

SRI SARADA COLLEGE FOR WOMEN (AUTONOMOUS)
SALEM - 16
Reaccredited with B++ Grade by NAAC
(Affiliated to Periyar University)



PG & RESEARCH DEPARTMENT OF COMPUTER SCIENCE

OUTCOME BASED SYLLABUS
B.Sc. Computer Science
(For the students admitted in 2021 - 22)

B. Sc. COMPUTER SCIENCE

PROGRAMME OUTCOMES

- PO1** To apply knowledge of computing appropriate to the discipline
- PO2** To identify, formulate, and develop solutions to computational challenges based on ethical principles.
- PO3** To design, implement, and evaluate a computational system to meet desired needs within realistic constraints.
- PO4** To use appropriate techniques, skills and tools necessary for sustainable development of societal and environmental contexts.
- PO5** To apply programming skills with their enhanced creativity as an individual or team.
- PO6** To equip students with sufficient knowledge web based programming languages for research project management.

SRI SARADA COLLEGE FOR WOMEN (AUTONOMOUS), SALEM - 16.
DEPARTMENT OF COMPUTER SCIENCE
B.Sc. Computer Science
PROGRAMME STRUCTURE UNDER CBCS
(For the students admitted in 2021-22)
Total Credits: 140 + Extra Credit (Maximum 28)

I SEMESTER

| Part | Course | Course Title | Code | Hrs./Week | Credits |
|------|---|---|---------------------------------|-----------|-----------|
| I | Language - I | Tamil/Hindi/Sanskrit - I | 21ULTC1/ 21ULHC1/ 21ULSC1 | 6 | 3 |
| II | English - I | Communicative English - I | 21ULEC1 | 6 | 3 |
| III | Core Course - I | Problem Solving & Programming Techniques | 21UCSC1 | 5 | 4 |
| III | Core Practical - I | 'C' Programming | 21UCSQC1 | 5 | 3 |
| III | Allied - I | Mathematics - I | 21UCSAC1 | 5 | 5 |
| IV | Skill Based - I | Graphics Design & Photo Editing | 21UCSSQC1 | 2 | 2 |
| V | Extension Activity | Group Project based on Extension Activity | 21UEXC1 | 1 | 1 |
| | | Total | | 30 | 21 |
| VI | Articulation and Idea Fixation Skills | | | | |
| | Physical Fitness Practice - 35 hours per Semester | | | | |
| | Advanced Diploma in Computer Programming Level - 1 : Certificate Course - 100 hours per year | | | | |

II SEMESTER

| Part | Course | Course Title | Code | Hrs./Week | Credits |
|------|---|--|---------------------------------|-----------|-----------|
| I | Language - II | Tamil/Hindi/Sanskrit - II | 21ULTC2/ 21ULHC2/ 21ULSC2 | 6 | 3 |
| II | English - II | Communicative English - II | 21ULEC2 | 6 | 3 |
| III | Core Course - II | Object Oriented Programming With Java | 21UCSC2 | 4 | 4 |
| III | Core Practical - II | Java Programming | 21UCSQC2 | 5 | 3 |
| III | Allied - I | Mathematics - II | 21UCSAC2 | 5 | 5 |
| IV | Skill Based - II | HTML Programming | 21UCSSQC2 | 2 | 2 |
| IV | Environmental Studies | Environmental Studies | 21UEVSC | 2 | 1 |
| | | Group Project Based On Environmental Studies | 21UEVSPC | | 1 |
| | | Total | | 30 | 22 |
| VI | Articulation and Idea Fixation Skills - 1 Extra Credit | | | | |
| | Physical Fitness Practice - 35 hours per Semester -- 1 Extra Credit | | | | |
| | Certificate Course in Yoga - 30 hours -- 1 Extra Credit | | | | |
| | Advanced Diploma in Computer Programming Level - 1 : Certificate Course - 100 hours per year - 2 Extra Credits | | | | |
| | Extra credits are given for extra skills and courses qualified in MOOC/NPTEL | | | | |

III SEMESTER

| Part | Course | Course Title | Code | Hrs./Week | Credits |
|--|---|---|---------------------------------|-----------|-----------|
| I | Language - III | Tamil/Hindi/Sanskrit - III | 21ULTC3/ 21ULHC3/ 21ULSC3 | 6 | 3 |
| II | English - III | Communicative English - III | 21ULEC3 | 6 | 3 |
| III | Core Course-III | Data Structures and Algorithms | 21UCSC3 | 5 | 5 |
| III | Core Practical-III | Data Structures using 'C' | 21UCSQC3 | 4 | 2 |
| III | Allied - II | Statistical Methods - I | 21UCSAC3 | 5 | 5 |
| IV | Skill Based - III | Industry 4.0 | 21UCSSQC3 | 2 | 2 |
| IV | Non - Major Elective - I | | | 2 | 2 |
| | | Total | | 30 | 22 |
| VI | Extension Activity | Group Project based on Extension Activity | | | |
| | Life Skill Courses | Course I: Communication Skill | | | 2 (Extra) |
| | Articulation and Idea Fixation Skills | | | | |
| | Physical Fitness Practice -- 35 hours per Semester | | | | |
| | Advanced Diploma in Computer Programming Level - 2 : Diploma Course - 100 hours per year | | | | |
| Extra credits are given for extra skills and courses qualified in MOOC/NPTEL | | | | | |

| | | |
|--|---------------------|------------|
| Non-Major Elective - I for II B.A./B.Sc./B.Com. | Photo Editing | 21UCSQNEC1 |
| Allied for II B.Sc. Statistics | "C" Programming - I | 21USTAC3 |

IV SEMESTER

| Part | Course | Course Title | Code | Hrs./Week | Credits |
|---|---|---|---------------------------------|-----------|-----------|
| I | Language - IV | Tamil/Hindi/Sanskrit - IV | 21ULTC4/ 21ULHC4/ 21ULSC4 | 6 | 3 |
| II | English - IV | Communicative English - IV | 21ULEC3 | 6 | 3 |
| III | Core Course - IV | Relational Database Management Systems | 21UCSC4 | 5 | 5 |
| III | Core Practical - IV | Database Lab | 21UCSQC4 | 4 | 2 |
| III | Allied - II | Statistical Methods - II | 21UCSAC4 | 5 | 5 |
| IV | Skill Based - IV | PHP with MySQL | 21UCSSQC4 | 2 | 2 |
| IV | Non-Major Elective - II | | | 2 | 2 |
| | | Total | | 30 | 22 |
| VI | Extension Activity | Group Project based on Extension Activity | | | 2(Extra) |
| | Life Skill Courses | Course II: Professional Skills | | | 2(Extra) |
| | Articulation and Idea Fixation Skills -- 1 Extra Credit | | | | |
| | Physical Fitness Practice - 35 hours per Semester -- 1 Extra Credit | | | | |
| | Advanced Diploma in Computer Programming Level - 2 : Diploma Course - 100 hours per year-- 2 Extra Credits | | | | |
| Extra credits are given for extra skills and courses qualified in MOOC/NPTEL and societal oriented group projects | | | | | |

| | | |
|---|----------------------|------------|
| Non-Major Elective - II for II B.A./B.Sc./B.Com. | Animation | 21UCSQNEC2 |
| Allied for II B.Sc. Statistics | “C” Programming - II | 21USTAC4 |

V SEMESTER

| Part | Course | Course Title | Code | Hrs./ Week | Credits |
|--|--|--|--|---------------|-----------|
| III | Core Course - V | .NET Programming | 21UCSC5 | 5 | 5 |
| III | Core Course - VI | Computer Architecture and Organization | 21UCSC6 | 5 | 5 |
| III | Core Course - VII | Operating Systems | 21UCSC7 | 5 | 5 |
| III | Elective - I | Software Engineering/ Artificial Intelligence/ Client Server Architecture/ Microprocessor | 21UCSEC1/ 21UCSEC1A/ 21UCSEC1B/ 21UCSEC1C | 4 | 4 |
| III | Core Practical - V | .NET Programming Lab | 21UCSQC5 | 4 | 2 |
| IV | Core Practical - VI | Microprocessor and Operating System Lab | 21UCSQC6 | 4 | 2 |
| IV | Non-Major Skill Based -1 | | | 2 | 2 |
| IV | Value Education | | 21UVENC | 1 | - |
| | | Total | | 30 | 25 |
| VI | Extension Activity | Group Project based on Extension Activity | | | |
| | Life Skill Courses | Course III : Leadership Skills | | | 2 (Extra) |
| | Articulation and Idea Fixation Skills | | | | |
| | Physical Fitness Practice -- 35 hours per Semester | | | | |
| | Advanced Diploma in Computer Programming Level - 3 : Advanced Diploma Course - 100 hours per year | | | | |
| | Internship Training -- 1 Extra Credit | | | | |
| Extra credits are given for extra skills and courses qualified in MOOC/NPTEL | | | | | |

| | | |
|---|---------------------------------------|------------|
| Non-Major Skill Based - I for III B.A./B.Sc./B.Com. | Data Analytics & Visualization - I | 21UCSQNSC1 |
|---|---------------------------------------|------------|

VI SEMESTER

| Part | Course | Course Title | Code | Hrs./Week | Credits |
|--|--|---|--|-----------|--------------|
| III | Core Course - VIII | Computer Graphics | 21UCSC8 | 5 | 5 |
| III | Core Course - IX | Data Mining | 21UCSC9 | 5 | 5 |
| III | Elective - II | Python Programming Language/ Compiler Design/ Assembly Language Programming/ Grid Computing | 21UCSEC2/ 21UCSEC2A/ 21UCSEC2B/ 21UCSEC2C | 4 | 4 |
| III | Elective - III | Computer Networks/ Web Designing using Open Source/ Mobile Communications/ System Analysis and Design/ | 21UCSEC3/ 21UCSEC3A/ 21UCSEC3B/ 21UCSEC3C | 4 | 4 |
| III | Core Practical – VII | Python Programming Lab | 21UCSQC7 | 4 | 2 |
| IV | Core Practical – VIII | Project | 21UCSQC8 | 5 | 4 |
| IV | Non-Major Skill Based -2 | | | 2 | 2 |
| IV | Value Education | | 21UVENC | 1 | 2 |
| Total | | | | 30 | 28 |
| VI | Extension Activity | Group Project based on Extension Activity | | | 2 (Extra) |
| | Life Skill Courses | Course IV : Universal Human Values | | | 2 (Extra) |
| | Articulation and Idea Fixation Skills -- 1 Extra Credit | | | | |
| | Physical Fitness Practice - 35 hours per Semester -- 1 Extra Credit | | | | |
| | Advanced Diploma in Computer Programming Level - 3 : Advanced Diploma Course - 100 hours per year-- 2 Extra Credits | | | | |
| Extra credits are given for extra skills and courses qualified in MOOC/NPTEL | | | | | |

| | | |
|--|--|------------|
| Non-Major Skill Based - II for III B.A./B.Sc./B.Com. | Data Analytics & Visualization - II | 21UCSQNSC2 |
|--|--|------------|

Programme Title : B.Sc. Computer Science
Course Title : Core Course-I: Problem Solving & Programming Techniques
Course Code : 21UCSC1 **Hours/Week: 5**
Semester : I **Credits: 4**
Course Objectives:

1. Provide fundamental knowledge in “C”
2. Introduce structured programming
3. Familiarize various features of “C”
4. Acquaint different file processing methods in “C”

SYLLABUS

UNIT - I (Hours: 15)

Computer Fundamentals: Introduction to Computers: Characteristics of Computers - History of Computers - Generations of Computers - Classification of Computers - Applications of Computers Overview of C - Constants - Variables - Data types - Operators and Expression - managing Input and Output operators.

UNIT - II (Hours: 15)

Decision making and Branching - If Statement , Switch and Goto Statement - Decision Making and Looping - While Statement Do statement - For statement - Arrays - One and Two Dimensional Arrays - Handling of Character String - Reading - Writing - Arithmetic Operations.

UNIT - III (Hours: 15)

Introduction to Functions - The Form of C Functions - Category of Functions - Nesting of Functions - Recursion - Functions with Arrays.

UNIT - IV (Hours: 15)

Structure and Unions - Definition - Initialization - Comparison - Arrays of Structures - Structures within the Structures - Structure and Function - Union.

UNIT - V: (Hours: 15)

File Management in C - Introduction - Defining and Opening a File - Closing a File - Input/Output Operations on Files - Error Handling during I/O Operations - Random Access to Files - Command Line Arguments.

Books for Study:

1. R.K. Taxali, PC Software for Windows 98 Made Simple, Tata McGraw-Hill.
Chapters 1.1 to 1.6
2. E. Balagurusamy, Programming in ANSI C, Third edition, Tata McGraw-Hill.
Chapter 1-10& 12

Books for Reference:

1. P. K. Sinha & Priti Sinha, "Computer Fundamentals", BPB Publications, 2007.
2. Dr. Anita Goel, Computer Fundamentals, Pearson Education, 2010.
3. V. Raja Raman - Computer Programming in C - Prentice - Hall of India.

Web Resources:

- <http://www.learn-c.org/>
- <http://crasseux.com/books/ctutorial/>
- <http://www.strath.ac.uk/IT/Docs/Ccourse/>
- **Course Outcomes (CO):** On completion of the course, students should be able to

| CO Number | CO Statement | Knowledge Level |
|-----------|---|-----------------|
| CO1 | Relate the essential notions of C Programming in problem solving | K1 |
| CO2 | Explain the various concepts of C Programming and problem solving skills | K2 |
| CO3 | Make use of different features of C Programming to Solve problems | K3 |
| CO4 | Develop diverse applications of C Programming in real world problems | K6 |

Mapping of COs with POs:

| CO \ PO | PO | | | | | |
|---------|-----|-----|-----|-----|-----|-----|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 |
| CO1 | S | M | M | L | S | S |
| CO2 | S | S | S | S | S | L |
| CO3 | S | M | M | M | S | S |
| CO4 | S | S | S | S | L | L |

S - Strong, M - Medium, L - Low

Programme Title : B.Sc. Computer Science
Course Title : Core Practical-I: “C” Programming Language
Course Code : 21UCSQC1 **Hours/Week: 5**
Semester : I **Credits: 3**
Course Objectives:

1. Introduce “C” program execution
2. Familiarize the different decision making statements in “C”
3. Build programs using arrays and strings
4. Provide basic knowledge on working with files and user-defined functions

SYLLABUS

1. Programs using simple variables, constants, expressions and operators.
2. Programs to read characters and to print them.
3. Programs using all decision making and looping statements.
4. Programs using one and multidimensional arrays.
5. Programs using character arrays and strings.
6. Programs with user-defined functions.
7. Programs using structures.
8. Programs using files.

