -     | -       |

\*CA conducted for 25 and converted into 15, ESE conducted for 75 and converted into 35

CC: Core Course , GE: Generic Elective, AEC : Ability Enhancing

Course, CA Continuous Assessment ESE : End Semester Examination,

ACC – AdditionalCredit Course



**Department of BCA**

**Choice Based Credit System (CBCS) & Learning Outcomes Based Curricular Framework (LOCF)**

**Bachelor of Computer Applications  
Scheme of Examination - 2024-2027 Batch  
Semester II**

| Semester | Part | Course Code                        | Title of Course                                         | Course Type | Instruction hours / week | Contact Hours | Tutorial hours | Duration of Examination | Examination Marks |                 |                 | Credits |
|----------|------|------------------------------------|---------------------------------------------------------|-------------|--------------------------|---------------|----------------|-------------------------|-------------------|-----------------|-----------------|---------|
|          |      |                                    |                                                         |             |                          |               |                |                         | CA                | ESE             | Total           |         |
| II       | I    | TAM2302A/<br>FRE2302A/<br>HIN2302A | Tamil Paper II /<br>French Paper II /<br>Hindi Paper II | L           | 4                        | 58            | 2              | 3                       | 25                | 75              | 100             | 3       |
| II       | II   | ENG2302A                           | English Paper II                                        | E           | 4                        | 58            | 2              | 3                       | 25                | 75              | 100             | 3       |
| II       | III  | IN24C04                            | Python Programming                                      | CC          | 5                        | 73            | 2              | 3                       | 25                | 75              | 100             | 3       |
| II       | III  | AP24C05                            | Digital Computer Fundamentals                           | CC          | 4                        | 58            | 2              | 3                       | 25                | 75              | 100             | 3       |
| II       | III  | AP24CP2                            | Python Programming Lab                                  | CC          | 5                        | 75            | -              | 3                       | 15 <sup>#</sup>   | 35 <sup>#</sup> | 50 <sup>#</sup> | 3       |
| II       | III  | TH24A11                            | Discrete Mathematics                                    | GE          | 6                        | 88            | 2              | 3                       | 25                | 75              | 100             | 5       |
| II       | IV   | NM24UHR                            | Universal Human Values and Human Rights                 | AECC        | 2                        | 30            | -              | -                       | 100               | -               | 100             | 2       |
| I-II     | VI   | NM23GAW                            | General Awareness                                       | AEC         | SS                       | -             | -              | -                       | 100               | -               | 100             | Gr.     |
| II       | IV   | NME23B2/<br>NME23A2 *              | Basic Tamil II/<br>Advanced Tamil II                    | AEC         | -                        | -             | -              | -                       | 100               | -               | 100             | Gr.     |
| I-IV     | VI   | COM15SER                           | Community Services<br>30 Hours                          | GC          | -                        | -             | -              | -                       | -                 | -               | -               | -       |
| I - V    | VI   | 24BONL1<br>24BONL2<br>24BONL3      | Online Course 1<br>Online Course 2<br>Online Course 3   | ACC         | -                        | -             | -              | -                       | -                 | -               | -               | -       |

\* After class hours

#CA conducted for 25 converted to 15    #ESE conducted for 75 converted into 35

CC : Core Course, L: Language, E: English

GE : Generic Elective,

AEC : Ability Enhancement Course, ACC: Additional Credit Course



**Bachelor of Computer Applications**  
**Choice Based Credit System(CBCS) & Learning Outcomes Based Curricular Framework(LOCF)**  
**Syllabus & Scheme of Examination 2024-2027 Batch**  
**Semester III**

| Semester | Part | Course Code                        | Title of the Course                                        | Course Type | Instruction hours / week | Contact Hours | Tutorial | Duration of Examination | Examination Marks |     |       | Credits |
|----------|------|------------------------------------|------------------------------------------------------------|-------------|--------------------------|---------------|----------|-------------------------|-------------------|-----|-------|---------|
|          |      |                                    |                                                            |             |                          |               |          |                         | CA                | ESE | Total |         |
| III      | I    | TAM2303A/<br>HIN2303A/<br>FRE2303A | Tamil Paper III /<br>Hindi Paper III /<br>French Paper III | L           | 4                        | 58            | 2        | 3                       | 25                | 75  | 100   | 3       |
| III      | II   | ENG2403A                           | English Paper III                                          | E           | 4                        | 58            | 2        | 3                       | 25                | 75  | 100   | 3       |
| III      | III  | AP23C06                            | Computer Networks                                          | CC          | 4                        | 58            | 2        | 3                       | 25                | 75  | 100   | 3       |
| III      | III  | AP23C07                            | Data Structures Using Python                               | CC          | 4                        | 58            | 2        | 3                       | 25                | 75  | 100   | 3       |
| III      | III  | CS23SBGP                           | Gen-AI                                                     | SEC         | 3                        | 44            | 1        | -                       | 100               | -   | 100   | 3       |
| III      | III  | TH24A20                            | Optimization Techniques                                    | GE          | 4                        | 58            | 2        | 3                       | 25                | 75  | 100   | 3       |
| III      | III  | AP23CP3                            | DBMS Lab                                                   | CC          | 5                        | 75            | -        | 3                       | 15*               | 35* | 50    | 4       |
| III      | IV   | NM23DTG                            | Design Thinking                                            | AEC         | 2                        | 30            | -        | -                       | 100               | -   | 100   | 2       |
| I-III    | VI   | COM15SER                           | Community Services<br>30 Hours                             | GC          | -                        | -             | -        | -                       | -                 | -   | -     | -       |
| I - V    | VI   | 24BONL 1<br>24BONL 2<br>24BONL 3   | Online Course I<br>Online Course II<br>Online Course III   | ACC         | -                        | -             | -        | -                       | -                 | -   | -     | -       |

CC : Core Course

GE : Generic Elective

AEC : Ability Enhancement Course

CA : Continuous Assessment ESE : End Semester Examination ACC : Additional Credit Course

SEC : Skill Enhancement Course

\*CA conducted for 25 and converted to 15, ESE conducted for 75 and converted to 35

**Bachelor of Computer Applications**  
**Choice Based Credit System (CBCS) &**  
**Learning Outcomes-Based Curriculum Framework (LOCF)**  
**Scheme & Syllabus & of Examination, 2024-2027 Batch**  
**Semester IV**

| Semester | Part | Course Code                       | Title of Course                                                  | Course Type | Instruction Hours / Week | Contact Hours | Tutorial Hours | Duration of Examination | Examination Marks |     |       | Credits |
|----------|------|-----------------------------------|------------------------------------------------------------------|-------------|--------------------------|---------------|----------------|-------------------------|-------------------|-----|-------|---------|
|          |      |                                   |                                                                  |             |                          |               |                |                         | CA                | ESE | Total |         |
| IV       | I    | TAM2304A<br>FRE2304A/<br>HIN2304A | Tamil Paper IV /<br>French Paper IV /<br>Hindi Paper IV          | L           | 4                        | 58            | 2              | 3                       | 25                | 75  | 100   | 3       |
| IV       | II   | ENG2404A                          | English Paper IV                                                 | E           | 4                        | 58            | 2              | 3                       | 25                | 75  | 100   | 3       |
| IV       | III  | AP23C08                           | Data Mining Techniques                                           | CC          | 4                        | 58            | 2              | 3                       | 25                | 75  | 100   | 3       |
| IV       | III  | AP23C09                           | Java Programming                                                 | CC          | 5                        | 73            | 2              | 3                       | 25                | 75  | 100   | 4       |
| IV       | III  | AP23CP4                           | Java Programming Lab                                             | CC          | 4                        | 60            | -              | 3                       | 15                | 35  | 50*   | 3       |
| IV       | III  | AP23A01 /<br>CS23A02              | Digital Marketing /<br>M-Commerce                                | GE          | 4                        | 58            | 2              | 3                       | 25                | 75  | 100   | 3       |
| IV       | III  | AP23SCE1                          | Excel Skills for Data Analytics and Visualization Specialization | SEC         | 3                        | 45            | -              | -                       | 100               | -   | 100   | 3       |
| IV       | IV   | NM23EII                           | Entrepreneurship and Innovation (IgniteX )                       | AECC        | 2                        | 30            | -              | -                       | 100               | -   | 100   | 2       |
| IV       | IV   | NM24EVS                           | Environmental Studies                                            | AECC        | SS                       | -             | -              | -                       | 100               | -   | 100   | Gr.     |
| IV       | V    | COCOACT                           | Co-Curricular Activities                                         | GC          | -                        | -             | -              | -                       | 100               | -   | 100   | 1       |
| I -V     | VI   | 24BONL1<br>24BONL2<br>24BONL3     | Online Course I<br>Online Course II<br>Online Course III         | ACC         | -                        | -             | -              | -                       | -                 | -   | -     | -       |

\* CA conducted for 25 converted to 15 , ESE conducted for 75 converted into 35

L: Language, E: English

AECC: Ability Enhancement compulsory Course

SEC : Skill Enhancement Courses

CA : Continuous Assessment

ESE : End Semester Examination

GE: Generic Electives

Gr. : Grade, GC : General course

ACC: Additional Credit Course

CC : Core Courses

SS : Self Study



**Bachelor of Computer Applications**  
**Choice Based Credit System (CBCS) &**  
**Learning Outcomes-Based Curriculum Framework (LOCF)**  
**Scheme & Syllabus of Examination, 2024-2027 Batch**  
**Semester V**

| Semester | Part | Course Code                      | Title of the Course                                      | Course Type | Instruction Hours / | Contact Hours | Tutorial hours | Duration of Examination | Examination Marks |     |       | Credits |
|----------|------|----------------------------------|----------------------------------------------------------|-------------|---------------------|---------------|----------------|-------------------------|-------------------|-----|-------|---------|
|          |      |                                  |                                                          |             |                     |               |                |                         | CA                | ESE | Total |         |
| V        | III  | AP23C11                          | .Net Programming                                         | CC          | 5                   | 73            | 2              | 3                       | 25                | 75  | 100   | 3       |
| V        | III  | AP23C12                          | Software Project Management                              | CC          | 5                   | 73            | 2              | 3                       | 25                | 75  | 100   | 4       |
| V        | III  | IN24C10                          | Machine Learning                                         | CC          | 5                   | 73            | 2              | 3                       | 25                | 75  | 100   | 4       |
| V        | III  | AP23E01/<br>AP23E02              | Computer Graphics/<br>Perl Programming                   | DSE         | 5                   | 73            | 2              | 3                       | 25                | 75  | 100   | 4       |
| V        | III  | AP23CP5                          | .Net Programming Lab                                     | CC          | 5                   | 75            | -              | 3                       | 15*               | 35* | 50    | 3       |
| V        | III  | AP23SBP1                         | Data Analytics – R Programming Lab                       | SEC         | 3                   | 41            | 4              | -                       | 100               | -   | 100   | 3       |
| V        | III  | AP21AC1/<br>AP21AC2              | Enterprise Resource Planning /<br>Mobile Edge Computing  | ACC         | SS                  | -             | -              | 3                       | 25                | 75  | 100   | 5\$     |
| V        | IV   | NM21CS1                          | Cyber Security I                                         | AECC        | 2                   | 30            | -              | -                       | 100               | -   | 100   | Gr.     |
| V        | VI   | AP24COM                          | Comprehensive Examination                                | GC          | -                   | -             | -              | -                       | 100               | -   | 100   | Gr.     |
| V        | IV   | AP23INST                         | Field work /<br>Institutional Training                   | DSE         | -                   | -             | -              | -                       | 100               | -   | 100   | 2       |
| I - V    | VI   | 24BONL 1<br>24BONL 2<br>24BONL 3 | Online Course I<br>Online Course II<br>Online Course III | ACC         | -                   | -             | -              | -                       | -                 | -   | -     | -       |

CC : Core Courses

DSE : Discipline Specific Elective

AEC : Ability Enhancement Course

ACC : Additional Credit Course

GC : General Courses

SS : Self Study

CA : Continuous Assessment

ESE : End Semester Examination

SEC : Skill Enhancement Course

AECC : Ability Enhancement Compulsory Course

Gr : Grade

\$Credits applicable to candidates who take up Advanced level Course examination

\* CA conducted for 25 marks converted to 15 marks, ESE conducted for 75 and converted to 35

## EVALUATION PATTERN

### 23-24 Batch onwards

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

##### Language and English

Section A 5 x 1 (No choice) : 5 Marks

Section B 4 x 5 (4 out of 6) : 20 Marks (250 words)

Section C 2 x 10 (2 out of 3) : 20 Marks (500 words)

**Total : 45 Marks**

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

##### CA Question from each unit comprising of

One question with a weightage of 2 Marks :  $2 \times 3 = 6$

One question with a weightage of 5 Marks (Internal Choice at the same CLO level) :  $5 \times 3 = 15$

One question with a weightage of 8 Marks (Internal Choice at the same CLO level) :  $8 \times 3 = 24$

**Total : 45 Marks**

#### ALC

Section A (Paragraph answer) (4 out of 6)  $4 \times 4$  : 16 Marks

Section B (Essay type) 1 out of 2 : 9 Marks

**Total : 25 Marks**

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

##### Language and English – UG

Section A 10 x 1 (10 out of 12) : 10 Marks

Section B 5 x 5 (5 out of 7) : 25 Marks (250 words)

Section A 4 x 10 (4 out of 6) : 40 Marks (600 - 700 words)

**Total : 75 Marks UG & PG - Core and Allied courses:**

#### ESE Question Paper Pattern: $5 \times 15 = 75$ Marks

##### Question from each unit comprising of

One question with a weightage of 2 Marks :  $2 \times 5 = 10$

One question with a weightage of 5 Marks (Internal Choice at the same CLO level):  $5 \times 5 = 25$

One question with a weightage of 8 Marks (Internal Choice at the same CLO level):  $8 \times 5 = 40$

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

Section A 5 questions out of 8 - open choice  $5 \times 5$  : 25 marks

Section B 5 questions out of 8 - open choice  $5 \times 10$  : 50 marks

**Total : 75 marks**

## Continuous Internal Assessment Pattern

### Theory

#### I Year UG / PG (23 Batch)

CIA Test : 5 marks (conducted for 45 marks after 50 days)

Model Exam : 7 marks (Conducted for 75 marks after 85 days (Each Unit 15 Marks))

Seminar/Assignment/Quiz : 5 marks

Class Participation : 5 marks

Attendance : 3 marks

**Total : 25 Marks**

### Practical

Lab Performance : 7 marks

Regularity : 5 marks

Model Exam : 10 marks

Attendance : 3 marks

**Total : 25 marks**

**ESE Practical Pattern**

The End Semester Examination will be conducted for a maximum of 75 marks respectively with a maximum 15 marks for the record and other submissions if any.

**Project:****Evaluation of Individual / Group Project & Viva Voce for UG & PG**

I Review - Selection of the field of study, : 5 Marks

Topic & literature collection

II Review - Research Design : 10 Marks

& Data Collection

III Review - Analysis & Conclusion : 10 Marks

Preparation of rough draft

**Total : 25 Marks**

**End semester examination:**

Evaluation of the project : 25 Marks

Viva Voce : 50 Marks

**Total : 75 Marks**

**Part IV****Introduction to Entrepreneurship / Women Studies/Value education / Environmental Studies / Design Thinking**

Quiz : 50 marks

Assignment : 25marks

Project / Case study : 25 marks

**Total : 100 Marks**

**Professional English**

The course offered in alignment with TANSCH norms with 2 credits.

Quiz (5 x 20 Marks) : 100 Marks

**Cyber Security I & II**

Quiz : 60 Marks

Case Study : 20 Marks

Poster : 20 Marks

From the academic year 2024-25 and onwards marks allotted for attendance component in CA is modified as

91-100% attendance : 3 Marks

81-90% attendance : 2 Marks

75-80% attendance : 1 Marks

| COURSE NUMBER | COURSE NAME      | CATEGORY | L  | T | P | CREDIT |
|---------------|------------------|----------|----|---|---|--------|
| CY24C01       | PROGRAMMING IN C | Theory   | 58 | 2 | - | 3      |

#### 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    | S    |
| CLO2 | S    | S    | M    | S    | M    |
| CLO3 | S    | S    | S    | S    | S    |
| CLO4 | S    | S    | S    | S    | S    |

S- Strong; M-Medium;

#### PROGRAMMING IN C - CY24C01

58 Hours

#### 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

12 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****11 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 - **Impact of Industry 4.0 on Society, Business, Government and People** - **Introduction to 5.0.**

**TEXT BOOK**

| S.NO | AUTHOR                 | TITLE OF THE BOOK                                                     | PUBLISHERS                         | EDITION / YEAR OF PUBLICATION |
|------|------------------------|-----------------------------------------------------------------------|------------------------------------|-------------------------------|
| 1    | E. Balagurusamy        | Programming In ANSI C                                                 | Tata Mc Graw Hill                  | 8 <sup>th</sup> Edition, 2019 |
| 2    | P. Kaliraj,<br>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**

| S.NO | AUTHOR             | TITLE OF THE BOOK                                   | PUBLISHERS       | EDITION / YEAR OF PUBLICATION  |
|------|--------------------|-----------------------------------------------------|------------------|--------------------------------|
| 1    | Byron Gottfried    | Programming with C                                  | Tata McGraw Hill | 4 <sup>th</sup> Edition, 2018  |
| 2    | 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**

1. Mrs.M.Selvanayagi

| COURSE NUMBER | COURSE NAME                                                | CATEGORY | L  | T | P | CREDIT |
|---------------|------------------------------------------------------------|----------|----|---|---|--------|
| PP22C02       | 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 behavior 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. | K1              |
| CLO3       | Apply algorithmic thinking to problem solving using tools Flowgorithm , Scratch, iPython.     | K2              |
| 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    | M    |
| CLO2 | S    | S    | S    | M    | M    |
| CLO3 | S    | M    | S    | S    | S    |
| CLO4 | S    | S    | M    | S    | S    |

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

### COMPUTATIONAL AND ALGORITHMIC THINKING FOR PROBLEM SOLVING -

**PP22C02**

**45 Hours**

### Syllabus

#### Unit I

**(7 Hrs)**

Basics: 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                                              | PUBLISHERS         | EDITION / YEAR OF PUBLICATION |
|------|----------------------------------|----------------------------------------------------------------|--------------------|-------------------------------|
| 1    | David Riley and Kenny Hunt       | Computational Thinking for Modern Solver                       | Chapman & Hall/CRC | 1 <sup>st</sup> Edition, 2014 |
| 2    | Paolo Ferragina, Fabrizio Luccio | Computational Thinking First Algorithms                        | Springer           | 1 <sup>st</sup> Edition, 2018 |
| 3    | Karl Beecher                     | Computational Thinking – A beginner's guide to problem solving | BSC publication    | 1 <sup>st</sup> Edition, 2017 |

**Pedagogy**

- Lectures, Group discussions, Demonstrations, Case studies

**Course Designers**

1. Mrs.T.S.Anushya Devi
2. Mrs.S.Kavitha
3. Mrs.V.Bharathi

**Evaluation Pattern**

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

| COURSE NUMBER | COURSE NAME                            | CATEGORY | L  | T | P | CREDIT |
|---------------|----------------------------------------|----------|----|---|---|--------|
| AP24C03       | OPERATING SYSTEMS FUNDAMENTALS – LINUX | Theory   | 58 | 2 | - | 3      |

#### Preamble

- This subject is designed to provide the students with a thorough discussion of the fundamentals of operating system.
- To explore the various memory management scheme and to perform administrative task on LINUX servers.

#### Course Learning Outcomes

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

| CLOs Number | CLO Statement                                                                                                                       | Knowledge Level |
|-------------|-------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| CLO1        | Recall the basic concepts with functions of operating systems and Linux system.                                                     | K1              |
| CLO2        | Understand the operating systems objectives and functionality along with system programs and system calls.                          | K2              |
| CLO3        | Compare and contrast various memory management schemes.                                                                             | K2              |
| CLO4        | Demonstrate deadlock, prevention and avoidance algorithms, storage management, various scheduling algorithms and shell programming. | K3              |

#### Mapping with Programme Learning Outcomes

| CLOs | PLO1 | PLO2 | PLO3 | PLO4 | PLO 5 |
|------|------|------|------|------|-------|
| CLO1 | M    | M    | S    | S    | S     |
| CLO2 | S    | S    | S    | S    | S     |
| CLO3 | S    | S    | S    | S    | S     |
| CLO4 | S    | S    | M    | S    | S     |

S- Strong; M-Medium; L-Low

### OPERATING SYSTEMS FUNDAMENTALS – LINUX - AP24C03

58 Hours

#### SYLLABUS

#### UNIT I

(12 Hrs)

Introduction: What is operating systems do - **Computer System Architecture - Operating- System Operations**. Process Management: **Process Concept** - Process Scheduling - Interprocess communication.

#### UNIT II

(12 Hrs)

Process Scheduling: **Basic Concepts- Preemptive and Nonpreemptive Scheduling** - Scheduling Algorithms (FCFS, SJF & Round Robin only). Synchronization: **Back ground**-The Critical Section Problem-Peterson's Solution- Semaphores- Deadlock: **Deadlock Characterization** - Methods Handling Deadlocks - Recovery from Deadlock.

#### UNIT III

(11 Hrs)

Memory Management Strategies: **Background-Contiguous Memory Allocation**-Paging. Virtual Memory Management: Demand Paging - Page Replacement - Basic Page Replacement, **FIFO Page Replacement**, Optimal Page Replacement.

**UNIT IV****(11 Hrs)**

**What Linux Is** – Becoming a Linux Power User : About Shells and Terminal Windows-Choosing your shell - **Running Commands** - **Recalling Commands Using Command History** - Connecting and Expanding Commands -Using Shell Variables.

**UNIT V****(12 Hrs)**

**Moving Around the File system : Using Basic File system Commands** - Using Meta characters and Operators - **Listing Files and Directories** - Moving, Copying, and Removing Files.

**Text Books**

| S.NO | AUTHOR                                           | TITLE OF THE BOOK          | PUBLISHERS        | EDITION / YEAR OF PUBLICATION  |
|------|--------------------------------------------------|----------------------------|-------------------|--------------------------------|
| 1    | Abraham Silberschatz, Peter Baer Galvin, G Gagne | OPERATING SYSTEMS CONCEPTS | Wiley Publishers, | 10 <sup>th</sup> Edition, 2018 |
| 2    | Christopher Negus                                | LINUX BIBLE                | Wiley Publishers, | 10 <sup>th</sup> Edition, 2020 |

**Reference Books**

| S.NO | AUTHOR             | TITLE OF THE BOOK                              | PUBLISHERS                   | EDITION / YEAR OF PUBLICATION |
|------|--------------------|------------------------------------------------|------------------------------|-------------------------------|
| 1    | Archer J harries   | Operating System                               | Tata Mc Graw Hill            | 2 <sup>nd</sup> Edition, 2011 |
| 2    | Williams E. Shotts | The Linux CommandLine: A Complete Introduction | John Wiley & Sons            | 2 <sup>nd</sup> Edition, 2019 |
| 3    | Jason Cannon       | Linux for Beginners                            | Create space Independent Pub | 1 <sup>st</sup> Edition, 2014 |

**Pedagogy**

- Lectures, Group discussions, Demonstrations, Case studies

**Course Designers**

1. Mrs.T.S.Anushya Devi
2. Dr.R.Surya Grace

| COURSE NUMBER | COURSE NAME          | CATEGORY  | L | T | P  | CREDIT |
|---------------|----------------------|-----------|---|---|----|--------|
| AP24CP1       | PROGRAMMING IN C LAB | Practical | - | - | 45 | 2      |

#### Preamble

- To provide the hands on experience on C Programming and improve the practical skill set.
- The learner will be able to develop the logic for the given problem, recognize and understand the syntax and construction of C code.
- To know the steps involved in compiling, linking and debugging C code, feel more confident about writing the C functions, write some complex programs.

#### Course Learning Outcomes

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

| CLO Number | CLO Statement                                                                                                              | Knowledge Level |
|------------|----------------------------------------------------------------------------------------------------------------------------|-----------------|
| CLO1       | Identify the basic terminologies of c programming by using different data types, decision structures, loops and functions. | K1              |
| CLO2       | Understand the dynamics of memory allocation by the use of pointers and files.                                             | K2              |
| CLO3       | Understand the concepts of Structures and Unions.                                                                          | K2              |
| CLO4       | Design and develop the simple business application.                                                                        | K3              |

#### Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium;

#### PROGRAMMING IN C LAB - AP24CP1

45 Hours

#### LIST OF PROGRAMS

- Using different operators.
- Control Structures.
- Using arrays.
- String handling functions.
- User defined functions.
- Structures.
- Pointers.
- Working with files.

#### Pedagogy

- Demonstration of working environment / Tools / Software / Program

#### Course Designers

1. Mrs. M. Selvanayaki
2. Ms. A. Deepika

| COURSE CODE | COURSE NAME        | CATEGORY | L  | T | P | CREDIT |
|-------------|--------------------|----------|----|---|---|--------|
| IN24C04     | PYTHON PROGRAMMING | Theory   | 73 | 2 | - | 3      |

### Preamble

- The course covers basic knowledge of Python Programming. It defines the Conditional Statements & Loops, Functions, Tuples, Python data structures and Exception & its tools.