Course Outcomes (CO): On completion of the course, students should be able to

| CO Number | CO Statement | Knowledge Level |
|-----------|---|-----------------|
| CO1 | Define the C programming language concept | K1 |
| CO2 | Interpret the different types of files and operations in C language | K2 |
| CO3 | Solve mathematical problems in C language | K3 |
| CO4 | Develop C program for scientific applications | K6 |

Mapping of COs with POs:

| CO | PO | | | | | |
|-----|-----|-----|-----|-----|-----|-----|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 |
| CO1 | S | S | M | M | M | S |
| CO2 | S | S | L | L | S | S |
| CO3 | S | L | S | S | S | S |
| CO4 | S | S | S | S | S | S |

S - Strong, M - Medium, L - Low

Course Title : Skill Based - I : Graphics Design & Photo Editing
Course Code : 21UCSSQC1 Hours/Week: 2
Semester : I Credits: 2

Course Objectives:

1. Familiarize with graphic designing
2. Provide techniques for image editing

SYLLABUS

List of Practicals:

GRAPHIC DESIGN

1. Using a path Fitting the Text and Blending the shape
2. Using effects create and Envelope
3. Creating concentric circle using the contour effect
4. Using the distortion effect for Zipper, Twister, Push and Pull
5. Stretching, Scaling, Reflecting and Mirroring an object
6. Applying brush strokes
7. Brushstroke Text Effect
8. Create frames
9. Cool Tricks with Paragraph text
10. Bouncing ball

IMAGE EDITING

1. Morphing using selection tool
2. Cloning using clone stamp tool
3. Join two images by using layers
4. Light effects
5. Text effects
6. Animation
7. Transparency effects
8. Creating multiple images
9. Clipping mask
10. Changing the figure from black and white to color

Course Outcomes (CO) : On completion of the course, students should be able to

| CO Number | CO Statement | Knowledge Level |
|------------------|--|------------------------|
| CO1 | Recollect about digital images | K1 |
| CO2 | Understand the features of graphics | K2 |
| CO3 | Apply the digital image editing to real time applications | K3 |

Mapping of COs with POs :

| COs \ PO | PO | | | | | |
|-----------------|-----------|-----|-----|-----|-----|-----|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 |
| CO1 | S | M | M | L | S | S |
| CO2 | S | S | S | S | S | L |
| CO3 | S | M | M | M | S | S |

S - Strong, M - Medium, L - Light

Programme Title : B.Sc., Computer Science
Course Title : Core Course - II: Object Oriented Programming with Java
Course Code : 21UCSC2 **Hours/Week: 4**
Semester : II **Credits: 4**

Course Objectives:

1. Introduce Object Oriented Paradigm
2. Acquire programming knowledge in Java with its special features
3. Learn to solve the real time problems in Java environments

SYLLABUS

UNIT - I (Hours :15)

Fundamentals of Object Oriented Programming - Benefits of OOP - Applications of OOP JAVA Evolution - Hardware and Software Requirements - Overview of Java language - Simple Java Programs - More of Java Applications with Two Classes - Java Program Structures - Java Tokens - Java Statements - Java Virtual Machine - Command Line Arguments - Programming Style, Constants, Variables and data types - Giving Value to Variables - Scope of Variables - Symbolic Constants - Type Casting - Getting Value of Variables - Standard Default Values.

UNIT - II (Hours :10)

Operators and Expressions - Type Conversion in Expression - Operator precedence and associativity - Mathematical Functions - Decision Making and Branching - Decision Making with if Statement - Simple if Statement - The if ... Else Statement - Nesting of If .. else statement - the else if ladder - The Switch Statement - The ?: Operator - Decision Making and Looping - The While Statement - The Do Statement - The For Statement - Jumps in Loops - Labeled Loops.

UNIT - III (Hours :15)

Classes, Objects and Methods - Defining a Class - Fields Declaration - Methods Declaration - Creating Objects - Accessing Class Members - Constructors - Methods Overloading - Static Member - Nesting of Methods - Inheritance - Overriding Methods - Final Variables and Methods - Final Classes - Finalizer Methods - Abstract Methods and Classes - Methods with Varargs - Visibility Control - Arrays, Strings and Vectors - One-dimensional arrays - Creating an Array - Two-Dimensional Arrays - Strings - Vectors - Wrapper Classes - Enumerated Types - Annotations - Interfaces, Multiple Inheritance : Introduction - Defining Interfaces - Extending Interfaces - Implementing Interfaces - Assessing Interface Variables.

UNIT - IV (Hours :10)

Packages - Java API Packages - Using System Packages - Naming Conventions - Creating Packages - Accessing Package - Adding a Class to a Package - Hiding Classes - Static Import - Multithreaded Programming - Creating Threads - Extending the Thread Class - Stopping and Blocking a Thread - Life Cycle of a Thread - Using Thread Methods - Thread Exceptions - Thread Priority - Synchronization - Implementing the Runnable Interface - Inter-Thread Communication - Managing Errors and Exceptions - Types of Errors - Exceptions - Syntax of Exception Handling Code - Multi Catch Statements - Using Finally Statements - Throwing our Own Exceptions - Using Exceptions for Debugging.

Unit - V (Hours :10)

Applet Programming: Introduction - How Applets Differ from Applications - Preparing to Write Applets - Building Applet Code - Applet Life Cycle - Creating and Executing Applet - Designing a Web Page - Applet Tag - Adding Applet to HTML File - Running the Applet - More About Applet Tag - Passing Parameters to Applets - Aligning the Display - More about HTML Tags - Displaying Numerical Values - Getting Input from the User - Concept of Streams - Stream Classes - Byte Stream Classes - Character Stream Classes - Using Streams - Other Useful I/O Classes.

Books for Study:

1. E. Balagurusamy, "Programming with Java - A Primer", TMH, Fourth Edition, 2010.
Chapters: 1 to 14 & 16 (Chapter 16 - Up to Page No. 287)

Books for Reference:

1. Herbert Schildt, "The Complete Reference JAVA 2", TMH, Seventh Edition, 2006.
2. C. Xavier, "Programming with JAVA 2", SCITECH, Third Reprint, June 2004.
3. C. Muthu, "Programming with JAVA", Vijay Nicole Imprints (P) Ltd., 2004.

Web Resources :

1. <https://www.tutorialspoint.com>
2. <https://beginnersbook.com/java-tutorial-for-beginners-with-examples>
3. <https://www.w3schools.in/java-tutorial>
4. <https://www.udemy.com/java-tutorial>

Course Outcomes (CO): On completion of the course, students should be able to

| CO Number | CO Statement | Knowledge Level |
|------------------|--|------------------------|
| CO1 | Recall the fundamentals of object oriented programming paradigm | K1 |
| CO2 | Illustrate simple java programs using java conditional and unconditional statements | K2 |
| CO3 | Apply and Analyze the reusable programming using the concepts of inheritance and polymorphism | K3&K4 |
| CO4 | Recommend the concepts of java advanced packages in programming | K5 |
| CO5 | Create web applications using applet programming | K6 |

Mapping of COs with POs:

| COs | POs | | | | | |
|------------|------------|------------|------------|------------|------------|------------|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 |
| CO1 | S | M | M | L | S | S |
| CO2 | S | S | S | S | S | L |
| CO3 | S | M | M | M | S | S |
| CO4 | S | S | S | S | L | L |
| CO5 | M | S | S | L | L | S |

S - Strong, M - Medium, L - Low

Programme Title : B.Sc., Computer Science
Course Title : Core Practical - II : Java Programming
Course Code : 21UCSQC2
Semester : II

Hours/Week: 5
Credits: 3

Course Objectives :

1. Introduce web designing with open source technologies
2. Acquire programming skill in Java
3. Develop and deploy websites in real time web environments

SYLLABUS

1. Programs using constructor and destructor.
2. Creation of classes and use of different types of functions.
3. Count the number of objects created for a class using static member function.
4. Write programs on interfaces.
5. Write programs on packages.
6. Write programs using function overloading.
7. Programs using inheritance
8. Programs using IO streams.
9. Programs using Applets.
10. Write a program using exception handling mechanism.

Course Outcomes (CO): On completion of the course, students should be able to

| CO Number | CO Statement | Knowledge Level |
|-----------|--|-----------------|
| CO1 | Select the essential features of Object oriented programming | K1 |
| CO2 | Demonstrate IDE to test simple & complex programs | K2 |
| CO3 | Analyze the concept of Exception handling. | K4 |
| CO4 | Build the concept of Applet programming. | K6 |

Mapping of COs with POs:

| COs | POs | | | | | |
|-----|-----|-----|-----|-----|-----|-----|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 |
| CO1 | S | M | M | L | S | S |
| CO2 | S | S | S | S | S | L |
| CO3 | S | M | M | M | S | S |
| CO4 | S | S | S | S | L | L |

S - Strong, M - Medium, L - Low

Programme Title : B.Sc. Computer Science
Course Title : Skill Based Practical - II: HTML Programming
Course Code : 21UCSSQC2 **Hours/Week : 2**
Semester : II **Credits : 2**

Course Objectives:

1. Introduce “HTML” programming concepts
2. Familiarize with different tags in HTML.
3. Construct colourful web pages.
4. Provide basic knowledge on working with frames and links.

1. Create a HTML document with the following formatting options:

- i. Bold
- ii. Italics
- iii. Underline
- iv. Headings (Using H1 to H6 heading styles)
- v. Font (Type, Size and Color)
- vi. Background (Colored background/Image in background)
- vii. Paragraph
- viii. Line Break
- ix. Horizontal Rule

2. Create a HTML document which consists of:

- i. Ordered List
- ii. Unordered List
- iii. Nested List
- iv. Image

3. Create a HTML document which implements Internal linking as well as external linking.

4. Create a table using HTML which consists of columns for Roll No., Student’s name and grade.

5. Create a form using HTML which has the following types of controls.

Text Box

Option / Radio Button

Check Boxes

Reset and Submit Buttons

6. Create a HTML document having multiple frames.

7. Create HTML document with image as a background and Create link using image.

Course Outcomes (CO) : On completion of the course, students should be able to

| CO Number | CO Statement | Knowledge Level |
|------------------|---|------------------------|
| CO1 | Understand the basic concepts of HTML programming | K2 |
| CO2 | Implement and apply different tags in HTML. | K3 |
| CO3 | Ability to analyze different types of visual basic applications. | K4 |

Mapping of COs with POs:

| CO \ PO | PO | | | | | |
|----------------|-----------|-----|-----|-----|-----|-----|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 |
| CO1 | S | S | M | M | M | S |
| CO2 | S | S | L | L | S | S |
| CO3 | S | L | S | S | S | S |

S - Strong M - Medium L – Light

Programme Title : B.Sc. Computer Science
Course Title : Core Course - III : Data Structures and Algorithms
Course Code : 21UCSC3 **Hours / Week : 5**
Semester : III **Credits: 5**
Course Objectives :

1. Introduce basic problem solving techniques and analysis of algorithms.
2. Impart knowledge on ADT such as List, Stack, Queue
3. Explore the concept of priority queues and circular queues
4. Learn about binary trees
5. Provide exposure in graph theory

SYLLABUS

UNIT - I (Hours: 15)

Introduction - Algorithms-Data Structures-Definition and Classification-Analysis of Algorithms-Efficiency-Asymptotic Notation-Time Complexity of an Algorithm-Average, Best and Worst Case Complexities-Recursive Programs -Arrays-Operations - Number of Elements in an Array - Representations of Arrays - Applications.

Unit - II (Hours: 15)

Stacks – Introduction - Stack Operations – Application – Queues – Introduction -Operations on Queues- Circular Queues - Other Types of Queues - Applications.

Unit - III(Hours: 15)

Linked Lists-Singly, Doubly, Circularly, Multiply Linked Lists -Applications.

Unit - IV(Hours: 15)

Trees and Binary Trees - Definition -Binary Trees Representation .-Binary Tree Traversals - Threaded Binary Trees - Graphs - Definitions - Representations of Graphs - Graph Traversals-Applications.

Unit - V (Hours: 15)

Greedy Algorithm - Dynamic Programming - Matrix Chain Multiplication - Hash Tables and Graph Algorithm.

Book for Study:

1. “Data Structures and algorithms concepts, Techniques and Applications”, G.A. VijayalakshmiPai, Tata McGraw Hill 2008.
Chapters 1 – 9
Module 8,9,10,18,19 from
NOC:2016: Programming Data Structures and Algorithms
<https://nptel.ac.in/courses/106/106/106106133/>

Books for Reference:

1. “Data Structures and Algorithms”, Seymour Lipschutz, Schanum's Series, Tata McGraw- Hill,
2. “Classic Data Structures”, DebasisSamanta, PHI, Second Edition
3. “Fundamentals of Data Structures”, Ellis Horowitz, SartajSahni, Galgotia Book Source 1976.