### Course Learning Outcomes

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

| CLO Number | CLO Statement                                                                  | Knowledge Level |
|------------|--------------------------------------------------------------------------------|-----------------|
| CLO1       | Recall the technical strengths, Python Interpreter and the program execution.  | K1              |
| CLO2       | Understand the purpose of operations, strings, lists, tuples to solve problems | K2              |
| CLO3       | Apply concepts from IKS 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    | M    | S    |
| CLO2 | S    | S    | M    | S    | M    |
| CLO3 | M    | S    | S    | S    | S    |
| CLO4 | S    | M    | S    | S    | S    |

S- Strong; M-Medium;

### Python Programming - IN24C04

58 Hrs

#### Syllabus

#### UNIT I

(10 Hrs)

Introduction: Why do people use python- Python a scripting language- **Users of Python- Need of Python- Python's Technical Strengths**- How Python runs programs: Introducing the Python Interpreter- Program Execution-Execution Model Variation: Python Implementation Alternatives.

#### UNIT II

(12 Hrs)

**Types & Operations: Numbers Types: Numeric type basics, Numbers in action, Other numeric types**- Strings Fundamentals: String Basics, String Literals, Strings in action, String Methods – Lists – Panini's Ashtadhyayi, Anitya - Dictionaries-Tuples and Immutable Truths-Sutras-Files.

#### UNIT III

(12 Hrs)

**Control Flow: Statements& Syntax: Assignment-Expressions & Print- if tests-While& for loops.** Functions: Function Basics: Why use functions- Coding Functions- Definition & Calls.

Scopes: Python basics-Global Statement-Scopes Nested functions -Arguments: Arguments passing Basics- Special Arguments Matching Modes.

## UNIT IV

(14 Hrs)

**Files and Exception handling:** Files -Text Files, File Objects, **File Built-in Methods**, File Built-in Attributes, Standard Files, **Reading and writing, Format operator, Filenames and Paths**, Pipes. Exceptions: Built-in Exceptions, Handling Exceptions, Exception with Arguments- Nyaya Logic- User-defined Exceptions.

## UNIT V

(10 Hrs)

**Modules and Packages: Modules - Modules and Files, Namespaces, Importing Modules, Importing Module Attributes, Module Built-in Functions.** Python packages- **Simple programs using the built-in functions of packages matplotlib, numpy, pandas.** **GUI Programming - Tkinter introduction, Buttons and callbacks, Canvas widgets, Coordinate sequences, Tk Widgets, Menus and Callables.**

### Text Book

| Sno | Author          | Title of the Book                                               | Publisher                          | Year of Publication           |
|-----|-----------------|-----------------------------------------------------------------|------------------------------------|-------------------------------|
| 1   | Mark Lutz       | Learning python(Unit I-III)                                     | O'Reilly Publication               | 2013,5 <sup>th</sup> edition  |
| 2   | Allen B. Downey | Think Python: How to Think like a Computer Scientist(Unit IV-V) | O'Reilly Publishers                | 2016 , 2nd Edition,           |
| 3   | Kapil Kapoor    | Indian Knowledge systems                                        | Indian Institute of Advanced study | 2005 ,1 <sup>st</sup> Edition |

### Reference Books

| S.No | Authors                               | Title                                                          | Publishers                                     | Year and Edition              |
|------|---------------------------------------|----------------------------------------------------------------|------------------------------------------------|-------------------------------|
| 1    | E. Balagurusamy                       | Problem Solving and Python Programming                         | McGraw-Hill                                    | 2017, 1 <sup>st</sup> Edition |
| 2    | Guido van Rossum and Fred L. Drake Jr | An Introduction to Python – Revised and updated for Python 3.2 | Python Software Foundation, Network Theory Ltd | 2011,1 <sup>st</sup> Edition  |
| 3    | Wesley J Chun                         | Core Python Applications Programming                           | Prentice Hall                                  | 2012, 3 <sup>rd</sup> Edition |

### Pedagogy

- Chalk and Talk PPT, Discussion, Assignment, Demo, Quiz, Case study.

| COURSE CODE | COURSE NAME                   | CATEGORY | L  | T | P | CREDIT |
|-------------|-------------------------------|----------|----|---|---|--------|
| AP24C05     | DIGITAL COMPUTER FUNDAMENTALS | Theory   | 58 | 2 | - | 3      |

#### Preamble

- To demonstrate the use of sequential logic circuits and their applications.
- To provide an introduction to the principles and practices of Digital Circuits and Design, Boolean Algebra and Logic Gates, Arithmetic circuits Combinational Circuits, flip-flops, Counters and Registers.

#### 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 principles of digital Circuits and Logic Gates                       | K1              |
| CLO2       | Discussion on the design of Arithmetic, combinational Circuits, Flip-Flops and registers. | K2              |
| CLO3       | Design, construct, and evaluate logic circuit and Registers from a given digital problem. | K3              |
| CLO4       | Analyse logic circuits using logic gates and K-map simplification.                        | K4              |

#### Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium;

**DIGITAL COMPUTER FUNDAMENTALS – AP24C05**

**58 Hrs**

#### Syllabus

#### UNIT I: (11 Hrs)

Introduction – Number System – **Floating Point Representation of Numbers** – Arithmetic Operations – 1's and 2's Complement subtraction – 9's complement subtraction – 10's Complement subtraction – Binary Coded Decimal.

#### UNIT II: (12 Hrs)

Boolean Algebra and Minimization Techniques: Introduction – Development of Boolean Algebra – Boolean Logic Operations – **Basic Law of Boolean Algebra** – Demorgans Theorems - Sum of products and Product of Sums - Karnaugh maps.

**Logic Gates: Introduction** – Logic Gates- OR,AND, NOT ,NAND,NOR,Universal Gates- Exclusive-OR (Ex-OR).

**UNIT III:****(11 Hrs)****Arithmetic Circuits: Introduction – Procedure for the Design of Combinational Circuits –**

Half Adder – Full Adder – K -Map simplification – Half Subtractor – Full Subtractor - 4 bit Parallel binary Adder/Subtractor.

**UNIT IV:****(12 Hrs)****Combinational Circuits: Introduction – Multiplexers –** Basic Four input Multiplexer- IC

74151 8 to 1 multiplexer– **Demultiplexers** : 1 to 4 , 1 to 8 demultiplexers– Decoders – basic binary decoder 3 to 8 decoder– Encoders – Octal to Binary Encoder.

**UNIT V:****(12 Hrs)****Flip Flops: Introduction – Latches –** Set-Reset (S-R) latch – NOR Based S-R Latch – NAND

Based S-R Latch – State Diagram and Characteristic Equation of S-R Latch – Types of flip flops – S-R flip flop – D flip flop – J K flip flop - T flip-flop.

**Registers: Introduction – Shift Registers –** Serial-in-Serial-out Shift register – Serial-in-

Parallel-out Shift Register – Parallel-in-serial-out Shift Register – Parallel-in-Parallel-out Shift register.

**Text Books**

| S. No | Author                               | Title of the Book           | Publisher                                             | Year of Publication |
|-------|--------------------------------------|-----------------------------|-------------------------------------------------------|---------------------|
| 1     | S. Salivahanan and<br>A. Arivazhagan | Digital Circuits and Design | 5 <sup>th</sup> Edition<br>OXFORD<br>University Press | 2018                |

**Reference Books:**

| S. No | Author                                | Title of the Book   | Publisher                                    | Year of Publication |
|-------|---------------------------------------|---------------------|----------------------------------------------|---------------------|
| 1     | Morris Mano,<br>Michael D.<br>Ciletti | Digital Design      | Pearson Edition –<br>6 <sup>th</sup> edition | 2018                |
| 2     | Subrata Ghoshal                       | Digital Electronics | Cengage – 2 <sup>nd</sup><br>Edition         | 2017                |

**Pedagogy**

- Chalk and Talk, PPT, Demo, Discussion, Quiz, and Assignment.

**Contents and Presentation Schedule**

| COURSE CODE | COURSE NAME            | CATEGORY  | L | T | P  | CREDIT |
|-------------|------------------------|-----------|---|---|----|--------|
| AP24CP2     | PYTHON PROGRAMMING LAB | PRACTICAL | - | - | 75 | 3      |

#### Preamble

- To provide the hands on experience on C Programming and improve the practical skill set.
- The learner will be able to develop the logic for the given problem, recognize and understand the syntax and construction of C code.
- To know the steps involved in compiling, linking and debugging C code, feel more confident about writing the C functions, write some complex programs.

#### Course Learning Outcomes

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

| CLO Number | CLO Statement                                                                                                              | Knowledge Level |
|------------|----------------------------------------------------------------------------------------------------------------------------|-----------------|
| CLO1       | Identify the basic terminologies of c programming by using different data types, decision structures, loops and functions. | K1              |
| CLO2       | Understand the dynamics of memory allocation by the use of pointers and files.                                             | K2              |
| CLO3       | Understand the concepts of Structures and Unions.                                                                          | K2              |
| CLO4       | Design and develop the simple business application.                                                                        | K3              |

#### Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium;

#### PYTHON PROGRAMMING LAB - AP24CP2

75 Hours

#### LIST OF PROGRAMS

1. Exercise programs on basic control structures and loops.
2. Exercise programs on operators.
3. Exercise programs on Dictionaries.
4. Exercise programs on Lists.
5. Exercise programs on Strings.
6. Exercise programs on functions.
7. Exercise programs on recursion & parameter passing techniques.
8. Exercise programs on Tuples.
9. Exercise programs on file.
10. Exercise programs on Exception handling concepts.
11. Exercise programs using Packages.

#### Pedagogy

- Demonstration of working environment / Tools / Software / Program

#### Course Designers

1. Mrs. T.S.Anushya Devi
2. Mrs. S.Mohana Priya

| COURSE CODE | COURSE TITLE      | CATEGORY | L  | T | P | CREDIT |
|-------------|-------------------|----------|----|---|---|--------|
| AP23C06     | COMPUTER NETWORKS | Theory   | 58 | 2 | - | 3      |

### Preamble

- To understand the protocol layering and physical level communication.
- To analyze the performance of a network and various components required to build different networks.
- To learn the functions of network layer and the various routing protocols.
- To familiarize the functions and protocols of the Transport layer.

### Course Learning Outcomes

On Completion of the course, the students should be able to

| CLO Number | CLO Statement                                                                                   | Knowledge Level |
|------------|-------------------------------------------------------------------------------------------------|-----------------|
| CLO1       | Identify the basic layers and various functionalities of computer networks.                     | K1              |
| CLO2       | Tag the basics of how data flows from one node to another node using different level of layers. | K2              |
| CLO3       | Determine the protocols, performance and Network Management                                     | K3              |
| CLO4       | Integrate and design the different layering and services                                        | K3              |

### Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium;

### COMPUTER NETWORKS - AP23C06

58 Hours

### Syllabus

#### UNIT I:

11 Hours

Introduction And Physical Layer: Networks-**Networks Types**-Protocol Layering-TCP/IP Protocol suite:Layered Architecture-Layers in the TCP/IP Protocol Suite-Encapsulation and Decapsulation-Addressing-**Multiplexing and Demultiplexing**- The OSI Model -Physical layer: Performance.

#### UNIT II:

11 Hours

Digital Transmission: **Transmission Modes**. Switching: Introduction-Circuit Switched Networks-Packet Switching: Datagram Networks.

Data-Link Layer: Introduction-**Link Layer Addressing - Three Types of addresses**- Address Resolution Protocol (ARP). Wired LANS: Ethernet -Ethernet Protocol-**Standard Ethernet**.

Wireless LANS: Introduction-IEEE 802.11-Architecture, Bluetooth - Architecture.

**UNIT III:****12 Hours**

Network Layers: **Network Layer Services-Packet Switching-** Network Layer Performance- IPv4 Addresses: Address Space-Classful Addressing-Classless Addressing- **Forwarding of IP Packets-** Network Layer Protocols: Internet Protocol-Datagram Format- Security of IPv4 Datagrams, ICMP V4.

**UNIT IV:****12 Hours**

Transport Layer: **Introduction to Transport Layer. Simple Protocol-Stop-and-Wait Protocol-Transport Layer Protocols: Introduction** -User Datagram Protocol- Transmission Control Protocol-TCP Services-TCP Features-Segment-SCTP - SCTP Services - SCTP Features.

**UNIT V:****12 Hours**

**Application Layer: World Wide Web and HTTP-** FTP-Telnet -Secure Shell (SSH) - **Network Management: Introduction** - SNMP-Managers and Agents - Management Components.

**Text Book**

| S. No | Authors             | Title                            | Publisher                   | Year & Edition            |
|-------|---------------------|----------------------------------|-----------------------------|---------------------------|
| 1     | Behrouz A. Forouzan | Data Communications and Networks | Tata McGraw-Hill Publishing | 2013, 5 <sup>th</sup> Edn |

**Reference Books**

| S. No | Authors                           | Title                                                           | Publisher                      | Year & Edition            |
|-------|-----------------------------------|-----------------------------------------------------------------|--------------------------------|---------------------------|
| 1     | Larry L. Peterson, Bruce S. Davie | Computer Networks: A Systems Approach                           | Morgan Kaufmann Publishers Inc | 2012,5 <sup>th</sup> Edn  |
| 2     | William Stallings                 | Data and Computer Communications                                | Pearson Education              | 2013,10 <sup>th</sup> Edn |
| 3     | Nader F. Mir                      | Computer and Communication Networks                             | Prentice Hall                  | 2014,2 <sup>nd</sup> Edn  |
| 4     | James F. Kurose, Keith W. Ross    | Computer Networking, A Top-Down Approach Featuring the Internet | Pearson Education              | 2013,6 <sup>th</sup> Edn  |

**Pedagogy**

- PPT, Black board, Discussion, Self-questioning by students, Group discussion, Quiz

**Course Designers:**

1. Mrs. T. S. Anushya Devi
2. Dr.L. Sheeba

| COURSE CODE | COURSE TITLE                 | CATEGORY | L  | T | P | CREDIT |
|-------------|------------------------------|----------|----|---|---|--------|
| AP23C07     | DATA STRUCTURES USING PYTHON | Theory   | 58 | 2 | - | 3      |

### Preamble

- To get familiarize knowledge with designing an algorithm using data structures in Python.
- To articulate the essential components of data structures like Stack, Queue, List, Searching, Sorting, Merging and Trees.

### Course Learning Outcomes

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

| CLOs Number | CLO Statement                                                                                 | Knowledge Level |
|-------------|-----------------------------------------------------------------------------------------------|-----------------|
| CLO1        | Identify the appropriate and optimal data structure for a specified application.              | K1              |
| CLO2        | Understand the concept of Data structures and its applications                                | K2              |
| CLO3        | Illustrate the use of different linear and non-linear data structures and their applications. | K3              |
| CLO4        | Design and implementation of data structure.                                                  | K4              |

### Mapping with Programme Learning Outcomes

| CLO's | PLO1 | PLO2 | PLO3 | PLO4 | PLO5 |
|-------|------|------|------|------|------|
| CLO1  | S    | S    | M    | M    | S    |
| CLO2  | S    | S    | M    | M    | S    |
| CLO3  | M    | S    | M    | S    | S    |
| CLO4  | S    | S    | S    | S    | S    |

S- Strong; M-Medium;

### DATA STRUCTURES USING PYTHON - AP23C07

58 Hours

### Syllabus

#### UNIT I:

12 Hrs

**Data Structures:** Introduction – What is Data Structure? Why do we need Data Structure? – Different types of Data Structures – How to select a Data Structure? – How are Data Structures Implemented? – Real life scenarios for Data Structures – **Difference between Data Structures and Database Management Systems.**

**Abstract Data Types and Analysis:** Introduction - Complexity – Time Complexity and Space Complexity - Asymptotic Notation: - Big O – Big Omega – Big Theta – Small O – Small Omega – Recursion: How Recursion works? Inefficient Recursion – Analysis of Recursive functions – **Applications of Recursion.**

**UNIT II:****12 Hrs**

**Linear Data Structures:** Arrays – Introduction - Declaration of Arrays – Implementation: Insertion – Deletion – Merging – Some more operations – Complexity Analysis – Applications – Python Sequences.

**Stack :** Introduction – Working: Push Operation, Pop Operation, Top Operation – Implementation of Stack using Pointers – Applications of Stacks – Infix to Postfix Conversion – Evaluation of Prefix Expression.

**Queues: Single Ended Queues – Enqueue Operation – Dequeue Operation – Front Operation** – Implementation of Single Ended Queues using lists – Double Ended Queues – Push Front operation – Push Back Operation – Pop Front Operation – Pop Back Operation – Front Operation– Rear Operation – **Applications of Queues.**

**UNIT III:****11 Hrs**

**Linked Lists:** Introduction to Linked List – **Singly Linked List: Insert Node Operations – Delete Node Operations – Value At Operation** – Implementation of Singly Linked List – **Doubly LinkedList:** Insert Node Operations – Delete Node Operations – Value At Operation – Implementation of Doubly Linked List – **Circular Linked Lists:** Insert and Delete Node Operation – Applications of Linked List.

**UNIT IV:****12 Hrs**

**Trees:** Introduction – Definitions – Binary Trees: Types of Binary Trees – **Implementation of Binary Trees: Pointer Based Implementation** – Array based Implementation – Linked List based Implementation – Traversal: In Order Traversal – Pre Order Traversal – Post Order Traversal – Level Ordered Traversal – Basic Operations: Inserting and Deleting a Node – **Applications of Trees.**

**Binary Search Trees:** Introduction – Operation: Search Value – Insert a Node – Delete a Node – Implementation of Binary Trees.

**UNIT V:****11 Hrs**

**Graphs:** Introduction, Components of a Graph, Graph representation, **Types of Graphs.**

**Sorting:** Introduction – Importance of Sorting Algorithm – Exchange Sort: Bubble Sort – Selection Sort: Straight Selection Sort – **Heap Sort – Insertion Sort: Simple Insertion Sort** – ShellSort – Divide and Conquer: Merge Sort – Quick Sort.

**Searching:** Introduction – Linear Search: Working – Implementation – Binary Search: Working – Implementation – Tree-Based Search – Hashing

### Text Books

| S. No | Authors                                                            | Title                           | Publisher                     | Year & Edition           |
|-------|--------------------------------------------------------------------|---------------------------------|-------------------------------|--------------------------|
| 1     | Shriram K Vasudevan,<br>Abhishek S Nagarajan,<br>Karthick Nanmaran | Data Structures Using<br>Python | Oxford<br>University<br>Press | 2021,1 <sup>st</sup> Edn |

### Reference Books

| S. No | Authors                           | Title                                          | Publisher               | Year & Edition            |
|-------|-----------------------------------|------------------------------------------------|-------------------------|---------------------------|
| 1     | Ellis Horowitz &<br>Sartaj Sahani | Fundamentals of Data<br>Structure              | Galgotia<br>Book Source | 2003,1 <sup>st</sup> Edn  |
| 2     | Rance D Necaie                    | Data Structures and<br>Algorithms using Python | John willey<br>&sons    | 2011,1 <sup>st</sup> Edn, |

### Pedagogy

- Lecture, Discussion, Quiz, Demonstrate, PPT, Case Studies

### Course Designers

1. Mrs. K. Geethalakshmi
2. Mrs. M. Selvanayaki

| COURSE CODE | COURSE TITLE | CATEGORY  | L  | T | P | CREDIT |
|-------------|--------------|-----------|----|---|---|--------|
| CS23SBGP    | Gen-AI       | Practical | 44 | 1 | - | 3      |

### Preamble

- The objective of this course is to understand the breadth and depth of Generative Artificial Intelligence (Gen AI) and to impart knowledge on its ethical implications, practical applications, and emerging trends.

### Course Learning Outcomes

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

| CLOs Number | CLO Statement                                                                                                                     | Knowledge Level |
|-------------|-----------------------------------------------------------------------------------------------------------------------------------|-----------------|
| CLO1        | Understand the fundamental concepts and ethical considerations of Generative AI.                                                  | K2              |
| CLO2        | Apply AI principles in practical settings using basic AI tools and platforms                                                      | K3              |
| CLO3        | Develop advanced skills in specialized AI applications such as text analysis, natural language processing, and image recognition. | K3              |
| CLO4        | Explore emerging trends in AI, integrating advanced AI tools into diverse professional practices.                                 | K4              |

### Mapping with Programme Learning Outcomes

| CLO's | 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    | M    | S    | M    | S    |

S- Strong; M-Medium;

**Gen-AI - CS23SBGP**

**44 Hours**

### Syllabus

#### UNIT I: Introduction to Gen AI

**9 Hrs**

Understanding Gen AI: Definition and scope of Gen AI - Overview of its applications in various fields  
 - Introduction to essential skills needed for Gen AI. Ethical Considerations: Discussion on ethical guidelines and responsible use of AI - Understanding the impact of AI on society and individuals.

#### Hands-on Activity: Exploring AI Tools

- Working with appropriate content creation Gen-AI tools to engage with ChatGPT to explore various subjects, simulate interviews, or create imaginative written content.
- Working with appropriate writing and rephrasing Gen-AI tools to drafting essays on designated topics and refining the content with improved clarity, coherence, and correctness.

## **UNIT II: Basic AI Concepts**

**8 Hrs**

Introduction to AI: Basic concepts and terminology of artificial intelligence - Examples of AI in everyday life - Real-world examples of AI applications in different domains. Machine Learning Basics: Understanding the principles of machine learning - Overview of supervised and unsupervised learning.

### **Hands-on Activity: Simple AI Projects**

- Working with appropriate educational content creation Gen-AI tools to generate quizzes and flashcards based on classroom material.
- Working with appropriate language learning Gen-AI tools to practice and enhance language skills through interactive exercises and games across multiple languages.

## **UNIT III: AI in Practice**

**9 Hrs**

Text Analysis and Natural Language Processing (NLP): Introduction to NLP concepts and techniques - Hands-on exercises analyzing text data and extracting insights. Image Recognition and Processing: Basics of image recognition algorithms and techniques - AI Tools for Text and Image Processing.

### **Hands-on Activity: Text and Image Projects**

- Working with appropriate image processing Gen-AI tools to experiment with AI-generated images.
- Working with appropriate object recognition Gen-AI tools to identify various objects such as text, images, products, plants, animals, artworks, barcodes, and QR codes.

## **UNIT IV: AI for Productivity and Creativity**

**9 Hrs**

AI-enhanced Productivity and creativity Tools: Overview of productivity and creativity tools enhanced with AI capabilities - Tips for integrating AI into daily tasks and workflows. AI and Jobs: Exploring how AI impacts jobs and industries - Discussion on opportunities and challenges - Exploration of AI-powered creative tools and applications.

### **Hands-on Activity: Productivity and Creativity**

- Working with appropriate content creation Gen-AI tools to generate interactive videos / blog posts / art / drawing / music and storytelling experience.
- Working with appropriate resume generation Gen-AI tools to create professional resumes efficiently.

## **UNIT V: Future of Gen AI and Final Project**

**9 Hrs**

Emerging Trends in Gen AI - Applications of Generative AI - Ethical and Societal Impact of Gen AI - Future Directions and Challenges - Case Studies in Generative AI.

### **Hands-on Activity: Trends in Gen AI**

- Working with appropriate speech generation Gen-AI tools to customize synthetic speech for virtual assistance across different applications.
- Working with appropriate data analysis Gen-AI tools to perform data analysis, visualization, and predictive modeling tasks.
- Working with appropriate Gen-AI design tools to simplify the creation of visually appealing presentations.
- Working with appropriate website builder Gen-AI tools to develop professional websites with AI assistance.

## **Pedagogy**

- Demonstration of AI Tools, Lectures and Case studies.

## **Course Designers**

- Mrs. S. Ponmalar

### **Evaluation pattern for Gen-AI**

Quiz : 50 Marks (5 quizzes with each 10 marks)

Case study : 25 Marks

Online Exam : 25 Marks (Departments to plan and conduct the exam)

Total : **100 Marks**

| Course Code | Course Title | Category  | L | T | P  | Credit |
|-------------|--------------|-----------|---|---|----|--------|
| AP23CP3     | 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 learn database functionality on real time projects.

### 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 primary and foreign key constraints                                                           | K2              |
| CLO3       | Apply functions and joins on data                                                                               | K3              |
| CLO4       | Demonstrate PL/SQL programming on databases and differentiate Key/value store database from relational database | K4              |

### Mapping with Programme Learning Outcomes

| CLOs | PLO 1 | PLO2 | PLO 3 | PLO4 | PLO5 |
|------|-------|------|-------|------|------|
| CLO1 | M     | S    | S     | S    | S    |
| CLO2 | S     | M    | S     | M    | S    |
| CLO3 | S     | S    | M     | S    | S    |
| CLO4 | M     | S    | S     | S    | M    |

S- Strong; M-Medium;

**DBMS Lab - AP23CP3**

**75 Hours**

### LIST OF PROGRAMS

- A Case study and formulate the problem statement on a specific project.
- Draw ER Diagrams with entities, attributes, keys, and relationships between entities, and cardinalities.
- Draw tables with Normalization
- Perform Data Definition Language statements (Create, Alter, Drop, Truncate, Rename)
- Perform Data Manipulation Language statements (Select, Insert, Update, Delete)
- Perform Transaction Control Language and Data Control Language statements (Grant, Revoke, Commit, Rollback, Savepoint)
- Perform Data Integrity Constraints Operations (Primary key, Foreign key, Not null, Unique, Check)
- Perform Aggregate Function and Sorting
- Implement Joins Operations and Sub Queries
- Write PL/SQL program to perform Functions and Procedure
- Create a Registration form using python programming and MySQL database connectivity
- Create a Login form using python programming and MySQL database connectivity.