Web Resources:

- www.university.youth4work.com
- <https://www.studytonight.com/data-structure>
- https://ece.uwaterloo.ca/~dwharder/aads/Lecture_materials/
- <https://www.smartzworld.com/notes/data-structures-pdf-notes-ds>

Course Outcomes (CO) : On completion of the course, students should be able to

Mapping of COs with POs:

| CO Number | CO Statement | Knowledge Level |
|------------------|--|------------------------|
| CO1 | Recall the basic concepts of data structure | K1 |
| CO2 | Demonstrate the appropriate operations of data structures | K2 |
| CO3 | Utilize the concepts of data structures | K3 |
| CO4 | Create representation of graphs and Traversals | K6 |

S - Strong M - Medium L – Low

Programme Title : B. Sc. Computer Science (CBCS)
Course Title : Core Practical - III: Data Structures Using “C”
Course Code : 21UCSQC3 **Hours / Week** : 4
Semester : III **Credits**: 2
Course Objectives :

1. Provide hands on training in manipulating arrays
2. Perform operations in STACK & QUEUE
3. Perform binary tree traversal and searching
4. Implement conversion and evaluation of expressions

SYLLABUS

1. Matrix Addition and Subtraction.
2. Matrix Multiplication and Transpose.
3. Sparse Matrix Transformation.
4. Implementation of Push and Pop operations of a Stack using Array.
5. Implementation of Add and Delete operations of a Queue using Pointer.
6. Write a Program to check the given String is Palindrome or not using stack with pointers.
7. Write a Program to Create a Doubly Linked List.
8. Perform Tree Traversal for a Binary Tree Using Arrays and Recursion.
9. Binary Search
10. Depth first Search
11. Infix to Postfix Conversion
12. Evaluation of postfix expression

Course Outcomes (CO): On completion of the course, students should be able to

| CO Number | CO Statement | Knowledge Level |
|-----------|--|-----------------|
| CO1 | Recall the efficiency of each data structures | K1 |
| CO2 | Demonstrate data structure with its operations | K2 |
| CO3 | Choose appropriate data structure relevant to the problem | K6 |

Mapping of COs with POs:

| CO \ PO | PO | | | | | |
|----------------|-----------|-----|-----|-----|-----|-----|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 |
| CO1 | S | M | M | L | M | S |
| CO2 | M | S | S | S | S | L |
| CO3 | S | M | L | M | S | S |

S - Strong M - Medium L - Low

Programme Title : B. Sc. Computer Science
Course Title : Skill Based - III: Industry 4.0
Course Code : 21UCSSQC3
Semester : III

Hours / Week : 2
Credits: 2

Course Objectives:

1. Align the concepts with Industrial application
2. Introduce the concept of Mobile App.
3. Apply Internet of Things.

SYLLABUS

MOBILE APPLICATION

1. Buttons Event Handler.
2. Display Toast Messages using Toast.
3. Adding Background images for the apps.
4. Importing multimedia files to apps.
5. Developing a Calculator.

IOT LAB

To Develop an

1. IOT program to Switch ON/OFF LED light
2. IOT program for object detection using IR sensor
3. IOT program for Humidity and Temperature Monitoring
4. IOT program for Fire Detection
5. IOT program for Gas Leakage detection

Course Outcomes (CO) : On completion of the course, students should be able to

| CO Number | CO Statement | Knowledge Level |
|-----------|--|-----------------|
| CO1 | List the sensors and activators of Industry 4.0 | K1 |
| CO2 | Apply knowledge of sensors in the industry application development | K3 |
| CO3 | Develop Mobile Applications | K6 |

Mapping of COs with POs :

| CO \ PO | PO | | | | | |
|---------|-----|-----|-----|-----|-----|-----|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 |
| CO1 | S | M | M | L | S | S |
| CO2 | S | S | S | S | S | L |
| CO3 | S | M | M | M | S | S |

S – Strong, M – Medium, L – Low

Programme Title : B. Sc. Computer Science

Course Title : Non-Major Elective - I: Photo Editing

Course Code : 21UCSQNEC1

Semester : III

Hours/Week :2

Credit : 2

Course Objectives:

1. Introduce number of tools and commands for working on digital images or bitmaps
2. Familiarize the utilities for retouching color correcting and compositing.
3. Provide the most powerful range of features for designing images.
4. Provide powerful capacity to transform objects into Both of the web compatible bitmap file format.

SYLLABUS

1. Simple Image Editing (Rotate, Resize, Crop, Zoom, Brightness, Contrast)
2. Colour Changing, Image Extraction and Merging of Images
3. Smoothing of Sharp Edges
4. Text on Images
5. Removal of Red Eyes
6. Working With Layers
7. Filters
8. Blending Image using Layer Mask
9. Clone a Image using Clone Stamp
10. Adding Shadow to the Image

Course Outcomes (CO) : On completion of the course, students should be able to

| CO Number | CO Statement | Knowledge Level |
|------------------|---|------------------------|
| CO1 | Understand the basic concepts of Photoshop. | K1 |
| CO2 | Implement and apply the tools in Photoshop. | K2 |
| CO3 | Analyze different types of Applications. | K3 |

Programme Title : B. Sc. Statistics
Course Title : Allied : 'C' Programming - I
Course Code : 21USTAC3
Semester : III

Hours / Week: 5
Credit : 5

Course Objectives :

1. Gain knowledge on problem solving techniques.
2. Learn how to write modular and readable C programs.
3. Understand the usage of arrays.
4. Write simple programs in C

SYLLABUS

UNIT I (Hours: 10)

Overview of C - Constants - Variables - Data types - Operators and Expressions - Managing Input and Output Operators.

UNIT II (Hours: 20)

Decision making and Branching -. Introduction - If Statement, simple if Statement, The if. Else statement – Nesting of if...else statement - the else if ladder – The Switch statement – the ?: operator - Go to Statement.

UNIT III (Hours: 20)

Decision Making and looping - Introduction - While Statement - Do Statement - For Statement - Jumps in Loops

UNIT IV (Hours: 15)

Arrays - One Dimensional Arrays - Declaration and Initialization of one Dimensional arrays - Handling of Character Strings - Two Dimensional Arrays- Initializing two dimensional arrays.

UNIT V (Practical) (Hours: 10)

Biggest among three numbers - smallest number in an array – Arrange numbers in ascending order.

Book for Study

1. E.Balagurusamy, "Programming in ANSI C" Third Edition. Tata McGraw Hill. Chapter 1-7.

Book for Reference

1. V.RajaRaman, "Computer Programming in C" -Prentice -Hall of India.

Web Resources

- <https://www.programiz.com/c-programming>
- <https://www.cprogramming.com>
- <https://www.geeksforgeeks.org/c-programming-language/>

Course Outcomes (CO) : On completion of the course, students should be able to

| CO Number | CO Statement | Knowledge Level |
|------------------|---|------------------------|
| CO1 | Relate the feature of <code>_C_</code> Language | K1 |
| CO2 | Interpret the meaning of <code>_C_</code> programs with decision making looping and arrays | K2 |
| CO3 | Develop simple <code>_C_</code> programs with decision making, looping and arrays | K3 |
| CO4 | Examine simple <code>_C_</code> programs for errors | K4 |

Programme Title : B. Sc. Computer Science

Course Title : Core Course - IV : Relational Database Management Systems

Course Code : 21UCSC4

Hours / Week : 5

Semester : IV

Credit : 5

Course Objectives :

1. Provide knowledge on database management system with different models
2. Impart the methodologies involved in the design of a database system
3. Identify the constraints that could be placed in a database
4. Develop queries to analyze the database
5. Understand the normalization process to prepare a well-organized database

SYLLABUS

UNIT - I (Hours: 10)

Introduction to Database Systems

Overview - Historical Perspective - File Systems versus a DBMS - Advantages of a DBMS - Describing and Storing Data in a DBMS - Queries in a DBMS - Transaction Management - Structure of a DBMS – People who Deal with Databases.

UNIT – II (Hours: 10)

The Entity-Relationship Model

Overview of Database Design - Entities, Attributes, and Entity Sets - Relationships and Relationships Sets - Additional Features of ER Model - Conceptual Design with ER Model – Conceptual Design for Large Enterprises.

UNIT – III (Hours: 10)

The Relational Model

Introduction to the Relational Model - Integrity Constraints over Relations - Enforcing Integrity Constraints - Querying Relational Data - Logical Database Design: ER to Relational - Introduction of Views - Destroying/Altering Tables and Views.

UNIT - IV(Hours: 28)

Relational Algebra and SQL

Preliminaries - Relational Algebra - SQL Overview - The Form of a Basic SQL Query - UNION, INTERSECT, AND EXCEPT - Nested Queries - Aggregate Operators - Null Values - Complex Integrity Constraints in SQL - Triggers and Active Databases - Designing the Active Databases – Functional Dependencies - Normalization

UNIT - V (Hours: 07)

Application Program Development

Application programs and user interfaces - Rapid Application Development - Object Relational Mapping - Mobile Apps - Library Information System

Books for Study:

- Raghu Ramakrishnan and Johannes Gehrke, "Database Management Systems", McGraw Hill, 2003.
Chapters: 1.1 - 4.2, 5.1 - 5.9
<https://nptel.ac.in/courses/106/105/106105175/>
Lecture 21,22,23
- C.J.Date, A. Kannan and S. Swamynathan, "An Introduction to Database Systems", Pearson, 2012 Chapters 11 and 12

Books for Reference:

- Abraham Silberschatz, Henry F. Korth and S. Sudharshan, "Database System Concepts", McGraw Hill, 2006.
- Rajesh Naran, "Database Management Systems", Prentice Hall of India Private Limited, 2004.

Web Resources:

- <http://tutorialpoint.com>
- <http://studytonight.com>
- <http://www.fidelcaptain.com>
- <https://arstechnica.com>
- <https://www.scribd.com>
- <https://studyopedia.com>

Course Outcomes (CO) :On completion of the course, students should be able to

| CO Number | CO Statement | Knowledge Level |
|-----------|--|-----------------|
| CO1 | Select data model to suit the problems | K1 |
| CO2 | Translate the problems statements into queries | K2 |
| CO3 | Plan the models for database design | K3 |
| CO4 | Examine relationship between relations | K4 |
| CO5 | Construct a normalized database | K6 |

Mapping of COs with POs:

| COs | POs | | | | | |
|-----|-----|-----|-----|-----|-----|-----|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 |
| CO1 | S | M | M | L | S | S |
| CO2 | S | M | S | L | S | L |
| CO3 | S | M | M | M | S | S |
| CO4 | S | S | S | S | L | L |
| CO5 | M | S | S | L | L | S |

S - Strong M - Medium L – Low

Programme Title : B. Sc. Computer Science
Course Title : Core Practical- IV: Database Lab
Course Code : 21UCSQ4
Semester : IV

Hours / Week : 4
Credit : 2

Course Objectives :

1. Understand SQL to create, modify and insert values into a database
2. Create a PL/SQL program to manipulate the database in a flexible manner
3. Prepare a report

SYLLABUS

1. Data Definition Language Commands
2. Data Manipulation Language Commands
3. Data Control Language and Transaction Control Language Commands
4. Built-in Functions
5. Nested Queries and Join Queries
6. Views
7. Simple PL/SQL
8. PL/SQL with Control Structures
9. Functions
10. Report Generation

Course Outcomes (CO) : On completion of the course, students should be able to

| CO Number | CO Statement | Knowledge Level |
|-----------|--|-----------------|
| CO1 | Apply SQL constructs for database creation | K3 |
| CO2 | Analyze the problem and queries | K4 |
| CO3 | Build a database for a given problem | K6 |

Mapping of COs with POs:

| COs | POs | | | | | |
|-----|-----|-----|-----|-----|-----|-----|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 |
| CO1 | S | M | M | L | S | S |
| CO2 | M | S | S | M | S | L |
| CO3 | S | M | M | M | S | S |

S - Strong M - Medium L – Low

Programme Title : B. Sc. Computer Science
Course Title : Skill Based - IV: PHP with MySQL
Course Code : 21UCSSQC4 **Hours / Week : 2**
Semester : IV **Credit : 2**

Course Objectives :

1. Provide basic knowledge in creating a Table and familiarize with Queries in MYSQL
2. Introduce PHP programming concepts
3. Provide basic knowledge on working with script

MY SQL

1. To create a table, alter and drop table.
2. To perform select, update, insert and delete operation in a table.
3. To make use of different clauses viz where, group by, having, order by, union and To study different constraints.

PHP

1. Create a PHP page using functions for comparing three integers and print the largest number.
2. Write a function to calculate the factorial of a number (non-negative integer). The function accept the number as an argument.
3. Write a program to sort an array.
4. Write a PHP script that finds out the sum of first n odd numbers.
5. Create a webpage with the greeting and and date and time stamps in the footer
6. Create a webpage with the submit button and an event handling PHP Script.
7. Create a login page having user name and password. On clicking submit, a welcome message should be displayed if the user is already registered (i.e. name is present in the database) otherwise error message should be displayed.
8. Create a simple 'birthday countdown' script, the script will count the number of number of days between current day and birthday.

Course Outcomes (CO): On completion of the course, students should be able to

| CO Number | CO Statement | Knowledge Level |
|------------------|--|------------------------|
| CO1 | Demonstrate database in MySQL | K2 |
| CO2 | Apply PHP scripts in web designing. | K3 |
| CO3 | Analyze the existing scripts in PHP | K4 |

Mapping of COs with POs:

| COs | POs | | | | | |
|------------|------------|-----|-----|-----|-----|-----|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 |
| CO1 | S | M | M | L | S | S |
| CO2 | S | S | S | S | S | L |
| CO3 | S | M | S | S | L | L |

S - Strong M - Medium L – Low

Programme Title : B.Sc. Computer Science

Course Title : Non-Major Elective-II : Animation

Course Code : 21UCSQNEC2

Semester : IV

Hours/Week : 2

Credits : 2

Course Objectives:

1. Introduce number of tools and commands for working on digital images or bitmaps
2. Familiarize the utilities for retouching, color correcting and compositing.
3. Provide the most powerful range of features for designing images.
4. Introduce morphing effect, Time line effect using Flash8

SYLLABUS

1. Design your dream house with animation.
2. Animate the object using riffle effect.
3. Change the size of balloon from smaller to larger using shape tween.
4. Animate: pendulum motion.
5. Convert human face to tiger as look like morphing effect.
6. Change the color of graphic art using filters.
7. Animate the object using timeline effect.
8. Make a ball and show the shadow movement of the ball by using onion skinning function.
9. Create different color balls to bounce on walls using geometric tools such as rectangle, circle etc.
10. Animate the object using selection tool, sub selection tool and lasso tool.

Course Outcomes (CO): On completion of the course, students should be able to

| CO Number | CO Statement | Knowledge Level |
|------------------|--|------------------------|
| CO1 | Understand the basic concepts of Flash 8. | K2 |
| CO2 | Implement and apply the tools in Flash 8 | K3 |
| CO3 | Analyze different types of applications. | K4 |

Programme Title : B. Sc. Statistics
Course Title : 'C' Programming - II
Course Code : 21USTAC4
Semester : IV
Course Objectives :

Hours / Week : 5
Credits : 5

1. Introduce String Manipulation
2. Familiarize with user defined functions
3. Build programs using structures
4. Gain knowledge in Statistical problem Solving using C

SYLLABUS

UNIT I (Hours: 10)

Character Arrays and strings – Introduction – Declaring and Initializing string variables-Reading strings from terminal-Writing strings to screen-Arithmetic operations onCharacters-putting strings together – Comparison of two strings –String handling functions- Table of Strings - Other features of strings.