### Pedagogy

- Demonstration of working environment / Tools / Software / Program

### Course Designers

- Dr. R. Hepziba Ganamalar

## **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 Route 53 - Amazon CloudFront - AWS Web Application Firewall (WAF)

**Database Services :** Amazon Relational DatabaseService (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 CloudHSM AWS Shield Management & Developer Tools - AWS Cloud Formation - AWS Cloud Trail - AWS Command Line Interface (CLI) - AWS Systems Manager - AWS CodeCommit - AWS CodeBuild - AWS CodeDeploy - AWS CodePipeline Amazon Kinesis - Amazon EMR - Amazon Athena - Amazon Redshift - Amazon QuickSight

**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 its types – Communication Protocols – Cabling – 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 CODE | COURSE TITLE          | CATEGORY | L  | T | P | CREDIT |
|-------------|-----------------------|----------|----|---|---|--------|
| AP23C08     | DATAMINING TECHNIQUES | Theory   | 58 | 2 | - | 3      |

## Preamble

- To gain knowledge of data mining fundamentals, techniques, and challenges for extracting insights from large datasets.
- This covers data warehousing, OLAP operations, and web mining techniques to manipulate data mining applications.
- To provide practical sessions with Weka to apply machine learning techniques like association, classification, and clustering to real-world data.

## Course Learning Outcomes

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

| CLO Number | CLO Statement                                                                                                                                                     | Knowledge Level |
|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| CLO1       | Identify and explain the core concepts of Data Mining, including its definition, techniques, challenges, Methods, classification and applications.                | K1              |
| CLO2       | Understand datamining techniques such as Apriori and Partition algorithms and clustering methods like partitioning and hierarchical clustering for data analysis. | K2              |
| CLO3       | Apply decision tree algorithms, data warehousing concepts, and web mining techniques to analyze and extract insights from real-world datasets.                    | K3              |
| CLO4       | Implement Weka to implement data loading, attribute selection, discretization, association rule mining, classification, and clustering techniques effectively.    | K4              |

## Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium;

## DATAMINING TECHNIQUES - AP23C08 (58 HRS)

### UNIT: I

(10 Hours)

Introduction: What is Data Mining? – Definition – KDD VS Data Mining – Data Mining Techniques – Issues and Challenges in DM – Data Mining Application Areas.

### UNIT: II

(12 Hours)

Introduction – What is an Association Rule? – Methods to Discover Association Rules – Apriori Algorithm – Partition Algorithm. Clustering Techniques: Introduction – Clustering Paradigms – Partitioning Algorithm – Hierarchical clustering.

**UNIT: III****(12 Hours)**

Decision Trees: Introduction – What is a Decision Tree? – Tree construction Principle – Best split – Splitting Indices – Splitting criteria – Decision Tree Construction Algorithm – CART.

**UNIT: IV****(12 Hours)**

Data Warehousing: Introduction – Data Warehouse Architecture – OLAP Operations – OLAP server – ROLAP – MOLAP. Web Mining: Introduction – Web Mining – Web Content Mining – Web Structure Mining – Web Usage Mining – Text Mining.

**UNIT: V****(12 Hours)**

Machine Learning with Weka – Getting Started – Loading the Data – Selecting or Jittering- Attributes – Discretization – Association Rule Mining – Classification Clustering.

**Text Books**

| S.NO | AUTHORS                              | TITLE                                                       | PUBLISHERS                           | YEAR AND EDITION           |
|------|--------------------------------------|-------------------------------------------------------------|--------------------------------------|----------------------------|
| 1    | Arun k. Pujari                       | Data Mining Techniques<br>(Unit I, II, III, IV)             | University Press<br>(India) Limited. | 2013, 3 <sup>rd</sup> edn. |
| 2    | K.P. Soman, Shyam<br>Diwakar, V Ajay | Insight into Data Mining<br>theory and practice<br>(Unit V) | PHI Learning<br>Private Ltd          | 2014                       |

**Books for Reference**

| S.NO | AUTHORS                                     | TITLE                                           | PUBLISHERS                    | YEAR AND EDITION            |
|------|---------------------------------------------|-------------------------------------------------|-------------------------------|-----------------------------|
| 1    | K.P.Soman, Shyam<br>Diwaka, K.Ajay          | Insight into Data<br>Mining                     | Prentice Hall of<br>India     | 2006 , 1 <sup>st</sup> edn. |
| 2    | Daniel T. Larose                            | Data Mining<br>Methods & Models                 | Wiley Student Edition         | 2006, 1 <sup>st</sup> edn.  |
| 3    | Alex Berson, Stephen<br>J.Smith             | Data<br>warehousing,<br>Data mining and<br>OLAP | Tata McGraw hill<br>publisher | 2022, 2 <sup>nd</sup> edn.  |
| 4    | Jiawei Han, Micheline<br>Kamber             | Data Mining<br>Concepts and<br>Techniques       | Morgan Kaufman<br>Publishers  | 2022, 2 <sup>nd</sup> edn.  |
| 5    | David Hand, Weikki<br>Mannil Padhraic Smyth | Principles of Data<br>Mining                    | Prentice Hall of India,       | 2001, 1 <sup>st</sup> edn , |

**Pedagogy:**

- PPT, Black board, Discussion, Interactive Teaching, Self-questioning by students, Group discussion, Quiz

| COURSE CODE | COURSE TITLE     | CATEGORY | L  | T | P | CREDIT |
|-------------|------------------|----------|----|---|---|--------|
| AP23C09     | JAVA PROGRAMMING | Theory   | 73 | 2 | - | 4      |

#### Preamble

- To impart the fundamental programming concepts of core java and gain exposure about inheritance, packages & collection interfaces.
- To analyse and implement exception handling & multi-threading concepts in java.

#### 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 Object Oriented Programming and Java programming structure | K1              |
| CLO2       | Understand the usage of programming elements of Java                              | K2              |
| CLO3       | Apply the concepts of Java to create simple applications                          | K3              |
| CLO4       | Construct the Java applications & Applet for real time applications.              | K3              |

#### Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium;

#### JAVA PROGRAMMING – AP23C09 (73 HRS )

##### UNIT I: (15 Hrs)

JAVA Basics: Object Oriented Programming (OOP) Concepts, Features of Java language, Types of Java programs, Java Architecture- literals, integer, floating point, character, string and Boolean literals. Data types, integer, floating point, character and Boolean -variables-structure of a Java program-comments, expression, statement, type conversion, block statement, scope. Operators - Arithmetic, Bitwise, Relational, Boolean logical and ternary operators, Operator precedence. Control statements - if...Else, Switch, While, do...while, for, break and continue statements, comma statement.

##### UNIT II: (14 Hrs)

Arrays: One dimensional array, multi-dimensional array, Arrays class.

Classes and Objects: Defining a class, new operator and object, the dot (.) operator- method declaration and calling, constructors, instance variable hiding, method overloading, passing objects and arrays as parameter to methods.

**UNIT III: (14 Hrs)**

Inheritance: Creating sub-classes, method overriding, final class, final methods and final variables, object destruction and garbage collection, recursion, Static method, block and variables-abstract classes.

Packages and Interfaces: Defining a packages, the import statement, access modifier, defining an interface, implementing an interface.

**UNIT IV: (15 Hrs)**

Exception Handling: Types of Exceptions, Catching Exceptions, Rethrowing Exceptions, creating your own exceptions, throws exception, finally block, checked and unchecked exceptions.

Handling I/O Files: I/O Streams, File Class and Byte Stream – Disk File Handling, File Input Stream and File Output Stream classes- Filtered Streams, Data Input Stream and Data Output Stream. Strings - The String Class, String Buffer class, String Builder class.

**UNIT V: (15 Hrs)**

Multithreaded Programming: Multitasking, Creating a Thread, States of a thread, multithreaded programming, thread priorities, thread- join () method, controlling the threads.

JDBC and ODBC - Types of Drivers, Java SQL Package , Using a JDBC, Driver Manager – Creating Connection, Connection Interface - Creating Statements, Statement Interface - Executing Statements, Prepared Statement Interface, Callable Statement Interface, Result Set Interface.

**Text Book**

| S.NO | AUTHORS         | TITLE                            | PUBLISHERS              | YEAR AND EDITION          |
|------|-----------------|----------------------------------|-------------------------|---------------------------|
| 1    | K. Somasundaram | Introduction to Java Programming | Jaico Pub.House, Mumbai | 2013,1 <sup>st</sup> edn. |

**Books for Reference**

| S.NO | AUTHORS                          | TITLE                         | PUBLISHERS | YEAR AND EDITION           |
|------|----------------------------------|-------------------------------|------------|----------------------------|
| 1    | Patrick Naughton& Hebert Schildt | The complete reference java 2 | TMH        | 2011, 5 <sup>th</sup> edn. |
| 2    | John R.Hubbard                   | Programming with java         | TMH        | 2020, 2 <sup>nd</sup> edn. |

| <b>COURSE CODE</b> | <b>COURSE TITLE</b>         | <b>CATEGORY</b>  | <b>L</b> | <b>T</b> | <b>P</b> | <b>CREDIT</b> |
|--------------------|-----------------------------|------------------|----------|----------|----------|---------------|
| <b>AP23CP4</b>     | <b>JAVA PROGRAMMING LAB</b> | <b>Practical</b> | -        | -        | 60       | 3             |

#### **Preamble**

- To know how to solve basic design problems using object oriented concepts
- To provide the hands on experience on Java Programming and improve the practical skill set.
- The learner will be able to develop the logic for the given problem, recognize and understand the syntax and construction JAVA code.

#### **Course Learning Outcomes**

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

| <b>CLO Number</b> | <b>CLO Statement</b>                                                                                      | <b>Knowledge Level</b> |
|-------------------|-----------------------------------------------------------------------------------------------------------|------------------------|
| CLO1              | Identify the logic for the given problem, recognize and understand the syntax and construction JAVA code. | K1                     |
| CLO2              | Understand and design the classes using string functions & methods.                                       | K2                     |
| CLO3              | Develop java application programs using packages & collection interfaces.                                 | K3                     |
| CLO4              | Implement the Applet and Graphics Programme                                                               | K3                     |

#### **Mapping with Programme Learning Outcomes**

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

S- Strong; M-Medium;

#### **JAVA PROGRAMMING LAB – AP23CP4**

#### **List of Programs**

- Program with Classes and Objects
- Program with String functions
- Program with Arrays
- Program with two or more constructors
- Program to implement Inheritance
- Program to implement Method overriding
- Program to implement Packages
- Program to create an interface and implement in a class
- Program to implement Exception handling
- Program to create two Threads
- Program to implement JDBC connectivity.

**Pedagogy**

- Demonstration of working environment / Tools / Software / Program

**Course Designers:**

1. Mrs. K. Geethalakshmi

| COURSE CODE | COURSE TITLE      | CATEGORY | L  | T | P | CREDIT |
|-------------|-------------------|----------|----|---|---|--------|
| AP23A01     | 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;

### DIGITAL MARKETING – AP23A01 (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 – 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>AUTHORS</b> | <b>TITLE</b>      | <b>PUBLISHERS</b>     | <b>YEAR AND EDITION</b>     |
|-------------|----------------|-------------------|-----------------------|-----------------------------|
| 1           | Seema Gupta    | Digital Marketing | McGraw Hill Education | 2018 , 2 <sup>nd</sup> edn. |

### **Books for Reference**

| <b>S.NO</b> | <b>AUTHORS</b>    | <b>TITLE</b>                                                             | <b>PUBLISHERS</b>                         | <b>YEAR AND EDITION</b>     |
|-------------|-------------------|--------------------------------------------------------------------------|-------------------------------------------|-----------------------------|
| 1           | Simon Kingsnorth  | Digital Marketing Strategy: An Integrated Approach to Online Marketing . | Kogan Page                                | 2019 , 2 <sup>nd</sup> edn. |
| 2           | Dave Chaffey      | Digital Marketing                                                        | Pearson                                   | 2019, 7 <sup>th</sup> edn.  |
| 3           | Stephanie Diamond | Digital Marketing All-in-One for Dummies                                 | For Dummies                               | 2023, Reprint               |
| 4           | Kevin Hartman     | Digital Marketing Analytics: In Theory and In Practice                   | Ostmen Bennett Bridge Publishing Services | 2020, 2 <sup>nd</sup> edn.  |

| <b>COURSE CODE</b> | <b>COURSE TITLE</b> | <b>CATEGORY</b> | <b>L</b>  | <b>T</b> | <b>P</b> | <b>CREDIT</b> |
|--------------------|---------------------|-----------------|-----------|----------|----------|---------------|
| <b>CS23A02</b>     | <b>M-COMMERCE</b>   | <b>Theory</b>   | <b>58</b> | <b>2</b> | <b>-</b> | <b>3</b>      |

#### **Preamble**

- This course provides an insight on M-Commerce principles and business models. It also explore 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

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

#### **Mapping with Programme Learning Outcomes**

| <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           |

S- Strong; M-Medium;

#### **M-COMMERCE - CS23A02 (58 HRS)**

#### **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 C2CEC .

**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 | AUTHORS                               | TITLE                                        | PUBLISHERS                 | YEAR AND EDITION                   |
|-------|---------------------------------------|----------------------------------------------|----------------------------|------------------------------------|
| 1     | Dr. U.S. Pandey and Er. SaurabhShukla | E- Commerce and Mobile Commerce Technologies | S.Chand & Company Pvt. Ltd | 2014, 2 <sup>nd</sup> Revised edn. |

**Reference Books**

| S. NO | AUTHORS               | TITLE           | PUBLISHERS                                   | YEAR AND EDITION |
|-------|-----------------------|-----------------|----------------------------------------------|------------------|
| 1     | Karabi Bandyopadhyaya | Mobile Commerce | Prentice Hall India Learning Private Limited | 2023,Reprint     |

| <b>COURSE CODE</b> | <b>COURSE TITLE</b>                                                     | <b>CATEGORY</b> | <b>L</b> | <b>T</b> | <b>P</b> | <b>CREDIT</b> |
|--------------------|-------------------------------------------------------------------------|-----------------|----------|----------|----------|---------------|
| <b>AP23SCE1</b>    | <b>Excel Skills for Data Analytics and Visualization Specialization</b> | <b>Theory</b>   | 45       | -        | -        | 3             |

#### Syllabus

#### **Excel Skills for Data Analytics and Visualization Specialization - AP23SCE1 – 45 Hours**

| <b>S. No</b> | <b>Course Name</b>                   | <b>Link</b>                                                                                                                                   | <b>Hours</b> |
|--------------|--------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| 1            | Excel Fundamentals for Data Analysis | <a href="https://www.coursera.org/learn/excel-data-analysis-fundamentals">https://www.coursera.org/learn/excel-data-analysis-fundamentals</a> | 15           |
| 2            | Data Visualization in Excel          | <a href="https://www.coursera.org/learn/excel-data-visualization">https://www.coursera.org/learn/excel-data-visualization</a>                 | 17           |
| 3            | Excel Power Tools for Data Analysis  | <a href="https://www.coursera.org/learn/excel-power-tools">https://www.coursera.org/learn/excel-power-tools</a>                               | 15           |

## **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 Route 53 - Amazon CloudFront - 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 CloudHSM AWS Shield Management & Developer Tools - AWS Cloud Formation - AWS Cloud Trail - AWS Command Line Interface (CLI) - AWS Systems Manager - AWS CodeCommit - AWS CodeBuild - AWS CodeDeploy - AWS CodePipeline Amazon Kinesis - Amazon EMR - Amazon Athena - Amazon Redshift - Amazon QuickSight

**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.

| <b>COURSE CODE</b> | <b>COURSE TITLE</b>     | <b>CATEGORY</b> | <b>L</b>  | <b>T</b> | <b>P</b> | <b>CREDIT</b> |
|--------------------|-------------------------|-----------------|-----------|----------|----------|---------------|
| <b>AP23C11</b>     | <b>.NET PROGRAMMING</b> | <b>Theory</b>   | <b>73</b> | <b>2</b> | <b>-</b> | <b>3</b>      |

#### **Preamble**

- The course is designed for the beginners as a guide to develop applications using VB.Net and ASP.Net
- This course is developed to provide the understanding of Dot Net framework, VB.Net, ASP.Net and XML.
- This course is designed to develop the programming skills to create Windows and Webbased Application using VB.Net and ASP.Net respectively.

#### **Course Learning Outcomes**

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

| <b>CLO Number</b> | <b>CLO Statement</b>                                                                    | <b>Knowledge Level</b> |
|-------------------|-----------------------------------------------------------------------------------------|------------------------|
| CLO1              | Identify the concepts of .Net Frame Work.                                               | K1                     |
| CLO2              | Understand the concepts of client and server-side scripting.                            | K2                     |
| CLO3              | Integrate the Web Applications.                                                         | K3                     |
| CLO4              | Illustrate the Industry defined problem and suggest solution(s) using .NET application. | K3                     |

#### **Mapping with Programme Learning Outcomes**

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

S- Strong; M-Medium;

#### **.NET PROGRAMMING - AP23C11**

**73 Hours**

#### **UNIT I:**

**15 Hrs**

Introduction to .Net: .Net Framework – Visual Basic .Net – **Creating windows forms applications** – creating a web forms application – **Data types and variables** – Operators – Arrays - Conditional Logic.

#### **UNIT II:**

**15 Hrs**

Procedures – Dialog Boxes – Error Handling– Visual Basic .Net IDE – Controls– **Specific controls-** Irregular forms

#### **UNIT III:**

**14 Hrs**

Data Access: Introduction to Data Access in .Net – **Overview of ADO.Net** - ADO .Net - Visual Studio .Net Database Tools.

**UNIT IV:****14 Hrs**

Introduction to XML in .Net - Introduction to Web Development - **Introduction to ASP.Net** – Page framework.

**UNIT V:****15 Hrs**

Web Controls – Validation Control – **Events – Cascading Style sheets** – ASP.Net applications.

**TEXT BOOK**

| S. No | Authors                 | Title of the Book                   | Publisher        | Year & Edition             |
|-------|-------------------------|-------------------------------------|------------------|----------------------------|
| 1     | Bill Evjen, Jason Beres | Visual Basic .Net Programming Bible | Wiley Publishing | 2006 , 1 <sup>st</sup> Edn |

**REFERENCE BOOKS**

| S. No | Authors        | Title of the Book                   | Publisher         | Year & Edition            |
|-------|----------------|-------------------------------------|-------------------|---------------------------|
| 1     | David Chappell | Understanding .NET                  | Pearson Education | 2002, 1 <sup>st</sup> Edn |
| 2     | Steven Holzner | VB.Net Programming Black book       | Dreamtech         | 2005, 1 <sup>st</sup> Edn |
| 3     | Matt J. Couch  | ASP. NET and VB.NET Web programming | Pearson Education | 2002, 1 <sup>st</sup> Edn |

**PEDAGOGY**

Chalk and talk, PPT, Discussion, Assignment, Demo, Quiz, Seminar.

**Course Designers**

1. Mrs. S. Mohana Priya
2. Mrs. K. S. Kamalam

| S.No | Learning Methods       | Percentage |
|------|------------------------|------------|
| 1    | Participatory Learning | 51%        |
| 2    | Experiential Learning  | 23 %       |
| 3    | Problem-based Learning | 26%        |

| COURSE CODE | COURSE TITLE                | CATEGORY | L  | T | P | CREDIT |
|-------------|-----------------------------|----------|----|---|---|--------|
| AP23C12     | SOFTWARE PROJECT MANAGEMENT | Theory   | 73 | 2 | - | 4      |

#### Preamble

- This course is designed to provide the graduates to identify key areas of concern over Project Life Cycle (PLC) and use of project management principles across all the phases of PLC.
- The course will also help student to make them understand the importance and necessity of project plan and how it is helpful to project manager in monitoring and controlling the various aspects of the project such as schedule, budget, etc.

#### Course Learning Outcomes

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

| CLO Number | CLO Statement                                                                    | Knowledge Level |
|------------|----------------------------------------------------------------------------------|-----------------|
| CLO1       | Recall the different activities of Software Project Management Plans             | K1              |
| CLO2       | Understand the different approaches to manage software development process       | K2              |
| CLO3       | Select the appropriate model or technique for the project management activities. | K2              |
| CLO4       | Apply the software project management concepts in real-time Scenarios            | K3              |

#### Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium;

#### SOFTWARE PROJECT MANAGEMENT – AP23C12

73 hours

##### UNIT I:

14 Hrs

Introduction to Software Project Management, Why is software project management important?, What is Project, Software Project vs other types of project, Activities covered by Software Project Management Plans, Methods and Methodologies, Categorizing software Projects, Stakeholder, Setting Objectives, Project success and Failure, **What is Management? Management Control, Traditional and modern Project Management Practices.**

##### UNIT II:

15 Hrs

An overview of Project Planning: Step 0 to 10, Selecting of an Appropriate Project Approach: Choosing methodologies and Technologies, Software Processes and Software Models, The Waterfall Model, The Spiral Model, Software Prototyping, other ways of categorizing prototypes, Incremental Delivery, **RAD and Agile Methods: Extreme programming, Scrum.**

**UNIT III:****15 Hrs**

Software Effort Estimation: Introduction, Where are Estimates Done? **Software Effort Estimation Techniques, Bottom up Estimating**, The Top Down Approach, Expert Judgement, Function Point Analysis, COCOMO Model, Activity Planning.

**UNIT IV:****15 Hrs**

Risk Management: Risk, Categories of Risk, A Framework for Dealing with Risk, Risk Identification, Risk Assessment, Risk Planning, **Risk Management**, Applying PERT Technique. Resource Allocation.

**UNIT V:****14 Hrs**

Monitoring and Control, **Managing People in Software environments.**

**Text Book**

| S. No | Authors                                      | Title of the Book           | Publisher                      | Year & Edition             |
|-------|----------------------------------------------|-----------------------------|--------------------------------|----------------------------|
| 1     | Bob Hughes,<br>Mike Cotterell,<br>Rajib Mall | Software Project Management | Tata McGraw Hill Publications, | 2011, 5 <sup>th</sup> Edn. |

**Reference Books**

| S. No | Authors                         | Title of the Book                                | Publisher                     | Year & Edition             |
|-------|---------------------------------|--------------------------------------------------|-------------------------------|----------------------------|
| 1     | Roger S. Pressman               | Software Engineering                             | Tata McGraw Hill Publications | 2014, 7 <sup>th</sup> Edn. |
| 2     | Richard H. Thayer               | Software Engineering and Project Management      | Wiley publication             | 2010, 2 <sup>nd</sup> Edn. |
| 3     | S.A.M. Rizvi,<br>Pankaj Agarwal | Principles of Software Project Management        | Khanna Book Publishing        | 2012, 1 <sup>st</sup> Edn  |
| 4     | Walker Royce                    | Software Project Management- A Unified Framework | Pearson publication,          | 2002, 1 <sup>st</sup> Edn  |

**PEDAGOGY**

- Chalk and talk, PPT, Discussion, Assignment, Demo, Quiz, Seminar.

**Note: Flipped mode learning topics are highlighted.** Course activity

| Unit     | Topic                                                                                        | Activity         | Web Resources                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|----------|----------------------------------------------------------------------------------------------|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Unit I   | What is Management? Management Control, Traditional and modern Project Management Practices. | Debate           | <a href="https://www.tutorialspoint.com/software_engineering/software_project_management.html">https://www.tutorialspoint.com/software_engineering/software_project_management.html</a><br><a href="https://www.slideshare.net/vinodaphec/spm-tutorials">https://www.slideshare.net/vinodaphec/spm-tutorials</a><br><a href="https://www.geeksforgeeks.org/software-engineering-project-management-process/">https://www.geeksforgeeks.org/software-engineering-project-management-process/</a><br><a href="https://www.guru99.com/project-management-methodology.html">https://www.guru99.com/project-management-methodology.html</a> |
| Unit II  | RAD and Agile Methods: Extreme programming, Scrum.                                           | Role play        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Unit III | Software Effort Estimation Techniques, Bottom up Estimating,                                 | Seminar          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Unit IV  | Risk Management,                                                                             | Case study       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Unit V   | Managing People in Software environments.                                                    | Group Discussion |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

### Course Designers

- 1.Dr.R.Hepziba Gnanamalar &
2. Dr. S.Reshmi

| S.No | Learning Methods       | Percentage |
|------|------------------------|------------|
| 1    | Participatory Learning | 29 %       |
| 2    | Experiential Learning  | 31 %       |
| 3    | Problem-based Learning | 40 %       |

| COURSE CODE | COURSE TITLE     | CATEGORY | L  | T | P | CREDIT |
|-------------|------------------|----------|----|---|---|--------|
| IN24C10     | MACHINE LEARNING | Theory   | 73 | 2 | - | 4      |

### Preamble

- This course introduces the fundamentals of Machine Learning and its algorithms.
- It also covers various supervised and unsupervised learning algorithms used for classification, prediction and clustering.

### 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 machine learning techniques                                                    | K1              |
| CLO2       | Understand the techniques of machine learning.                                                      | K2              |
| CLO3       | Apply supervised and unsupervised learning algorithms for classification, prediction and clustering | K3              |
| CLO4       | Analyze the efficiency of machine learning algorithms suitable for applications.                    | K4              |

### Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium;

**MACHINE LEARNING - AI23C10**

**73 Hours**

## SYLLABUS

### UNIT I

14 Hrs

The Machine Learning Landscape: Introduction to Machine Learning - Why Use Machine Learning?  
- Examples of Applications - Types of Machine Learning systems – Main Challenges of Machine Learning  
– Testing and Validating - Classification and Prediction - **The Role of Python in Machine Learning - Anaconda in Python - Python Libraries.**

### UNIT II:

15 Hrs

Classification: MNIST - Training a Binary Classifier - Performance Measures: Measuring Accuracy Using Cross-Validation - Confusion Matrix - Precision and Recall - The ROC Curve. Multiclass Classification - Multilabel Classification - Multi Output Classification – Classification Tree. **Advanced Machine Learning: Scikit-Learn Library for Machine Learning** - Cross-Validation.