UNIT II (Hours: 20)

User defined functions – Introduction-Need for user – defined functions – Elements of userDefined functions – Definition of functions – Return values and their types – Function Calls - Function Declaration – Category of Functions.

UNIT III (Hours: 20)

Functions that return multiple values – Nesting of functions- Recursion - Passing ArraysTo Functions – Passing strings to functions- The scope ,visibility and lifetime of variables

UNIT IV (Hours: 15)

Structures and Unions – Introduction – Defining a structure- Declaring a structure variable Accessing structure members-Structure initialization- Copying and comparing structure Variables-Operations on individual members – Arrays of structures – Arrays within Structures—Structures within structures- Structures and functions- Unions- Size of structures

UNIT V (Practical) (Hours: 10)

Mean - Median - Mode - Standard Deviation - Correlation Coefficient

Book for Study

1. E.Balagurusamy, "Programming in ANSI C" Third Edition. Tata McGraw Hill. Chapter 8-10.

Book for Reference

1. V.RajaRaman, "Computer Programming in C" -Prentice -Hall of India.

Web Resources

- <https://www.programiz.com/c-programming>
- <https://www.cprogramming.com>
- <https://www.geeksforgeeks.org/c-programming-language/>

Course Outcomes (CO) :On completion of the course, students should be able to

| CO Number | CO Statement | Knowledge Level |
|------------------|---|------------------------|
| CO1 | Define strings, functions and structure | K1 |
| CO2 | Explain the solutions to the problem as function | K2 |
| CO3 | Develop programs using functions and structures | K3 |
| CO4 | Analyze the program and divide into functions | K4 |
| CO5 | Create solutions to a problem by integrating functions | K6 |

Programme Title : B.Sc. Computer Science

Course Title : Core Course V: .NET PROGRAMMING

Course Code : 21UCSC5

Semester : V

Hours/Week :5

Credit :5

Course Objectives:

1. Provide fundamental knowledge in 'VB.NET'
2. Introduce Windows form & Web form with HTML
3. Familiarize various Tools in 'VB.NET'
4. Acquaint with different Database Connectivity methods in 'VB.NET'

SYLLABUS

UNIT – I (Hours: 15)

Essential Visual Basic Net: Putting Visual Basic to work- New concept in VB.NET - Upgrading from Visual Basic 6.0 - The .NET Framework and the Common Language Runtime - Building VB.NET Applications - The Visual Basic Integrated Development Environment - Coding to get the most from Visual Basic.

UNIT – II (Hours: 15)

Windows Forms: All about Windows Forms - All about Windows MDI Forms Text Boxes - Labels - Buttons - Check Boxes - Radio Buttons - List Boxes - Combo Boxes - Timers - Menus - Menu Items - Context Menus, The build-in dialog boxes - Open file dialogs, save file dialogs - Font dialogs - Colour dialogs.

UNIT – III (Hours: 15)

Object Oriented Programming: Classes And Objects – Fields, Properties, Methods and Events - Classes vs. Object Members - Abstraction, Encapsulation, Inheritance, Polymorphism Overloading, Overriding, and Shadowing - Constructor & Destructors - An OOP Example - Structures And Modules.

UNIT – IV (Hours: 13)

Web Forms: Web Forms And HTML - Creating a Web Application - Adding Controls to a Web Form - Running a Web Application - Creating a Multi Form Web Project – Handling Client Events - The Control Class - The Web Control Class - Validation Controls – Required Field Validators - Comparison Validators - Range Validators – Regular Expression Validators - Custom Validators - Validation Summaries - Calendars - AdRotators.

UNIT – V (Hours: 17)

Data Access With ADO.NET: Accessing Data With Data Adapters and Datasets Working with ADO.NET - Overview of ADO.NET Objects - Simple Binding - Complex Binding - Binding Data to Controls - Navigating in Data Sets - The OleDbConnection class - The SqlConnection class - The OleDbCommand class - The SqlCommand class - The OleDbDataAdapter class - The SqlDataAdapter class – The DataSet class - The OleDbDataReader class - The SqlDataReader class.

Book For Study

1. “Visual Basic.NET Programming” , Steven Holzner, 2005 Edition

Books For Reference

1. Jeffrey R. Shapiro, “The Complete Reference Visual Basic.NET”, TMH2002.

Web resources:

- <http://www.learn-c.org/>
- <http://crasseux.com/books/ctutorial/>
- <http://www.strath.ac.uk/IT/Docs/Ccourse/>

Course Outcomes (CO) : On completion of the course, students should be able to

| CO Number | CO Statement | Knowledge Level |
|-----------|---|-----------------|
| CO1 | Relate the basic and extensive concepts of .NET Programming | K1 |
| CO2 | Infer the various tools of VB.NET Programming | K2 |
| CO3 | Examine different features of OOP Concepts in VB.NET Programming for real time applications | K4 |
| CO4 | Create GUI and web related application which reflects the real world scenarios | K6 |

Mapping of COs with POs:

| COs | POs | | | | | |
|-----|-----|-----|-----|-----|-----|-----|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 |
| CO1 | S | M | M | L | S | S |
| CO2 | S | S | S | S | S | L |
| CO3 | S | M | M | M | S | S |
| CO4 | S | S | S | S | L | L |

S - Strong M - Medium L – Low

Programme Title : B.Sc. Computer Science
Course Title : Core Course - VI: Computer Architecture and Organization
Course Code : 21UCSC6 **Hours/Week : 5**
Semester : V **Credit : 5**
Course Objectives:

1. Provide fundamental knowledge in Computer Architecture
2. Introduce peripheral devices
3. Familiarize interrupts and input output processor
4. Acquaint different types of memories

SYLLABUS

UNIT - I (Hours: 15)

Overview of Microprocessor - Architecture of 8 bit Microprocessor Intel 8085 - Addressing modes - 8085 Instructions - Assembly Language Programming - Simple Programs - Addition, Subtraction, Multiplication, Division – Ascending and descending orders.

UNIT - II (Hours: 15)

Input - Output Organization - Peripheral Devices - Input - Output Interface - Asynchronous Data Transfer - Modes of Transfer.

UNIT – III (Hours: 15)

Priority Interrupt - Direct Memory Access - DMA Controller -DMA Transfer - Input Output Processor (IOP).

UNIT – IV (Hours: 15)

Memory Hierarchy - Auxiliary Memory -Cache Memory - Virtual Memory.

UNIT – V(Hours: 15)

Basic computer Organization and Design - Instruction Code - Computer Register - Computer Instruction - Timing and Control - Instruction Cycle - Memory Reference Instructions - Input Output and Interrupt - Complete Computer Description - Design of Basic Computers - Design of Accumulator Logic.

Book for Study:

1. B. Ram, “Fundamentals of Microprocessors and Microcomputers”, Dhanpat Rai Publications, Sixth Edition (Unit - I).
2. M. Morris Mano, “Computer System Architecture”, Prentice Hall of India, Third Edition 1993. (Unit - II, III, IV, V).

Books for Reference:

1. Lance a Levanthal, “Introduction to Microprocessors - Hardware and Programming”, Prentice hall of India, 1978

Web Resources :

- <http://williamstallings.com/ComputerOrganization/>
- <http://nptel.ac.in/courses/106103068/9>
- <https://inspirit.net.in/books/academic/Computer%20Organisation%20and%20Architecture%20e%20by%20William%20Stallings.pdf>

Course Outcomes (CO) : On completion of the course, students should be able to

| CO Number | CO Statement | Knowledge Level |
|------------------|---|------------------------|
| CO1 | Relate the architecture of 8085 microprocessor | K1 |
| CO2 | Explain the concepts of input and output organization | K2 |
| CO3 | Make use of the different usage of interrupts | K3 |
| CO4 | Classify the different applications of memory management | K4 |

Mapping of COs with POs :

| COs | POs | | | | | |
|------------|------------|-----|-----|-----|-----|-----|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 |
| CO1 | S | M | M | L | S | S |
| CO2 | S | S | S | S | S | L |
| CO3 | S | M | M | M | S | S |
| CO4 | S | S | S | S | L | L |

S - Strong, M - Medium, L - Low

Programme Title : B.Sc. Computer Science

Course Title : Core Course - VII: Operating Systems

Course Code : 21UCSC7

Semester : V

Hours/Week : 5

Credits: 5

Course Objectives:

1. Explain the basic concepts of Operating system components, calls, programs and structures.
2. Describe the basic concepts of CPU scheduling and Deadlock System Model.
3. Familiarize the various techniques of Memory management.
4. Describe the concepts of File system structure..

SYLLABUS

UNIT - I (Hours: 13)

System Components - Operating System Services - System Calls - System Programs - System Structure - Virtual Machines - System Design and Implementation

UNIT - II (Hours: 18)

Process Concept - Process Scheduling - Operations on Processes - Cooperating Processes - Inter Process Communication - Communication in Client-Server System - CPU Scheduling Basic Concepts - Scheduling Criteria - Scheduling Algorithms –First – Come ,First – Served Scheduling – Shortest –Job – First Scheduling – Priority Scheduling.

UNIT - III (Hours: 18)

Process Synchronization - Background - The Critical-Section Problem - Synchronization Hardware - Semaphores - Classic Problem of Synchronization - Critical Regions - Monitors - Deadlocks System Model - Deadlock Characterization - Methods for Handling - Deadlock Prevention - Deadlock Avoidance - Deadlock Detection.

UNIT - IV (Hours: 13)

Memory Management - Background - Swapping - Contiguous Memory Allocation - Paging - Segmentation - Segmentation with Paging - Virtual Memory Background - Demand Paging - Process Creation - Page Replacement –Basic Scheme- FIFO Page Replacement - Optimal Page Replacement

UNIT - V (Hours: 13)

File System Implementation - File-System Structure - Implementation - Directory Implementation – Allocation Methods – Free-space Managements – Efficiency and Performance – Recovery – Log-Structured File System - NPS

Book For Study

1. Silberschatz, Galvin, Gagne, “Operating System Concepts”, Sixth Edition, Wiley, Reprint 2012.
Chapters : 3, 4, 6.1-6.3.3, 7.1 – 7.7, 8.1-8.6, 9,10.1-10.4, 12

Books For Reference

1. William Stallings, “Operating Systems - Internals and Design Principles”, Sixth Edition, Pearson, 2009
2. Deital H.M, “An Introduction to Operating System”, Addition Wesley Publishing Company, Seventh Indian Reprint 2001.

Web Resources :

- <http://www.learn-c.org/>
- <http://crasseux.com/books/ctutorial/>
- <http://www.strath.ac.uk/IT/Docs/Ccourse/>

Course Outcomes (CO) : On completion of the course, students should be able to

| CO Number | CO Statement | Knowledge Level |
|-----------|--|-----------------|
| CO1 | Recall the basic concepts of operating systems. | K1 |
| CO2 | Explain operating system as a resource manager | K2 |
| CO3 | Apply scheduling and deadlock related algorithm | K3 |
| CO4 | Compare different resource management techniques | K4 |

Mapping of COs with POs :

| COs | POs | | | | | |
|-----|-----|-----|-----|-----|-----|-----|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 |
| CO1 | S | M | M | L | S | S |
| CO2 | S | S | S | S | S | L |
| CO3 | S | M | M | M | S | S |
| CO4 | S | S | S | S | L | L |

S – Strong, M – Medium, L – Low

Programme Title: B.Sc. Computer Science

Course Title : ELECTIVE - I: Software Engineering

Course Code : 21UCSEC1

Semester : V

Hours / Week : 4

Credit : 4

Course Objectives:

1. Provide the basic concepts of software engineering
2. Introduce about the software engineering requirements.
3. Elucidate the concepts of analysis model and reengineering.
4. To elaborate the essence of user Interface Design

SYLLABUS

UNIT –I (Hours: 8)

Introduction to Software Engineering

The Evolving Role of Software –Software-The Changing Nature of Software- Legacy Software-Software Myths-Software Engineering-A Layered Technology-A Process Framework-The Capability Maturity Model Integration(CMMI)-Process Patterns- Process Assessment- Personal And Team Process Models – Process Technology- Product and Process.

UNIT –II (Hours: 10)

Requirements Engineering

A Bridge to Design and Construction- Requirements Engineering Tasks-Initiating the Requirements Engineering Process- Eliciting Requirements- Developing Use- Cases-Building the Analysis Model- Negotiating Requirements- Validating Requirements.

UNIT- III (Hours: 15)

Building the Analysis Model

Requirements Analysis- Analysis Modeling Approaches-Data Modeling Concepts- Object- Oriented Analysis- Scenario- Based Modelling- Flow- Oriented Modeling- Class-Based Modeling-Creating a Behavioural Model.

UNIT-IV (Hours: 12)

Design Engineering and Performing User Interface Design

Design within the Context of Software Engineering- Design Process and Design Quality- Design Concepts- The Design Model- Pattern- Based Software Design- The Golden Rules- User Interface Analysis And Design- Interface Analysis- Interface Design Steps- Design Evaluation.

UNIT-V (Hours: 15)

Metrics for Process and Projects and Reengineering

Metrics in the Process and Project Domains- Software Measurement- Metrics of Software Quality- Integrating Metrics Within the Software Process- Metrics for Small Organisations- Establishing a Software Metrics Program- Business Process Reengineering- Software Reengineering- Reverse Engineering-Restructuring- Forward Engineering- The Economics of Reengineering.

Book for study:

1. "Software Engineering"-Roger S. Pressman McGraw- Hill International Sixth Edition.

Book for reference:

1. "Fundamentals of Software Engineering."-Rajib Mall

Web Resources :

- http://www.vssut.ac.in/lecture_notes/lecture1428551142.pdf
- https://www.tutorialspoint.com/software_engineering/index.htm
- <http://ecomputernotes.com/software-engineering/characteristics-and-classification-of-software>

Course Outcomes (CO) : On completion of the course, students should be able to

| CO Number | CO Statement | Knowledge Level |
|-----------|---|-----------------|
| CO1 | Relate the basic knowledge and understanding of the analysis and design of complex systems | K1 |
| CO2 | Explain the various software engineering principles and techniques | K2 |
| CO3 | Apply design engineering process for performing user interface design | K3 |
| CO4 | Analyze the concepts of analysis model and reengineering process | K4 |
| CO5 | Conclude the software engineering tools necessary for engineering practice | K5 |

Mapping of COs with POs :

| COs | POs | | | | | |
|-----|-----|-----|-----|-----|-----|-----|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 |
| CO1 | S | M | M | L | S | S |
| CO2 | S | S | S | S | S | L |
| CO3 | S | M | M | M | S | S |
| CO4 | S | S | S | S | L | L |
| CO5 | M | S | S | L | L | S |

S – Strong, M – Medium, L – Low

Programme Title: B.Sc. Computer Science

Course Title : ELECTIVE - I : Artificial Intelligence

Course Code : 21UCSEC1A

Hours / Week : 4

Semester : V

Credits: 4

Course Objectives:

1. Provide fundamental knowledge in Artificial Intelligence
2. Introduce logic programming
3. Familiarize reasoning techniques
4. Acquaint different applications of Artificial Intelligence

SYLLABUS

UNIT – I (Hours: 10)

Introduction: Foundation and history of AI, AI problems and techniques - AI programming - Introduction to LISP and PROLOG - Problem spaces and searches - Blind search strategies- Depth first - Heuristic search techniques Hill climbing - Best first - A* algorithm AO*, trees -Minimax algorithm- Game playing and alpha beta pruning.

UNIT – II (Hours: 10)

Knowledge representation: Issues of Knowledge representation, Predicate logic - Logic programming - Semantic inheritance - constraints propagation - Representing Knowledge using rules.

UNIT – III (Hours: 10)

Reasoning under uncertainty: Uncertain Knowledge - Review of probability - Bayes Probabilistic Inferences and Heuristic methods - symbolic reasoning under uncertainty statistical reasoning - fuzzy logic - temporal reasoning- Non monotonic reasoning.

UNIT – IV(Hours: 10)

Planning in situational calculus -Representation for planning -Partial order algorithm- Learning from examples - Discovery as learning - Learning by analogy explanation - Neural nets and genetic algorithms.

UNIT – V(Hours: 20)

Applications, NLP - Rule based systems architecture - expert systems - Knowledge based concepts - AI applications to robotics - Current trends in intelligent systems.

Book for Study:

1. Rich and Kevin Knight, "Artificial Intelligence", Tata McGraw Hill, Third Edition, 2009.

Books for Reference:

1. Russel and Peter Norvig, "Artificial Intelligence-A modern approach", Prentice Hall, Third Edition, Dec 2009.
2. Patrick Henry Winston, "AI", Addison Wesley, Third Edition, 1992.

Web Resources :

- <http://www.cs.huji.ac.il/~shais/UnderstandingMachineLearning/understanding-machine-learning-theory-algorithms.pdf>
- <http://neuralnetworksanddeeplearning.com/>
- <http://cimpl.info/>

Course Outcomes (CO) : On completion of the course, students should be able to

| CO Number | CO Statement | Knowledge Level |
|------------------|---|------------------------|
| CO1 | Define the Artificial Intelligence Techniques | K1 |
| CO2 | Explain the concepts of logic programming and knowledge representation | K2 |
| CO3 | Apply different kinds of reasoning to real time applications | K3 |
| CO4 | Analyze the different applications of AI Programming | K4 |

Mapping of COs with POs:

| COs | POs | | | | | |
|------------|------------|-----|-----|-----|-----|-----|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 |
| CO1 | S | M | M | L | S | S |
| CO2 | S | S | S | S | S | L |
| CO3 | S | M | M | M | S | S |
| CO4 | S | S | S | S | L | L |

S – Strong, M – Medium, L – Low

Programme Title : B.Sc., Computer Science
Course Title : ELECTIVE - I: Client/Server Architecture
Course Code : 21UCSEC1B
Semester : V

Hours/Week: 4
Credits: 4

Course Objectives:

1. Introduce with Client/Server Concepts
2. Familiarise SQL Database Server Architecture
3. Acquaint with CORBA Distributed and Business Objects.

SYLLABUS

UNIT – I (Hours: 7)

Client/Server Concepts - File Servers - Database Servers - Transaction Servers - Groupware Servers - Object Servers - Web Sever - Fat Servers or Fat Clients - 2-Tier Versus 3-Tier - Client Server Building Blocks - A One Size Fits All Model - Client/Server for Tiny shops and Nomadic Tribes Client/Server for Small Shops And Departments - Client/Server for Intergalactia Enterprises - Base Services - Extended Services - Server Scalability -- Client Anatomy 101.

UNIT – II (Hours: 15)

NOS Middleware - Transparency - Extending the Local OS's Reach - Global Directory Services - Distributed Time Services - Distributed Security Services - Peer-to-Peer Communications- Sockets -Netware : IPX/SPX and TLI - NetBIOS and NetBEUI - Named Pipes - Remote Procedure Call (RPC) - Messaging And Queuing– MOM versus RPC - The Fundamentals Of SQL And Relational Databases - SQL Database Server Architecture -. - Stored Procedures - Triggers And Rules.

UNIT – III (Hours: 10)

OLTP Concepts - Decision-Support Systems -Comparing Decision Support and OLTP Systems-Production Versus Informational Databases - The Elements of Data Warehousing - Warehousing hierarchies: The Datamarts - Replication versus Direct Access - The Mechanics of Data Replication - OLAP and Multidimensional Data - client/server Transaction processing -Transaction models- TP Monitors -Transaction Management standards.

UNIT – IV (Hours: 13)

Is Groupware Different from SQL Database - Is Groupware Different from TP Monitors - The Components of Groupware - Work Flow– Scheduling and Calendaring - Conferencing - From Distributed Objects To Components–The Driving Force Behind Components - Super Components - The Ultimate Components - CORBA Distributed Object - CORBA Components - OMG'S Object Management Architecture - CORBA Object Services - CORBA Business Objects.

UNIT – V (Hours: 15)

Client /Server Distributed System Management - Dealing With Chaos - The Components of an OPEN DSM Platform - Management Applications - Distributed System Management Standards - The Internet Management Protocols - The Internet's SNMP - OSI

Management Framework - The Desktop Management Interface(DMI) – X/Open
 Management Standards - Client /Server Application Development Tools - Client/Server
 Application design - From Prototype to Working System.

Book for Study:

1. L.RobertOrfali, Dan Harkey& Jeri Edwards, "The Essential Client/Server Survival Guide", GalgotiaPublication,Second Edition, 2007.

Book for Reference:

1. Dawna Travis Dewire "Client/Server Computing", Tata McGraw-Hill, 2003.

Web Resources:

1. <https://www.kshitijdivakar.com/blog/tag/client-server-computing-notes>
2. <http://www.dcs.ed.ac.uk/teaching/cs3/ipse/ClientServer.pdf>
3. <https://www.lynda.com/Web-Foundations-tutorials/Working-clients-servers>

Course Outcomes (CO): On completion of the course, students should be able to

| CO Number | CO Statement | Knowledge Level |
|-----------|---|-----------------|
| CO1 | List the basic concepts of client server technology | K1 |
| CO2 | Illustrate middleware technologies and fundamentals of SQL and Relational Databases | K2 |
| CO3 | Make use of OLTP client/server Transaction processing | K3 |
| CO4 | Examine the components of groupware and CORBA Distributed Object | K4 |

Mapping of COs with POs :

| COs | POs | | | | | |
|-----|-----|-----|-----|-----|-----|-----|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 |
| CO1 | S | M | M | L | S | S |
| CO2 | S | S | S | S | S | L |
| CO3 | S | M | M | M | S | S |
| CO4 | S | S | S | S | L | L |

S – Strong, M – Medium, L – Low

Programme Title : **B. Sc. Computer Science**
Course Title : **ELECTIVE - I: Microprocessor**
Course Code : **21UCSEC1C** **Hours / Week : 4**
Semester : **V** **Credits : 4**

Course Objectives :

1. Give a complete understanding of the architecture of 8085 Microprocessor
2. Impart the knowledge of programming 8085
3. Make the students to solve real life problems using Microprocessor based systems

SYLLABUS

UNIT – I (Hours: 10)

Evolution of Microprocessors – Single-chip Microcomputer – Memory – Buses – Memory Address Capacity of CPU – Microcomputers – Processing Architecture – Intel 8085 – Instruction Cycle – Timing Diagram.

UNIT – II (Hours: 10)

Instruction set of Intel 8085 – Instruction and Data Formats – Addressing Modes – Status Flags – Intel 8085 Instructions – Programming of Microprocessors – Assemblers – Stacks and Subroutines – Macros and Micro Programming.

UNIT – III (Hours: 10)

Assembly Language Programming – Simple Examples – Addition and Subtraction of Binary and Decimal Numbers – Complements – Shift – Masking – Finding Max and Min Number in an array – Arranging a series of numbers – Multiplication, Division – Multibyte Addition and Subtraction.

UNIT – IV (Hours: 15)

Peripheral devices and interfacing – Address Space Partitioning – Memory and I/O Interfacing – Data Transfer Schemes – Interrupts of Intel 8085 – Interfacing Devices and I/O Devices – I/O Ports – Programmable Peripheral Interface.

UNIT – V (Hours: 15)

Microprocessor Applications – Delay Subroutines – Interfacing of 7 segment LED Displays – Frequency measurement – Temperature Measurement and Control – Water Level Indicator – Microprocessor Based Traffic Control.

Book for Study

1. Fundamentals of Microprocessors and Microcomputers – Badri Ram – Fifth revised and enlarged edition – Dhanpat Rai publication – 2001.

Books for Reference

1. Microprocessor Architecture, programming and application with the 8085/8080A – Romesh S. Ganokar – Penram International Publishers India 1997.

Web Resources

- <https://www.university.youth4work.com>
- <https://www.wiziq.com/tutorials>
- <https://lecturenotes.in/subject/21/microprocessor-mp>

Course Outcomes (CO) : On completion of the course, students should be able to

| CO Number | CO Statement | Knowledge Level |
|------------------|---|------------------------|
| CO1 | Label the basic parts of microprocessor | K1 |
| CO2 | Illustrate the instructions set of 8085 | K2 |
| CO3 | Inspect the flow of assembly language programs | K4 |
| CO4 | Design the microprocessor applications | K6 |

Mapping of COs with POs:

| COs | POs | | | | | |
|------------|------------|-----|-----|-----|-----|-----|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 |
| CO1 | S | M | M | L | S | S |
| CO2 | S | S | S | S | S | L |
| CO3 | S | M | M | M | S | S |
| CO4 | S | S | S | S | L | L |

S – Strong, M – Medium, L – Light

Programme Title : B.Sc. Computer Science
Course Title : Core Practical – V: .NET PROGRAMMING LAB
Course Code : 21UCSQC5 **Hours/Week: 4**
Semester : V **Credits: 2**

Course Objectives :

1. Introduce “VB.NET” programming concepts
2. Familiarize the different forms and controls of “VB.NET”
3. Build programs using menus, OOP concepts
4. Provide basic knowledge on working with web forms and html.
5. Analyze and evaluate different methods of database connectivity in “VB.NET”

SYLLABUS

1. Programs using windows forms and controls
2. Programs using menus and built-in dialog boxes
3. Programs using OOP concepts
4. Programs using web forms and controls
5. Programs using validation controls
6. Programs using database
7. Program using animation & hyperlink
8. Program using data binding
9. Program using data grid
10. Program using console application

Course Outcomes (CO): On completion of the course, students should be able to

| CO Number | CO Statement | Knowledge Level |
|------------|--|-----------------|
| CO1 | Relate the basic and extensive concepts of .NET Programming | K1 |
| CO2 | Apply different forms and controls | K3 |
| CO3 | Analyze the programs using OOPs concepts | K4 |
| CO4 | Design diverse web applications and database connectivity | K6 |

Mapping of COs with POs:

| COs | POs | | | | | |
|------------|-----|-----|-----|-----|-----|-----|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 |
| CO1 | S | S | M | M | M | S |
| CO2 | S | S | L | L | S | S |
| CO3 | S | L | S | S | S | S |
| CO4 | L | L | S | S | S | S |

S - Strong M - Medium L – Light

Programme Title : B.Sc. Computer Science
Course Title : Core Practical - VI: Microprocessor and Operating System Lab
Course Code : 21UCSQC6 **Hours/Week : 4**
Semester : V **Credit : 2**

Course Objectives :

1. Introduce microprocessor programming concepts
2. Familiarize with Code Conversion
3. Understand Operating system commands
4. Acquire shell programming knowledge

SYLLABUS

MICROPROCESSOR:

1. 8-bit Addition
2. 8-bit Subtraction
3. 8-bit Multiplication
4. 8-bit Division
5. To find the largest number in a Data Array
6. To arrange a series of numbers in Ascending Order
7. To arrange a series of numbers in Descending Order

OS LAB :

1. Usage of following commands: ls, pwd, tty, cat, who, who am I, rm, mkdir, rmdir, touch, cd.
2. Usage of following commands: cal, cat(append), cat(concatenate), mv, cp, man, date
3. Usage of following commands: chmod, grep, tput (clear, highlight), bc.
4. Write a shell script to check if the number entered at the command line is prime or not.
5. Write a shell script to modify “cal” command to display calendar of the specified month.
6. Write a shell script to modify “cal” command to display calendars of the specified range of months.
7. Write a shell script to accept a login name. If not a valid login name display message- “Entered login name is invalid.

Course Outcomes (CO) : On completion of the course, students should be able to

| CO Number | CO Statement | Knowledge Level |
|------------------|---|------------------------|
| CO1 | List the instructions in assembly Language Programming | K1 |
| CO2 | Demonstrate the operating system commands. | K2 |
| CO3 | Analyze different types of shell scripts | K4 |

Mapping of COs with POs :

| COs | POs | | | | | |
|------------|------------|-----|-----|-----|-----|-----|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 |
| CO1 | S | M | M | L | S | S |
| CO2 | S | S | S | S | S | L |
| CO3 | S | M | M | M | S | S |

Programme Title : B.A/B.Sc./B.Com, Non-Computer Science

Course Title : Non-Major Skill Based - I: Data Analytics & Visualization - I (Practical)

Course Code : 21UCSQNSC1

Hours/Week: 2

Semester : V

Credits: 2

Course objectives:

- Prepare the students to become skillful by doing hands on project based learning in the real time environment using Tableau
 - Making them to become industry /job - ready
1. Create a file and connect it with the data source in tableau.
 2. Create a table in excel and connect it with tableau.
 3. Create a table and a database using sql commands in tableau.
 4. Execute CRUD operations using sql commands.
 5. Execute Interface of tableau with the functions: New worksheet, Sort, Total, Group members, Swap.
 6. Create a box plot and histogram in tableau.
 7. Create different type of visualization: Pie , Bar , Line and Scatter chart.
 8. Execute different types of joins in tableau.
 9. Blend the data from various sources in tableau
 10. Execute cross-database joining and data extraction.
 11. Create a mark sheet and highlight group sets.
 12. Execute various types of sets in tableau.
 13. Execute types of sorting techniques.
 14. Create a Dataset and use formatting pane to edit it.
 15. Execute filtering techniques in tableau.