### UNIT III:

15 Hrs

Linear Regression: Simple Linear Regression – Steps in Building a Regression Model – Building Simple Linear Regression Model – Multiple Linear Regression: Developing Multiple Linear Regression Model Using Python –**Splitting the Dataset into Train and Validation Sets -Building the Model on a Training Dataset** – Logistic Regression.

### UNIT IV:

14 Hrs

Unsupervised Learning Techniques: Clustering – K-Means Clustering – Limits of K-Means – Clustering for Image Segmentation - Clustering for Preprocessing - Clustering for Semi-Supervised Learning – DBSCAN – **Other Clustering Algorithm. Hierarchical Clustering.**

### UNIT V:

15 Hrs

Recommender Systems: Overview – Association Rules – Applying Association Rules. Text Analytics: Overview – Sentiment Classification . **Introduction to Artificial Neural Networks with Keras: From Biological to Artificial Neurons.** Deep Computer Vision Using Convolutional Neural Networks: Convolutional Layers.

## TEXT BOOK

| S.NO | AUTHOR                             | TITLE OF THE BOOK                                                                                                           | PUBLISHERS           | YEAR & EDITION           |
|------|------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|----------------------|--------------------------|
| 1    | Manaranjan Pradhan, U.Dinesh Kumar | Machine Learning using Python                                                                                               | Wiley India,         | 2019,1 <sup>st</sup> Edn |
| 2    | Aurélien Géron                     | Hands-on Machine Learning with Scikit-Learn, Keras & TensorFlow Concepts, Tools, and Techniques to Build Intelligent System | O'Reilly Media, Inc. | 2019,2 <sup>nd</sup> Edn |

## REFERENCE BOOKS

| S.NO | AUTHOR         | TITLE OF THE BOOK | PUBLISHERS                  | YEAR & EDITION                 |
|------|----------------|-------------------|-----------------------------|--------------------------------|
| 1    | Tom M Mitchell | Machine Learning  | Tata McGraw-Hill, New Delhi | 2017,1 <sup>st</sup> Edn, 2017 |

|   |                                           |                                                           |                         |                           |
|---|-------------------------------------------|-----------------------------------------------------------|-------------------------|---------------------------|
| 2 | Anuradha Srinivasa Raghavan, Vincy Joseph | Machine Learning                                          | Wiley India             | 2019, 1 <sup>st</sup> Edn |
| 3 | Zsolt Nagy                                | Artificial Intelligence and Machine Learning Fundamentals | Packt publisher         | 2018, 1 <sup>st</sup> Edn |
| 4 | Dr. S Sridhar, Dr. M Vijayalakshmi        | Machine Learning                                          | Oxford University Press | 2021, 1 <sup>st</sup> Edn |

## PEDAGOGY

Lecture, Discussion, Quiz, Demonstrate, PPT, Case Studies

Course Designers

1. Dr.R.Jayasree
2. Dr.L.Sheeba

| S.No | Learning Methods       | Percentage |
|------|------------------------|------------|
| 1    | Participatory Learning | 41 %       |
| 2    | Experiential Learning  | 34 %       |
| 3    | Problem-based Learning | 25 %       |

| COURSE CODE | COURSE TITLE      | CATEGORY | L  | T | P | CREDIT |
|-------------|-------------------|----------|----|---|---|--------|
| AP23E01     | COMPUTER GRAPHICS | Theory   | 73 | 2 | - | 4      |

### Preamble

The objective of the course is to gain knowledge and understand the latest innovations in computer graphics.

### Course Learning Outcomes

| CLO Number | CLO Statement                                                                         | Knowledge Level |
|------------|---------------------------------------------------------------------------------------|-----------------|
| CLO1       | Recall the fundamentals of different Computer Graphics System and applications.       | K1              |
| CLO2       | Understand the concept of drawing, clipping algorithm and geometrical transformation. | K2              |
| CLO3       | Illustrate the various Algorithmic concepts of 2D and 3D graphics system.             | K2              |
| CLO4       | Apply the various Algorithmic concept to create interactive Graphics system.          | K3              |

### Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium;

### COMPUTER GRAPHICS - AP23E01 SYLLABUS

**73 Hours**

#### UNIT I:

**14 Hrs**

Basic Concepts: - Introduction – **Uses of computer graphics** – **Display devices** -, **CRT**, Color CRT monitors – Inherent memory devices – Direct view storage tube – Flat panel displays –Three-dimensional viewing devices, Raster scan system, **Random scan system**.

#### UNIT II:

**15 Hrs**

Line drawing algorithm – **Simple DDA** – Bresenham's line drawing algorithm – circle generation. Two-dimensional transformations: Basic transformations, **Matrix representation** - Composite transformation of translation, rotation, scaling – Pivot, **point rotation** – **fixed point scaling**, other transformation.

**UNIT III:****15 Hrs**

Clipping and Windowing: Point clipping –Line clipping – Sutherland – Liang Barsky - Hodgeman polygon clipping – Text clipping – **Viewing transformation – Windowing transformation.**

**UNIT IV:****14 Hrs**

Graphical input devices: – Pointing and Positioning – **keyboard, mouse, trackball, joystick, scanner, light pens, and tables.** Three-dimensional input devices: - **printers and plotters.** Three-dimensional concepts: - Three-dimensional display methods – Three-dimensional transformation – translation, rotation, scaling – Three-dimensional viewing – **Viewing pipeline –Viewing coordinates** – Projections.

**UNIT V:****15 Hrs**

Hidden surface removal - Object space methods – Back face detection method – Painter's algorithm – Image space methods – **Area subdivision – Octree – Depth – buffer – Scan line – Ray tracing,** Surface renderings – **Surface textures – Shading.**

**TEXTBOOK**

| S.NO | AUTHOR                          | TITLE OF THE BOOK             | PUBLISHERS        | YEAR & EDITION /          |
|------|---------------------------------|-------------------------------|-------------------|---------------------------|
| 1    | Donald Hearn & M. Pauline Baker | Computer Graphics – C Version | Pearson Education | 2013, 2 <sup>nd</sup> Edn |

**REFERENCE BOOKS**

| S.NO | AUTHOR                                                                                                   | TITLE OF THE BOOK                           | PUBLISHERS                 | YEAR & EDITION             |
|------|----------------------------------------------------------------------------------------------------------|---------------------------------------------|----------------------------|----------------------------|
| 1    | Phsdtuilip J. Schneider, David H. Eberly                                                                 | Geometric Tools for Computer Graphics       | Morgan Kaufmann Publishers | 2016, 2 <sup>nd</sup> Edn, |
| 2    | William M.Newman, Robert F. Sproull                                                                      | Principles of Interactive Computer Graphics | Tata McGraw Hill           | 2002, 2 <sup>nd</sup> Edn, |
| 3    | James D.Foley, Andries Van Dam, Steven K. Feiner, John F.Hughes                                          | Computer Graphics Principles and Practice   | Pearson Education, Inc     | 2002, 2 <sup>nd</sup> Edn  |
| 4    | David F. Rogers                                                                                          | Procedural Element for Computer Graphics    | Tata McGraw Hill           | 2001, 2 <sup>nd</sup> Edn  |
| 5    | ISRD group                                                                                               | Computer graphics                           | THM publications           | 2012, 11 <sup>th</sup> Edn |
| 6    | John F.Hughes, AndriesVan Dam, Morgan Mcguire, David F.Sklar,James D.Foley, Steven K.Fenier, Kurt Akeley | Computer Graphics Principles and Practice   | Pearson Education,         | 2014, 3 <sup>rd</sup> Edn  |

**PEDAGOGY**

- Chalk and talk, PPT, Discussion, Assignment, Demo, Quiz, Seminar.

**Course Designers**

1. Mrs. T.S.Anushya Devi

2. Dr. L. Sheeba

| S.No | Learning Methods       | Percentage |
|------|------------------------|------------|
| 1    | Participatory Learning | 40 %       |
| 2    | Experiential Learning  | 40 %       |
| 3    | Problem-based Learning | 20 %       |

| COURSE CODE | COURSE TITLE     | CATEGORY | L  | T | P | CREDIT |
|-------------|------------------|----------|----|---|---|--------|
| AP23E02     | PERL PROGRAMMING | Theory   | 73 | 2 | - | 4      |

### Preamble

To provide an understanding of application of Perl programming in general as well as in biological problem solving in addition to the basic Perl working environment.

### 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 of Perl control structures, subroutines and modules.                      | K1              |
| CLO2       | Identify the Regular expression and Various Operations in Perl                             | K2              |
| CLO3       | Implement the Perl modules, Formatting and debugging the Commands                          | K3              |
| CLO4       | Determine and execute the Perl regular expression, commands using Perl control structures. | K3              |

### Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium;

### PERL PROGRAMMING - AP23E02

73 Hours

### SYLLABUS

#### UNIT I

15 Hrs

Introduction to Perl: Scalars: Introduction - Learning Perl: A Functional Approach - **Constructing atgc.pl** - The tr /// Function - Text Formatting - Formatting Numerical Output with printf-Trapping Errors at Run-time - The s /// Operators - **The chop and chomp Operators.**

#### UNIT II

14 Hrs

Introduction to Perl: Arrays Introduction - jobs.pl - The split Function - The foreach Loop Using Standard Perl Modules: Introduction to Perl Modules - **The Getopt::Long Module** – The LWP::Simple Module-Capturing Data with Regular Expressions - The Perl Dot(.) Character - Filtering Job Description with regexs- **Case-insensitive Regular Expressions Matching.**

#### UNIT III

15 Hrs

Perl regular expressions: **Regular expression** – special character (+) - special character (\*) special character (?)Special character ([]) -multiline regexs: The s Option. The Perl Debugger: Debugging

Perl Code-**The Perl Debugger** –The \$array Variable-Setting Conditional Break-Points. Useful Debugger Comments.

#### UNIT IV

14 Hrs

Perl Regular Expressions–II: Introduction – a summary of regex operation – pattern modifier operators – **conditional matching operators** – special characters – using the range of operators to exclude the alternatives – regex pattern comments – match quantifiers – **beginning of the pattern and end of the pattern anchors** – s///Revisited –tr///revisited- escape sequences for special characters.

#### UNIT V

15 Hrs

Perl control statements: Perl control structures – syntax and operation of if statements – if statements – if\_else statements – if\_else if statement – if\_elseif\_else – unless modifier – the while loop – the until loop – the for loop – the for each loop. File I/O:opening files: The file variable – file mode – file test operators –**accessing file with <> -accessing file with the @ARGV variable** - Accessing file with perl modules: getopt::Long &getopt::std – extracting file information with file:: Basename – deleting files – **accessing directories – the CWD module.**

#### TEXTBOOK

| S.NO | AUTHOR              | TITLE OF THE BOOK                   | PUBLISHERS                   | YEAR & EDITION            |
|------|---------------------|-------------------------------------|------------------------------|---------------------------|
| 1    | Harshawardhan P Bal | Perl Programming for Bioinformatics | Tata McGraw Hill publication | 2003, 1 <sup>st</sup> Edn |

#### REFERENCE BOOKS

| S.NO | AUTHOR        | TITLE OF THE BOOK                 | PUBLISHERS | YEAR & EDITION            |
|------|---------------|-----------------------------------|------------|---------------------------|
| 1    | James Tisdall | Beginning Perl for Bioinformatics | O'Reilly   | 2014, 1 <sup>st</sup> Edn |
| 2    | James Tisdall | Mastering Perl for Bioinformatics | O'Reilly   | 2010, 1 <sup>st</sup> Edn |
| 3    | James Lee     | Beginning Perl                    | Apress     | 2004, 1 <sup>st</sup> Edn |

#### PEDAGOGY

- Demonstration, Discussion, Interactive Teaching, Group discussion, Quiz

#### Course Designers

1. Dr. L.Sheeba
2. Mrs.S.Kavitha

| S.No | Learning Methods       | Percentage |
|------|------------------------|------------|
| 1    | Participatory Learning | 30 %       |
| 2    | Experiential Learning  | 30 %       |
| 3    | Problem-based Learning | 40 %       |

| COURSE CODE | COURSE TITLE         | CATEGORY  | L | T | P  | CREDIT |
|-------------|----------------------|-----------|---|---|----|--------|
| AP23CP5     | .NET PROGRAMMING LAB | Practical | - | - | 75 | 3      |

### Preamble

- To provide the knowledge about .Net framework and set up a programming environment for ASP .Net programs.
- The learner will be able to use ASP.Net controls in web applications.
- The learner will be able to implement database connectivity.