Course Outcomes (CO) : On completion of the course, students should be able to

| CO Number | CO Statement | Knowledge Level |
|------------------|--|------------------------|
| CO1 | Gain hands on working skills and industry project experience by learning & Hands-on-with Tableau Platform. | K2 |
| CO2 | Data Extraction using Database & Flat files, Working with Metadata and Data Blending | K3 |
| CO3 | Working with Filters, Organizing Data & Visual Analytics, Working With Mapping ,Calculations, Expressions & Parameters | K4 |

Programme Title : B.Sc. Computer Science
Course Title : Core Course - VIII: Computer Graphics
Course Code : 21UCSC8 **Hours/Week: 5**
Semester : VI **Credits: 5**

Course Objectives:

1. Explain the basic concepts of computer graphics and its applications..
2. Describe the different types of Line drawing and line Clipping algorithms.
3. Familiarize the various techniques of 2-D and 3-D transformations. Hidden surfaces and advanced modeling techniques.
4. Describe the concepts of multimedia and its applications.

SYLLABUS

UNIT- I

No. of Hours : 15

Computer Graphics Applications: Introduction to computer applications – Applications of computer graphics. Graphics Devices: Introduction to Graphic Devices – Display Systems – Hardware Components. Graphical User Interface: Graphical User Interface – An Introduction – Types of GUIs – Designing a Graphical User Interface – Principles for good GUI design – User Interface Engineering – Graphical User Interface (GUI) Examples.

UNIT-II

No. of Hours :15

Scan Conversion: Line Drawing Algorithms-DDA Algorithm -Bresenham's Line Drawing Algorithm-General Bresenham's Algorithm- Bresenham's Circle Generation Algorithm-Polygon Filling –Windows and Clipping: Windows and Viewports-Window-to-viewport Mapping-Clipping-Sutherland-Cohen Subdivision Line Clipping Algorithm- Midpoint Subdivision Algorithm.

UNIT-III

No. of Hours :20

2-DTransformation:2-Dtransformation-AnIntroduction- Representation of points in Matrix Form-Representation of any 2-D Object in Matrix Form-Transformation of Points-Transformation-Transformation between Coordinate Systems-Translation and Homogeneous Coordinates-Translation - 2D-Rotation –Reflection- Scaling- General Fixed-Point Scaling-Shearing- Combined Transformations- Rotation about an arbitrary point- Reflection through an arbitrary Line- 3-D Transformation: 3-d Transformation- An Introduction- Representation of points- Representation of a 3-D object in matrix form- Three dimensional Translation- 3-D Rotation- 3-D Reflection -3-D Scaling- 3-D Shearing- Multiple Transformations- Rotation about an axis parallel to a Coordinate Axis- Rotation about an arbitrary Axis in Space.

UNIT-IV

No. of Hours :20

Hidden Surfaces: Hidden Surfaces and Lines-Back- Face Detection- Back- Face – Removal- Z-Buffer Algorithm- A-Buffer Algorithm- The Painter's Algorithm- Binary Space Partition- Franklin Algorithm – Ray Tracing Algorithm- Advanced Modeling Techniques: Procedural Modeling- Multi Particle Systems- Volume Rendering- Grammar Based System.

UNIT-V

No. of Hours : 5

Graphics Hardware and Software - Graphics I/O Devices – Introduction to CPU and Shaders – Programming with OpenGL

BOOK FOR STUDY:

1. ISRD Group, "computer Graphics", Tata MCGraw-Hill Companies, ISBN No 0-07-059376-0,2006.

2. <https://nptel.ac.in/courses/106/103/106103224/>
Module 8 Lec. 29,30,31,32

BOOKS FOR REFERENCE:

1. Schaum Series, “ Computer Graphics”, Tata MCGraw-Hill, Second Edition, sep 2000.
2. Donald Hearn,M.Pauline Baker “Computer Graphics”, Second Edition, May 1996.
3. Newman W.M.Sproul, “Principles of Interactive Computer Graphics”, Tata MCGrawHill Pub, Second Edition, July 1978.

Web Resources :

- <http://www.learn-c.org/>
- <http://crasseux.com/books/ctutorial/>
- <http://www.strath.ac.uk/IT/Docs/Ccourse/>

Course Outcomes (CO) : On completion of the course, students should be able to

| CO Number | CO Statement | Knowledge Level |
|-----------|---|-----------------|
| CO1 | Label the basic ideas of computer graphics. | K1 |
| CO2 | Demonstrate the various ideas of line drawing algorithms. | K2 |
| CO3 | Make use of the various ideas of 2-D, 3-D transformations and Hidden Surface Removal Algorithms | K3 |
| CO4 | Discuss Graphics Hardware and Software used | K6 |

Mapping of COs with POs:

| COs | POs | | | | | |
|-----|-----|-----|-----|-----|-----|-----|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 |
| CO1 | S | M | M | L | S | S |
| CO2 | S | S | S | S | S | L |
| CO3 | S | M | M | M | S | S |
| CO4 | S | S | S | S | L | L |

S – Strong, M – Medium, L – Low

Programme Title : B.Sc. Computer Science
Course Title : Core Course - IX : Data Mining
Course Code : 21UCSC9
Semester : VI

Hours/Week : 5
Credits: 5

Course Objectives :

1. Introduce Data Mining concepts
2. Make them understand the classification task in data mining
3. Acquire knowledge in data clustering
4. Impart association rule mining

SYLLABUS

UNIT – I (Hours: 8)

Introduction: Basic Data Mining Tasks – Data Mining vs Knowledge Discovery in Data base – Issues - Metrics – Social Implications – Data Mining from a Database perspective – Related Concepts: Database/OLT systems – Fuzzy set and logic – Information retrieval – Decision Support Systems – Dimensional Modeling – Data Warehousing – OLAP – web Search Engines – Statistics – Machine Learning – Pattern Matching

UNIT – II (Hours: 12)

Data Mining Techniques: Introduction – A statistical perspective on Data Mining – Similarity measure – Decision Tree – Neural Network – Genetic Algorithm.

UNIT – III (Hours: 15)

Classification: introduction – Statistical Based Algorithms – Distance Based Algorithms – Decision Tree Based Algorithms – Neural Network Based Algorithm – Rule Based Algorithm – Combining Techniques.

UNIT – IV (Hours: 20)

Clustering: Introduction – Similarity and Distance Measures – Outliers – Hierarchical Algorithm – Partitional Algorithm – Clustering Large Database – Clustering with Categorical attributes – Comparison.

UNIT – V (Hours: 20)

Association Rules: Introduction – Large Item sets – Basic Algorithms – Parallel and Distributed algorithms – Comparing approaches – Incremental rules – Advanced Association Rule Techniques – Measuring the quality of rules.

Book for Study:

1. Dunham, “Data Mining – Introduction and Advanced Topics”, Pearson Education, New Delhi 2006.
Chapters: 1,2,3,4,5,6

Books for Reference:

1. Jiawei Han and MichelineKamber, “Data Mining Concepts and Techniques”, Morgan Kaufmann Publications 2007
2. ArunK.Pujari, “Data Mining Techniques”, University Press India PvtLts., New Delho 2002.

Web Resources:

1. <https://www.oreilly.com/library/view/data-mining-concepts/9780123814791>
2. https://www.tutorialspoint.com/data_mining/index.htm
3. <https://www.worldcat.org/wepa/servlet/DCARead?standardNo=0471228524&standardNoType=1&excerpt=true>

Course Outcomes (CO) : On completion of the course, students should be able to

| CO Number | CO Statement | Knowledge Level |
|------------------|--|------------------------|
| CO1 | Demonstrate knowledge of data mining concepts and techniques | K2 |
| CO2 | Apply the techniques of clustering, classification, association finding | K3 |
| CO3 | Determine the real world problem has a data mining solution | K5 |
| CO4 | Build data mining process for an application, including data preparation, modeling and evaluation | K6 |

Mapping of COs with POs:

| COs | POs | | | | | |
|------------|------------|------------|------------|------------|------------|------------|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 |
| CO1 | S | M | M | L | S | S |
| CO2 | S | S | S | S | S | L |
| CO3 | S | M | M | M | S | S |
| CO4 | S | S | S | S | L | L |

S - Strong, M - Medium, L - Low

| | | |
|------------------------|--|----------------------|
| Programme Title | : B.Sc. Computer Science | |
| Course Title | : Elective-II : Python Programming Language | |
| Course Code | : 21UCSEC2 | Hours/Week: 4 |
| Semester | : VI | Credits: 4 |

Course objectives:

1. Describe the core syntax and semantics of Python programming language.
2. Discover the need for working with the strings and functions.
3. Illustrate the process of structuring the data using lists, dictionaries, tuples and sets.
4. Indicate the use of regular expressions and built-in functions to navigate the file system.
5. Infer the Object-oriented Programming concepts in Python.

UNIT – I (Hours: 15)

Parts of Python Programming Language, Identifiers, Keywords, Statements and Expressions, Variables, Operators, Precedence and Associativity, Data Types, Indentation, Comments, Reading Input, Print Output, Type Conversions, The type() Function and Is Operator, Dynamic and Strongly Typed Language, **Control Flow Statements**, The if Decision Control Flow Statement, The if...else Decision Control Flow Statement, The if...elif...else Decision Control Statement, Nested if Statement, The while Loop, The for Loop, The continue and break Statements, Catching Exceptions Using try and except Statement,

UNIT – II (Hours: 10)

Functions, Built-In Functions, Commonly Used Modules, Function Definition and Calling the Function, The return Statement and void Function, Scope and Lifetime of Variables, Default Parameters, Keyword Arguments, *args and **kwargs, Command Line Arguments.

Strings, Creating and Storing Strings, Basic String Operations, Accessing Characters in String by Index Number, String Slicing and Joining, String Methods, Formatting Strings.

UNIT –III (Hours: 10)

Lists, Creating Lists, Basic List Operations, Indexing and Slicing in Lists, Built-In Functions Used on Lists, List Methods, The del Statement.

Dictionaries, Creating Dictionary, Accessing and Modifying key:value Pairs in Dictionaries, Built-In Functions Used on Dictionaries, Dictionary Methods, The del Statement, **Tuples and Sets**, Creating Tuples, Basic Tuple Operations, Indexing and Slicing in Tuples, Built-In Functions Used on Tuples, Relation between Tuples and Lists, Relation between Tuples and Dictionaries, Tuple Methods, Using zip() Function, Sets, Set Methods, Traversing of Sets, Frozenset.

UNIT - IV (Hours: 10)

Files, Types of Files, Creating and Reading Text Data, File Methods to Read and Write Data, Reading and Writing Binary Files, The Pickle Module, Reading and Writing

CSV Files, Python os and os.path Modules, **Regular Expression Operations**, Using Special Characters, Regular Expression Methods, Named Groups in Python Regular Expressions, Regular Expression with glob Module.

UNIT –V (Hours: 15)

Object-Oriented Programming, Classes and Objects, Creating Classes in Python, Creating Objects in Python, The Constructor Method, Classes with Multiple Objects, Class Attributes versus Data Attributes, Encapsulation, Inheritance, The Polymorphism.

Text Book

1. Gowrishankar S, Veena A, “Introduction to Python Programming”, 1st Edition, CRC Press/Taylor & Francis, 2018. ISBN-13: 978-0815394372

Reference books / weblinks:

1. Jake VanderPlas, “Python Data Science Handbook: Essential Tools for Working with Data”, 1st Edition, O'Reilly Media, 2016. ISBN-13: 978-1491912058
2. AurelienGeron, “Hands-On Machine Learning with Scikit-Learn and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems”, 2nd Edition, O'Reilly Media, 2019. ISBN – 13: 978-9352139057.
3. Wesley J Chun, “Core Python Applications Programming”, 3rd Edition, Pearson Education India, 2015. ISBN-13: 978-9332555365
4. Miguel Grinberg, “Flask Web Development: Developing Web Applications with Python”, 2nd Edition, O'Reilly Media, 2018. ISBN-13: 978-1491991732.

Web Resources

1. Dictionaries
<https://www.youtube.com/watch?v=daefaLgNkw0>
2. Tuples and Set
<https://www.youtube.com/watch?v=W8KRzm-HUcc>

Course Outcomes (CO): On completion of the course, students should be able to

Mapping of COs with POs:

| COs | Statements | Knowledge Level |
|------------|--|------------------------|
| CO1 | Recall the essential features of object oriented programming and open source software | K1 |
| CO2 | Interpret the python syntax and semantics to use control flow statements | K2 |
| CO3 | Competence in applying python programming constructs to develop programs | K3 |
| CO4 | Create and manipulate new python programs by utilizing the possible data structures which reflects the real world scenarios | K6 |

Mapping of COs with POs:

| COs | POs | | | | | |
|------------|------------|------------|------------|------------|------------|------------|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 |
| CO1 | S | M | M | L | S | S |
| CO2 | S | S | S | S | M | L |
| CO3 | S | M | M | M | S | S |
| CO4 | S | S | S | S | L | L |

S - Strong M - Medium L – Light

Programme Title : B.Sc. Computer Science
Course Title : Elective-II : Compiler Design
Course Code : 21UCSEC2A
Semester : VI
Course Objectives:

Hours/Week : 4
Credit : 4

1. Provide fundamental knowledge on compilers
2. Introduce different types of parsers
3. Familiarize basic blocks and flow graphs
4. Acquaint with optimization

SYLLABUS

UNIT -I (Hours: 12)

Compilers - Analysis of the source program - Phases of a compiler - Cousins of the Compiler - Grouping of Phases - Compiler construction tools - Lexical Analysis - Role of Lexical Analyzer - input Buffering– Specification of Tokens

UNIT –II (Hours: 8)

Role of the parser, Writing Grammars - Context - Free Grammars - Top Down parsing - Recursive Descent parsing - Predictive parsing - bottom --up parsing -- shift Reduce Parsing - Operator Precedent Parsing - LR Parsers - SLR Parser - Canonical LR Parser - LALR Parser

UNIT -III (Hours: 17)

Intermediate Languages - Declarations - Assignment Statements - Boolean Expressions - Case Statements - Back patching - procedure calls

UNIT -IV (Hours: 13)

Issues in the design of code generator - The target machine – Runtime Storage management - Basic Blocks and Flow Graphs - Next use Information - A simple Code generator -- DAG representation of Basic Blocks - Peephole optimization

UNIT – V (Hours: 10)

Introduction - Principal Sources of Optimization - Optimization of basic Blocks - Introduction to Global Data Flow Analysis - Runtime Environments - Source Language issues - Storage Organization - Storage Allocation strategies - Access to non-local names - Parameter Passing

Book for Study:

Alfred Aho, Ravi Sethi, Jeffrey D. Ullman, "Compilers - Principles, Techniques and Tools", Pearson Education Asia, 2nd Edition, 2003

Books for Reference:

1. Henk Alblas and Albert Nymeyer, "Practice and Principles of Compiler Building with C", PHI, 2001
2. Kenneth C. Loudon, "Compiler Construction: Principles and Practices" Thompson Learning, 2003.

Web Resources :

- <http://www.peterindia.net/CompilersResources.html>
- https://www.tutorialspoint.com/compiler_design/index.htm
- <https://www.isi.edu/~pedro/Teaching/CSCI565-Spring17/>

Course Outcomes (CO) : On completion of the course, students should be able to

| CO Number | CO Statement | Knowledge Level |
|------------------|--|------------------------|
| CO1 | Show the principles of compiler design | K1 |
| CO2 | Explain the concepts of parsers | K2 |
| CO3 | Apply different basic blocks and flow graphs in compiler design | K3 |
| CO4 | Discuss the different applications of optimization | K6 |

Mapping of COs with POs:

| COs | POs | | | | | |
|------------|------------|-----|-----|-----|-----|-----|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 |
| CO1 | S | M | M | L | S | S |
| CO2 | S | S | S | S | S | L |
| CO3 | S | M | M | M | S | S |
| CO4 | S | S | S | S | L | L |

S – Strong, M – Medium, L – Light

Programme Title : B. Sc. Computer Science
Course Title : Elective-II : Assembly Language Programming
Course Code : 21UCSEC2B **Hours / Week** : 4
Semester : VI **Credit** : 4

Course Objectives :

1. Facilitate the internal representation of numbers and operations
2. Provide knowledge of internal working principles of CPU
3. Afford different types of addressing
4. Empower with different types of assembly language instructions
5. Inculcate different forms of decimal notations

SYLLABUS

UNIT – I (Hours: 10)

Number system: Positional number system - Binary to Decimal conversion - Hexadecimal to Decimal conversion - Decimal to Binary and Decimal to hexadecimal conversions - Hexadecimal to binary and binary to hexadecimal conversion - addition of binary and hexadecimal numbers - Subtraction of binary and hexadecimal numbers - Bits, words and halfwords.

UNIT – II (Hours: 10)

Representation of negative binary numbers-Assembly language format Registers and memory - Assembly language format -,Defining storage in memory - How the program works - Literals- Arithmetic operations : the multiply (M) Instruction - the divide (D) Instruction - RR Instructions - LPR ,LNR and LCR Instructions –Halfword instructions.

UNIT – III (Hours: 10)

Addressing: Machine language format for RR and RX Instruction - Effective addresses -Effects of BALR and USING - Boundary requirements - Explicit notation - Load address –Debugging programs - addressing long programs - Equivalence pseudo-instructions.

UNIT – IV (Hours: 15)

Compare and Branch Instructions: the condition code and branching - load and test register - Compare Instructions. Arrays and Looping: The BCT and BCTR Instructions - arrays - Address modification - the BXLE and BXH Instruction. Character string manipulation: Representation of Character Strings - Declaration of character strings - Move character (MEC) - Logical Comparison - Immediate instructions - Arrays of character strings.

UNIT – V (Hours: 15)

Packed decimal numbers: Packed decimal number format - Declaration (definition) of packed decimal numbers - packed decimal operations and formats - Zero and Addpacked - Multiplication and division, of packed numbers - Arrays of packed decimal numbers - Advanced packed decimal concepts: Fractional packed decimal numbers - shift and round packed - move zone and move numeric - move with offsets - number conversions - input / output - edit and edit with mark.

Book for Study:

1. David E. Goldberg, Jacqueline a.Jones, Pat H. Sterbenz "Theory and Problems of Programming with Assembly Language", McGraw Hill International editions, Schaum's Outline Series, Oct 1988

Books for Reference:

1. Lance a Levantal, "8080A-8085 Assembly language programming", McGrawHill, International Editions, 4th printing, 1988.
2. Douglas V Hall, "Microprocessors and interfacing", TMH, Revised Second Edition, Eleventh Reprint, 2010.

Web Resources:

- www.tutorialspoint.com
- www.scribd.com
- www.pickatutorial.com

Course Outcomes (CO) : On completion of the course, students should be able to

| CO Number | CO Statement | Knowledge Level |
|-----------|---|-----------------|
| CO1 | Find the challenges in programming | K1 |
| CO2 | Apply the knowledge in understanding system software | K3 |
| CO3 | Construct the assembly language program | K4 |
| CO4 | Design the system software | K6 |

Mapping of COs with POs:

| COs | POs | | | | | |
|-----|-----|-----|-----|-----|-----|-----|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 |
| CO1 | S | M | M | L | S | S |
| CO2 | S | S | S | S | S | L |
| CO3 | S | M | M | M | S | S |
| CO4 | S | S | S | S | L | L |

S – Strong, M – Medium, L – Low

Programme Title : B. Sc. Computer Science
Course Title : Elective-II : Grid Computing
Course Code : 21UCSEC2C
Semester : VI

Hours / Week : 4
Credits: 4

Course Objectives :

1. Provide key concepts of Grid Computing
2. Facilitate with Grid Computing history, evolution and Challenges
3. Have exposure to Grid Computing standards

UNIT – I (Hours: 10)

Introduction: Grid Computing & Key Issues - Applications - Other Approaches - Grid Computing Standards - Pragmatic course of investigation

UNIT – II (Hours: 15)

Grid Benefits & Status of Technology: Motivations - History of Computing, Communications and Grid Computing - Grid Computing Prime Time - Suppliers and Vendors - Economic Value - Challenges

UNIT – III (Hours: 10)

Components of Grid Computing Systems and Architectures: Basic Constituent Elements – A Functional View – A Physical View – Service View

UNIT – IV (Hours: 15)

Grid Computing Standards - OGSI: Standardization - Architectural Constructs - Practical View - OGSA/OGSI Service Elements and Layered Model - More Detailed View

UNIT-V (Hours: 10)

Standard Supporting Grid Computing - OGSA: Functionality Requirements - OGSA Service Taxonomy - Service Relationships - OGSA Services - Security Considerations

Books For Study

1. A Networking Approach to Grid Computing, Daniel Minoli, Wiley Publication.

Books For Reference

1. Grid Computing - A Practical Guide to Technology and Applications. Ahmar Abbas
Charles River Media Publications

Web Resources:

- www.guru99.com
- www.cs.kent.edu
- www.wiziq.com

Course Outcomes (CO) : On completion of the course, students should be able to

| CO Number | CO Statement | Knowledge Level |
|-----------|--|-----------------|
| CO1 | Find the technology and tool kits for facilitating grid computing | K1 |
| CO2 | Explain the genesis of grid computing | K2 |
| CO3 | Analyze where the grid computing could be effectively used | K4 |
| CO4 | Discuss the system for supporting grid services | K6 |

Mapping of COs with POs:

| COs | POs | | | | | |
|-----|-----|-----|-----|-----|-----|-----|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 |
| CO1 | S | M | M | L | S | S |
| CO2 | S | S | S | S | S | L |
| CO3 | S | M | M | M | S | S |
| CO4 | S | S | S | S | L | L |

S – Strong, M – Medium, L – Light

Programme Title : B.Sc. Computer Science
Course Title : Elective-III : Computer Networks
Course Code : 21UCSEC3
Semester : VI

Hours/Week : 4
Credit :4

Course Objectives:

1. Afford the basic and Classification of Networks.
2. Describe the types of errors and different Compression Algorithms.
3. Familiarize various protocols and topologies LAN, WAN and Wireless LAN.
4. Comprehend the different application of Networks.

SYLLABUS

UNIT - I (Hours: 8)

Introduction - Applications - Computer Networks - Categories of Networks - Standards and Standards Organizations - Network Architecture - Open Systems and OSI Model - TCP/IP Architecture - Communication Media and Data Transmission – Fourier Analysis – Analog and Digital Data Transmission – Modulation and Demodulation – Transmission Media – Wireless Communications – Data Transmission Basics – Transmission Mode – Interfacing – Multiplexing.

UNIT – II (Hours: 12)

Error Detection and Correction – Types of Errors – Error Detection – Error Correction – Data Compression – Lossless Compression Algorithms – Image Compression (JPEG) – Video Compression (MPEG) – Audio Compression (MP3) – Data Link Control and Protocol Concepts – Flow Control – Error Control – Asynchronous Protocols – Synchronous Protocols – High – Level Data Link Control (HDLC).

UNIT – III (Hours: 15)

Local Area Networks – Types of Networks and Topology – LAN Transmission equipment – LAN Installation and Performance – Ethernet: IEEE Standard 802.3 – Token Bus: IEEE Standard 802.4 – Token Ring: IEEE Standard 802.5 – Fiber Distributed Data Interface(FDDI) – Distributed Queue Dual Bus(DQDB): IEEE Standard 802.6 – LAN Operating Systems and Protocols – Ethernet Technologies – Wide Area Networks – WAN Transmission Methods – WAN Carrier Types – WAN Transmission Equipment – WAN Design and Multicast Considerations – WAN Protocols – Integrated Services and Routing Protocols – Integrating Services – ISDN Services – ISDN Topology – ISDN Protocols – Broadband ISDN – Asynchronous Transfer Mode(ATM) – Principle Characteristics of ATM – Frame Relay – Compression Of ISDN,ATM and Frame Relay.

UNIT - IV (Hours: 10)

Wireless LANs – WLAN Applications – Wireless LAN Requirements – Planning for Wireless LANs – Wireless LAN Architecture – IEEE 802.11 Protocol Layer – IEEE 802.11 Physical Layer – Designing the Wireless LAN Layout – WAP Services – Internetworking – Principles of internetworking – Routing Principles – Internet work protocols(IP) – Shortcomings of IPv4 – IP Next Generation – TCP Reliable Transport Service – Transport Protocols – The service TCP Provides to Applications – End – to – End Service and Datagrams – Transmission Control Protocol – User Datagram Protocol.

UNIT – V (Hours: 15)

Network Applications – Client – server Model – Domain Name System (DNS) – Telnet – File Transfer and Remote File Access – Electronic Mail – World Wide Web(WWW) – Network Management – Goal of Network Management – Network Management Standards – Network Management Model – Infrastructure for Network Management – Simple Network Management Protocols(SNMP) – Network Security – Fundamental Concepts – Identification and Authentication – Access Control – A Model for Network Security – Malicious Software – Security Services and Cryptography – Securing Network Using Firewall – Web Security – Intrusion Detection.

Book for Study:

1. Brijendra Singh, “Data communications And Computer Networks”, Prentice Hall of India, 2006.

Books for Reference:

1. Wayne Tomasi, “Introduction To Data Communication and Networks”, Pearson Education 2007.

Web Resources :

- <http://www.learn-c.org/>
- <http://crasseux.com/books/tutorial/>
- <http://www.strath.ac.uk/IT/Docs/Ccourse/>

Course Outcomes (CO) : On completion of the course, students should be able to

| CO Number | CO Statement | Knowledge Level |
|-----------|--|-----------------|
| CO1 | Recall Basic and Classifications of Networks. | K1 |
| CO2 | Explain various types of errors and algorithms. | K2 |
| CO3 | Construct various type network and their usage. | K3 |
| CO4 | Analyze the different types of Network Applications. | K4 |

Mapping of COs with POs :

| COs | POs | | | | | |
|-----|-----|-----|-----|-----|-----|-----|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 |
| CO1 | S | M | M | L | S | S |
| CO2 | S | S | S | S | S | L |
| CO3 | S | M | M | M | S | S |
| CO4 | S | S | S | S | L | L |

S – Strong, M – Medium, L – Light

Programme Title : B.Sc., Computer Science
Course Title : ELECTIVE - III : Web Designing Using Open Source
Course Code : 21UCSEC3A **Hours/Week: 4**
Semester : VI **Credits: 4**

Course Objectives:

1. Introduce web designing with open source technologies
2. Acquaint programming knowledge in Php&MySql
3. Develop and deploy websites in real time web environments

SYLLABUS

UNIT – I (Hours: 12)

HTML tags – Creating Your HTML Document – Displaying the Document in a Web Browser –Modifying an HTML document- HTML Document Headings- HTML Headings- HTML Paragraph Breaks- HTML Style Tags- Embedding Including Pictures in Web Pages- Linking to Local Files- Anchor Link a Graphic – Preformatted Text- Lists- Colorful and Textured Backgrounds- Horizontal Rules- Text Alignment. Tables- Creation of Table- Cell Padding ,Spacing, Column Specification- Framed Web Pages- Forms- Attributes- Text Input Elements- Password Input Elements- Text Area Input Elements- Radio Buttons- Check Boxes- Menu Select- Submit And Reset Buttons.

UNIT – II (Hours: 12)

Introduction to PHP: Basic Syntax- Sending data to a Web Browser- Writing comments- Variables- Strings- Concatenating Strings- Numbers- Constants- Single Vs. Double Quotation Marks- Programming with PHP- Creating And Handling an HTML Forms- Conditional and Operators- Validating Form Data- Introducing Arrays- For and While Loops- Creating Dynamic Websites: Including Multiple Files- Handling HTML Form, Revisited- Making Sticky Forms- Creating Own Functions.

UNIT – III (Hours: 12)

Introduction to MYSQL: Naming Database Elements- Choosing Your Column Types- Choosing Other Column Properties- Accessing MYSQL- Introduction to SQL: Creating Databases and Tables- Inserting Rows – Selecting Data- Using Conditionals- Using LIKE and NOTLIKE- Sorting Query Results- Limiting Query Results- Updating Data- Deleting Data- Using Functions.