### Course Learning Outcomes

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

| CLO Number | CLO Statement                                                                                       | Knowledge Level |
|------------|-----------------------------------------------------------------------------------------------------|-----------------|
| CLO1       | Demonstrate advanced features and controls of .Net programming.                                     | K1              |
| CLO2       | Develop windows applications and web applications in .Net framework by analysing user requirements. | K2              |
| CLO3       | Design GUI Applications                                                                             | K3              |
| CLO4       | Utilize the .Net framework to build distributed enterprise applications.                            | K4              |

### Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium;

**.NET PROGRAMMING LAB - AP23CP5**

**75 hours**

### LIST OF PROGRAMS:

- Simple form Design with controls in VB .Net
- Windows application using controls structures and Arrays.
- Creation of menus.
- Mouse events using VB.Net.
- Implementing Message Box and Input Box functions.
- Validation controls in VB .Net
- Web controls in ASP .Net
- Validation control in ASP.Net.

- Implementing data grid.
- Web page creation using ASP.Net.
- Database connectivity program using ASP.Net.

## **PEDAGOGY**

- Demonstration of working environment / Tools / Software / Program

## **COURSE DESIGNERS**

1. Mrs. S. Mohana Priya
2. Mrs. K. S. Kamalam

| COURSE CODE | COURSE TITLE                       | CATEGORY  | L | T | P  | CREDIT |
|-------------|------------------------------------|-----------|---|---|----|--------|
| AP23SBP1    | DATA ANALYTICS - R PROGRAMMING LAB | Practical |   | 4 | 41 | 3      |

### Preamble

- This course is used to understand the concepts used to perform vector operations and matrix operations.
- It familiarizes the students with various statistics operations mean, median etc., are performed.
- It enables the student to explore data from a variety of sources by building regression model and to generate charts, graphs, and other data representations.

### Course Learning Outcomes

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

| CLO Number | CLO Statement                                                                                                         | Knowledge Level |
|------------|-----------------------------------------------------------------------------------------------------------------------|-----------------|
| CLO1.      | Understand the fundamental syntax of R through demonstrations, and writing R code                                     | K2              |
| CLO2.      | Apply concepts such as data types, iteration, control structures, functions, and Boolean operators using R            | K2              |
| CLO3.      | Able to import a variety of data formats into R using R Studio                                                        | K3              |
| CLO4.      | Explore data-sets to perform appropriate statistical tests using R and generate charts & graphs visualization using R | K3              |

### Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium; L-Low

### DATA ANALYTICS - R PROGRAMMING- AP23SBP1

(41Hrs)

#### List of Programs

1. Create two vectors. Perform arithmetic addition and sort it in ascending and descending order.
2. Find the Mean, median and Mode for the values given in vector.
3. Write an R program to merge two given lists into one list.
4. Write an R program to find all elements of a given list that are not in another given list.
5. Write an R program to create an ordered factor from data consisting of the names of months.
6. Write an R program to convert a given pH levels of soil to an ordered factor.

7. Write an R program to create inner, outer, left, right join (merge) from given two data frames.
8. Write an R program to save the information of a data frame in a file and display the information of the file.
9. Write an R program to create two 2x3 matrix and add, subtract, multiply and divide the matrixes.
10. Finding the transpose of a matrix by using the t() function and by iterating over each value using Loops
11. Write a program using R bar plot to display maximum temperature in a week
12. Write a R histogram program to plot Maximum Daily Temperature at La Guardia Airport
13. Create a scatter plot and scatter plot matrix on the dataset MT Cars.
14. Write an R program to display the temperature of each month using a boxplot
15. Write an R program to display monthly expenditure in a Pie chart.

### **Pedagogy**

- Demonstration of working environment / Tools / Software / Program

### **Course Designers:**

1. Mrs. S. Mohana Priya

| <b>COURSE CODE</b> | <b>COURSE TITLE</b>                      | <b>CATEGORY</b> | <b>L</b> | <b>T</b> | <b>P</b> | <b>CREDIT</b> |
|--------------------|------------------------------------------|-----------------|----------|----------|----------|---------------|
| <b>AP21AC1</b>     | <b>ALC: ENTERPRISE RESOURCE PLANNING</b> | <b>Theory</b>   | <b>-</b> | <b>-</b> | <b>-</b> | <b>5</b>      |

### **Preamble**

To provide an overview of an enterprise-wide software solution that integrates and automates business functions of an organization and implementation of various Modules.

### **Course Learning Outcomes**

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

| <b>CLO Number</b> | <b>CLO Statement</b>                                                            | <b>Knowledge Level</b> |
|-------------------|---------------------------------------------------------------------------------|------------------------|
| CLO1              | Recall the fundamentals of ERP implementation methodology and different modules | K1                     |
| CLO2              | Understand the concepts of ERP Technologies                                     | K2                     |
| CLO3              | Apply the acquired knowledge in real-time scenario                              | K3                     |
| CLO4              | Analyse the present and future directions in ERP                                | K4                     |

### **Mapping with Programme Learning Outcomes**

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

S- Strong; M-Medium;

### **ALC: ENTERPRISE RESOURCE PLANNING - AP21AC1**

### **SYLLABUS**

#### **UNIT I:**

INTRODUCTION TO ERP: Overview – Benefits of ERP – ERP and Related Technologies.

#### **UNIT II:**

ERP IMPLEMENTATION: Implementation Life Cycle – Implementation Methodology – Hidden Costs – Organizing Implementation.

#### **UNIT III:**

BUSINESS MODULES: Business Modules in an ERP Package – Human Resource – Plant Maintenance – Quality Management – Sales and Distribution.

#### **UNIT IV:**

ERP MARKET: ERP Market Place – SAP AG – Oracle Corporation – QAD – System Software Associates.

#### **UNIT V:**

ERP – PRESENT AND FUTURE: Turbo Charge the ERP System – EIA – ERP and Internet.

#### **TEXT BOOK**

| <b>S.NO</b> | <b>AUTHOR</b> | <b>TITLE OF THE BOOK</b> | <b>PUBLISHERS</b> | <b>YEAR &amp; EDITION</b> |
|-------------|---------------|--------------------------|-------------------|---------------------------|
| 1           | Alexis Leon   | ERP Demystified          | Tata McGraw Hill  | 2014, 3 <sup>rd</sup> Edn |

#### **REFERENCE BOOKS**

| <b>S.NO</b> | <b>AUTHOR</b>                                        | <b>TITLE OF THE BOOK</b>                                   | <b>PUBLISHERS</b>   | <b>YEAR &amp; EDITION</b> |
|-------------|------------------------------------------------------|------------------------------------------------------------|---------------------|---------------------------|
| 1           | Joseph A. Brady,<br>Ellen F. Monk, Bret<br>J.Wangner | Concepts in<br>Enterprise Resource<br>Planning             | Thomson<br>Learning | 2001, 1 <sup>st</sup> Edn |
| 2           | Vinod Kumar Garg<br>and N.K.Venkata<br>Krishnan      | Enterprise Resource<br>Planning – Concepts<br>and Planning | Prentice Hall       | 2003, 2 <sup>nd</sup> Edn |
| 3           | Jose Antonio Fernandz                                | The SAP R /3 Hand<br>book                                  | Tata McGraw<br>Hill | 2000, 2 <sup>nd</sup> Edn |

#### **COURSE DESIGNER**

1. Mrs. K.Geethalakshmi
2. Mrs. M.Selvanayaki

| <b>COURSE CODE</b> | <b>COURSE TITLE</b>               | <b>CATEGORY</b> | <b>L</b> | <b>T</b> | <b>P</b> | <b>CREDIT</b> |
|--------------------|-----------------------------------|-----------------|----------|----------|----------|---------------|
| <b>AP21AC2</b>     | <b>ALC: MOBILE EDGE COMPUTING</b> | <b>Theory</b>   | -        | -        | -        | <b>5</b>      |

### Preamble

- Learn comprehensive, self-contained knowledge on Mobile Edge Computing (MEC) - 5G/6G and the Internet of Things ideas and best practices - Achieving intelligence in next generation wireless communications and computing networks - Centralized computing mechanisms incur high latency and network congestion.

### Course Learning Outcomes

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

| <b>CLO Number</b> | <b>CLO Statement</b>                                                                                                     | <b>Knowledge Level</b> |
|-------------------|--------------------------------------------------------------------------------------------------------------------------|------------------------|
| CLO1              | Learn basic concepts of MEC, to explore the promising application scenarios of MEC integrated with emerging technologies | K1                     |
| CLO2              | Utilize insights into the possible future directions of MEC, MEC models and applications in different scenarios.         | K2                     |
| CLO3              | Analyse how MEC meets blockchain, artificial intelligence, and distributed machine learning.                             | K3                     |
| CLO4              | Interpret emerging applications of MEC in a pandemic, the Industrial Internet of Things, and disaster management.        | K3                     |

### Mapping with Programme Learning Outcomes

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

S- Strong; M-Medium; L-Low

### ALC: MOBILE EDGE COMPUTING - AP21AC2 SYLLABUS

#### UNIT 1

Introduction: Mobile Cloud Computing (MCC) - Overview of MEC - Mobile Edge Computing: A Hierarchical Architecture of Mobile Edge Computing (MEC) - Computation Model: Computation Model of Local Execution - Computation Model of Full Offloading - A Computation Model for Partial Offloading - Offloading Policy : Binary Offloading - Partial Offloading - Challenges and Future Directions.

## UNIT II

3 Mobile Edge Caching : Introduction - The Architecture of Mobile Edge Caching - Caching Performance Metrics : Hit Rate Ratio - Content Acquisition Latency - Quality of Experience (QoE) - Caching System Utility Caching Service Design and Data Scheduling Mechanisms : Edge Caching Based on Network Infrastructure Services - Edge Caching Based on D2D Services - Hybrid Service-Enabled Edge Caching - Case Study: Deep Reinforcement Learning-Empowered Social-Aware Edge Caching : System Model - Numerical Results.

## UNIT III

Mobile Edge Computing for Beyond 5G/6G: Fundamental Characteristics of 6G - Integrating Mobile Edge Computing (MEC) into 6G: Motivations, Applications, and Challenges : Use Cases of Integrating MEC into 6G - Applications of Integrating MEC into 6G - Challenges of Integrating MEC into 6G - Case Study: MEC-Empowered Edge Model Sharing for 6G : Sharing at the Edge: From Data to Model - Architecture of Edge Model Sharing - Processes of Edge Model Sharing.

## UNIT IV

5 Mobile Edge Computing for the Internet of Vehicles : Introduction - Challenges in VEC - Architecture of VEC - Key Techniques of VEC : Task Offloading - Heterogeneous Edge Server Cooperation - AI-Empowered VEC - A Case Study: Predictive Task Offloading for Fast-Moving Vehicles - Mobile Edge Computing for UAVs : Unmanned Aerial Vehicle-Assisted Mobile Edge Computing (MEC) Networks - Joint Trajectory and Resource Optimization in UAV-Assisted MEC Networks : Resource Allocation and Optimization in the Scenario of a UAV Exploiting MEC Computing Capabilities - Resource Allocation and Optimization in the Scenario of a UAV Serving as a Computing Server.

## UNIT V

The Future of Mobile Edge Computing: The Integration of Blockchain and Mobile Edge Computing (MEC): The Blockchain Structure - Blockchain Classification - Integration of Blockchain and MEC - Edge Intelligence: The Convergence of AI and MEC: Federated Learning in MEC - Transfer Learning in MEC - MEC in Other Applications: MEC in Pandemics - MEC in the Industrial IoT (IIoT) - MEC in Disaster Management.

### TEXT BOOK:

| S.NO | AUTHOR    | TITLE OF THE BOOK     | PUBLISHERS                        | YEAR & EDITION            |
|------|-----------|-----------------------|-----------------------------------|---------------------------|
| 1    | Yan Zhang | Mobile Edge Computing | Springer International Publishing | 2022, 1 <sup>st</sup> Edn |

### REFERENCE BOOKS

| S.NO | AUTHOR                                                          | TITLE OF THE BOOK                      | PUBLISHERS                        | YEAR & EDITION            |
|------|-----------------------------------------------------------------|----------------------------------------|-----------------------------------|---------------------------|
| 1    | Anwesha Mukherjee, Debashis De, Rajkumar Buyya, Soumya K. Ghosh | Mobile Edge Computing                  | Springer International Publishing | 2021, 1 <sup>st</sup> Edn |
| 2    | Gerardus Blokdyk                                                | Mobile Edge Computing A Complete Guide | 5 STAR Cooks Publishers           | 2019, 1 <sup>st</sup> Edn |

| COURSE CODE | COURSE TITLE     | CATEGORY | L  | T | P | CREDIT |
|-------------|------------------|----------|----|---|---|--------|
| NM21CS1     | CYBER SECURITY 1 | Theory   | 30 | - | - | Grade  |

### Preamble

- This course introduces fundamental concepts of Cyber Security in the digital era. It provides 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 1- NM21CS1 SYLLABUS

**30 Hours**

#### 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:** N map – 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 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. Security in the digital age: social media security threats and vulnerabilities by Henry A. Oliver, Create Space Independent publishing platform.

## EVALUATION PATTERN

|            |          |
|------------|----------|
| QUIZ       | 60 MARKS |
| CASE STUDY | 20 MARKS |
| POSTER     | 20 MARKS |