UNIT – IV (Hours: 12)

Advanced SQL and MYSQL: Database Design – Performing Joins- Grouping Selected Results- Creating Indexes- Using Different Table Types- Performing Full Text Searches- Performing Transactions.

UNIT – V (Hours: 12)

Error Handling and Debugging: Error Types and Basic Debugging- Displaying PHP Errors- Adjusting Error Reporting in PHP- Creating Custom Error Handlers- PHP Debugging Techniques- SQL and MYSQL Debugging Techniques- Using PHP with MYSQL- Modifying the Template- Connecting to MYSQL- Executing Simple Queries- Retrieving Query Results- Ensuring Secure SQL – Counting Returned Records- Updating Records with PHP.

Books for Study:

1. C.xavier,” world wide web design with HTML”, Tata McGraw Hill Publication, New Delhi, Third reprint 2001.
2. Larry Ullman, “PHP 6 and MYSQL 5”, Pearson Education, First Impression, 2008. Chapters 1-8.

Books for Reference:

1. Thomas A.Powell, “ The Complete Reference HTML & XHTML”, Tata McGraw Hill Publication Company Limited Fourth Edition, Third Reprint 2000.
2. Andrew Curioso, Ronald Bradford, Patrick Galbraith,” Expert PHP and MYSQL “, Wiley India Pvt.Ltd, reprint 2010.
3. Luke Welling, Laura Thomson, “PHP and MYSQL Web Development”, Pearson Edition, Fourth Edition, First Impression 2010.
4. VikramVaswami, “MYSQL- The Complete Reference”, Tata McGraw Hill Publication Company Limited. 8th reprint 2008.

Web Resources :

1. <https://www.w3schools.in/html-tutorial/>
2. <https://www.udemy.com/php-mysql-tutorial/>
3. https://www.tutorialspoint.com/php/php_and_mysql.htm

Course Outcomes (CO) : On completion of the course, students should be able to

| CO Number | CO Statement | Knowledge Level |
|-----------|---|-----------------|
| CO1 | List the concepts on Html Programming for website creation | K1 |
| CO2 | Relate web applications through PHP | K2 |
| CO3 | Make use of error handling, debugging and retrieving query results in PHP | K3 |
| CO4 | Classify advanced features of MySql | K4 |
| CO5 | Design websites through PHP with MySql | K6 |

Mapping of COs with POs:

| COs | POs | | | | | |
|------------|-----|-----|-----|-----|-----|-----|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 |
| CO1 | S | M | M | L | S | S |
| CO2 | S | S | S | S | S | L |
| CO3 | S | M | M | M | S | S |
| CO4 | S | S | S | S | L | L |
| CO5 | M | S | S | L | L | S |

S – Strong, M – Medium, L – Low

Programme Title : B. Sc. Computer Science
Course Title : ELECTIVE - III : Mobile Communications
Course Code : 21UCSEC3B **Hours / Week : 4**
Semester : VI **Credit : 4**

Course Objectives :

1. Impart the fundamental concepts of mobile communication systems
2. Provide understanding of medium access techniques
3. Study the wireless LAN architecture.

SYLLABUS

UNIT-I (Hours: 15)

Introduction: Applications - A Simplified Reference Model. Wireless Transaction: Cellular Systems. Medium Access Control: Motivation For A Specialized MAC: Hidden and exposed terminals - Near and far terminals - SDMA-FDMA-TDMA: Fixed TDM -Classical Aloha - Slotted Aloha - Carrier Sense Multiple Access - Demand Sense Multiple Access - PRMA Packet Reservation Multiple Access - Reservation TDMA - Multiple Access with Collision Avoidance - Polling - Inhabit Sense Multiple Access. CDMA: Spread Aloha Multiple Accesses.

UNIT-II (Hours: 10)

Telecommunication Systems: GSM: Mobile Services: System Architecture - Radio Interface - Protocols - Localization and calling - Handover - Security - New Data Services- DECT: System Architecture - Protocol Architecture-TETRA.

UNIT-III (Hours: 15)

UMTS and IMT 2000: UNITS Releases and Standardization - UMTS System Architecture –UMTS Radio Interface - UTRAN - Core Network - Handover. Satellite System: History - Applications - Basics: GEO 173 - LEO 175- MEO 175. Routing - Localization - Handover. Broadcast Systems: Overview - Cyclical Repetition of Data - Digital Audio Broadcasting - Digital Video Broadcasting - Convergence of Broadcasting and Mobile Communications.

UNIT – IV (Hours: 10)

Wireless LAN: Infra Red versus Radio Transmission - Infrastructure and Ad-Hoc Network - IEEE 802.11: System Architecture - Protocol Architecture - Physical Layer - Medium Access Control Layer - MAC Management - HIPERLAN: HIPERLAN 1 - WATM - BRAN - HyperLAN2. Bluetooth: User scenarios - Architecture - Radio layer - Base band layer - Link manager Protocol.

UNIT-V (Hours: 10)

Mobile Network Layer: Mobile IP - Dynamic Host Configuration Protocol - Mobile Ad - Hoc Networks, Mobile Transport Layer: Traditional TCP - Classical TCP improvements - TCP Over 2.5/3G Wireless Networks - Performance Enhancing Proxies.

Books for Study:

1. Jochen Schiller, "Mobile Communications", Pearson Education, Second Edition,2003.

Books for Reference:

1. ShivaniDubey, "Mobile Computing", A.B Publications, 2010.
2. SundaraRajan, Ramesh, RajaSekaran, "Mobile Computing", Sams Publishers, First Edition, 2008.

Web Resources:

- www.tutorialspoint.com
- <https://pdfs.semanticscholar.org>

Course Outcomes (CO) : On completion of the course, students should be able to

| CO Number | CO Statement | Knowledge Level |
|------------------|--|------------------------|
| CO1 | Define the basic features of mobile communications | K1 |
| CO2 | Summarize the mobile system architecture | K2 |
| CO3 | Compare and select best device for mobile communication | K4 |
| CO4 | Choose the features of particular mobile device | K6 |

Mapping of COs with POs:

| COs | POs | | | | | |
|------------|------------|-----|-----|-----|-----|-----|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 |
| CO1 | S | M | M | L | S | S |
| CO2 | S | S | S | S | S | L |
| CO3 | S | M | M | M | S | S |
| CO4 | S | S | S | S | L | L |

S – Strong, M – Medium, L – Light

Programme Title : B.Sc., Computer Science
Course Title : ELECTIVE - III : System Analysis and Design
Course Code : 21UCSEC3C **Hours/Week: 4**
Semester : VI **Credits: 4**
Course Objectives :

1. Introduce the concept and characteristics of a System
2. Provide knowledge on requirement analysis
3. Develop skill in system design
4. Train in system implementation
5. Provide knowledge on Project Management

SYLLABUS

UNIT- I (Hours: 15)

Introduction- Systems Concepts and the Information Systems Environment - The Systems Concepts: Definition - Characteristics of a System - Elements of a System - Types of Systems - The System Development Life Cycle - Introduction-The System Development Life Cycle - Considerations for Candidate Systems :Political Considerations- Planning and Control for System Success - Prototyping.

UNIT-II (Hours: 15)

System Analysis - Systems Planning and the Initial Investigation - Bases for Planning in Systems Analysis - Initial Investigation - Determining The User's information Requirements - Problem Definition and Project Initiation - Background Analysis - Fact Finding -Fact Analysis - Determination of Feasibility - Information Gathering - The Kind of Information We Need - Information Origin - Information Gathering Tools - Types of Interviews And Questionnaires.

UNIT- III (Hours: 10)

System Design-The Process and Stages of Systems Design - The Process of Design - Design Methodologies - Major Development Activities - Audit Considerations –Input/ Output and Forms Design - input Design - Input Media and Devices - Output Design- Forms Design - Types of Forms - Layout Considerations - Forms Control.

UNIT – IV (Hours: 10)

System implementation - System Testing and Quality Assurance - System Testing - The Need To Test - The Test Plan - Quality Assurance - Trends in Testing - Role of the Data Processing Auditor - Implementation and Software Maintenance - Activity Network For Conversion - Combating Resistance to Change - Post Implementation Review - Software Maintenance.

UNIT – V (Hours: 10)

Project Scheduling and Software- Cause of System Failure - Project Management - Crisis Elimination through Planning - Project Organization - Security ,Disaster / Recovery, and Ethics in Systems Development - System Security - Disaster / Recovery Planning - Ethics in System Development.

Book for Study

1. Elias M. Awad , "Systems Analysis and Design", Galgotia Publications, Reprint 2005.

Books for Reference

1. James A Senn , "Analysis and Design of Information Systems", McGraw Hill, Second Edition, 1989.
2. Igor Hawryszkiewicz, " Introduction to system analysis and design", PHI New Delhi, 2000

Web Resources

1. https://www.tutorialspoint.com/system_analysis_and_design/system_analysis_and_design_tutorial.pdf
2. <http://www.conceptdraw.com/diagram/system-analysis-and-design-tutorial>
3. <https://www.xoobooks.com/book/systems-analysis-and-design-methods/>
4. <http://www.bookpump.com/upb/pdf-b/2330754b.pdf>

Course Outcomes (CO) : On completion of the course, students should be able to

| CO Number | CO Statement | Knowledge Level |
|-----------|---|-----------------|
| CO1 | List the characteristics of a system | K1 |
| CO2 | Illustrate the Existing System | K2 |
| CO3 | Construct the system requirements | K3 |
| CO4 | Discover the requirements and design a new system | K4 |

Mapping of COs with POs:

| COs | POs | | | | | |
|-----|-----|-----|-----|-----|-----|-----|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 |
| CO1 | S | M | M | L | S | S |
| CO2 | S | S | S | S | S | L |
| CO3 | S | M | M | M | S | S |
| CO4 | S | S | S | S | L | L |

S – Strong, M – Medium, L – Light

Programme Title : B.SC., Computer Science
Course Title : Core Practical- VII: Python Programming Lab
Course Code : 21UCSQC7
Semester : VI

Hours/Week: 4
Credits: 2

Course Objectives:

1. Introduce open source technologies in scientific programming
2. Acquaint programming knowledge in Python
3. Solve problem using python

SYLLABUS

1. Write a program to compute distance between two points taking input from the user.
2. Write a program add.py that takes 2 numbers as command line arguments and prints its sum.
3. Write a Program for checking whether the given number is an even number or not.
4. Write a Program to demonstrate list and tuple in python. Write a program using a for loop that loops over a sequence.
5. Write a program using a while loop that asks the user for a number, and prints a countdown from that number to zero.
6. Write a program to count the numbers of characters in the string and store them in a dictionary data structure.
7. Write a program to use split and join methods in the string and trace a birthday of a person with a dictionary data structure.
8. Write a program to count frequency of characters in a given file.
9. Write a program to print each line of a file in reverse order. Write a program to compute the number of characters, words and lines in a file.
10. Write function to compute GCD, LCM of two numbers

Course Outcomes (CO) On the successful completion of the course, students will be able to

| CO Number | CO Statement | Knowledge Level |
|-----------|--|-----------------|
| CO1 | Show the programming features of python | K2 |
| CO2 | Apply and analyze through different mathematical functions | K3&k4 |
| CO3 | Develop solutions to simple computational problems using python programs | K6 |

Mapping with CourseOutcomes with Program outcomes:

| COs | POs | | | | | |
|-----|-----|-----|-----|-----|-----|-----|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 |
| CO1 | S | M | M | L | S | S |
| CO2 | S | S | S | S | S | L |
| CO3 | S | M | M | M | S | S |

S – Strong, M – Medium, L – Light

Programme Title : B.Sc., Computer Science
Course Title : Core Practical- VIII : Project
Course Code : 21UCSQC8
Semester : VI
Course Objectives:

Hours/Week: 5
Credits: 4

1. Introduce real time applications
2. Familiarize Modular programming
3. Enhance the creativity in applications
4. Establish top down approach in programming
5. Apply database connectivity to any front end

Course Outcomes (CO) : On completion of the course, students should be able to

| CO Number | CO Statement | Knowledge Level |
|-----------|---|-----------------|
| CO1 | Show the process of software development | K1 |
| CO2 | Experiment with the programming concepts and tools they learnt. | K3 |
| CO3 | Classify the various requirements for the project developed. | K4 |

Mapping of COs with POs:

| COs | POs | | | | | |
|-----|-----|-----|-----|-----|-----|-----|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 |
| CO1 | S | M | M | L | S | S |
| CO2 | S | S | S | S | S | L |
| CO3 | S | M | M | M | S | S |

S – Strong, M – Medium, L – Low

Programme Title : B.A/B.Sc./B.Com, Non-Computer Science

Course Title : Non-Major Skill Based - II : Data Analytics & Visualization - II
Course Code : 21UCSQNSC2 **Hours/Week: 4**
Semester : VI **Credits: 2**

Course objectives:

- Prepare the students to become skillful by doing hands on project based learning in the real time environment using Tableau
 - Making them to become industry /job - ready
1. Create a file and connect it with the data source in tableau.
 2. Create a table in excel and connect it with tableau.
 3. Create a table and a database using sql commands in tableau.
 4. Execute CRUD operations using sql commands.
 5. Execute Interface of tableau with the functions: New worksheet, Sort, Total, Group members, Swap.
 6. Create a box plot and histogram in tableau.
 7. Create different type of visualization: Pie , Bar , Line and Scatter chart.
 8. Execute different types of joins in tableau.
 9. Blend the data from various sources in tableau
 10. Execute cross-database joining and data extraction.
 11. Create a mark sheet and highlight group sets.
 12. Execute various types of sets in tableau.
 13. Execute types of sorting techniques.
 14. Create a Dataset and use formatting pane to edit it.
 15. Execute filtering techniques in tableau.

Course Outcomes (CO) On the successful completion of the course, students will be able to

| CO Number | CO Statement | Knowledge Level |
|------------------|---|------------------------|
| CO1 | Use the Tableau Analytics interface/paradigm to create powerful Visualizations, Dashboards & Story effectively | K2 |
| CO2 | Represent data using various visualization types | K3 |
| CO3 | Build a web application using flask web framework & Build a number of use cases in multiple domains such as Financial Services, Insurance, Retail, Ecommerce, Telecom, Agriculture, Aviation etc. | K3 |