

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 2022 - 23)

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 in web based programming languages for research project management.

SRI SARADA COLLEGE FOR WOMEN (AUTONOMOUS), SALEM - 16.

DEPARTMENT OF COMPUTER SCIENCE
B.Sc. Computer Science
22UPROGRAMME STRUCTURE UNDER CBCS
(For the students admitted in 2022-23)
Total Credits: 140 + Extra Credit (Maximum 28)

I SEMESTER

Part	Course	Course Title	Code	Hrs./Week	Credits
I	Language - I	Tamil/Hindi/Sanskrit - I	22ULTC1/ 22ULHC1/ 22ULSC1	6	3
II	English - I	Communicative English - I	22ULEC1	6	3
III	Core Course - I	Digital Computer Fundamentals	22UCSC1	3	3
III	Core Course - II	Programming in C	22UCSC2	4	4
III	Core Practical - I	C Programming	22UCSQC1	3	2
III	Allied - I	Mathematics - I	22UCSAC1	5	5
IV	Skill Based - I	Office Automation	22UCSSQC1	2	2
V	Society Connect Activity	Group Project based on Society Connect Activity	22USCAC	1	1
		Total		30	23
VI	Articulation and Idea Fixation Skills-6 Hours per Semester(out of college hours)				
	Physical Fitness Practice - Physical Fitness Practice - 35 hours per Semester -- 1 Extra Credit				
	Advanced Diploma in Computer Programming (Applicable for Non -Computer Science Students) 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	22ULTC2/ 22ULHC2/ 22ULSC2	6	3
II	English - II	Communicative English - II	22ULEC2	6	3
III	Core Course - III	Object Oriented Programming With Java	22UCSC3	3	3
III	Core Course - IV	Cyber Security	22UCSC4	3	3
III	Core Practical - II	Java Programming	22UCSQC2	3	2
III	Allied - I	Mathematics - II	22UCSAC2	5	5
IV	Skill Based - II	Cyber Security Skills Development	22UCSSQC2	2	2
IV	Environmental Studies	Environmental Studies	22UEVSC	2	1
		Group Project Based On Environmental Studies	22UEVSPC		1
		Total		30	23
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	22ULTC3/ 22ULHC3/ 22ULSC3	6	3
II	English - III	Communicative English - III	22ULEC3	6	3
III	Core Course - V	Data Structures and Algorithms	22UCSC5	5	5
III	Core Practical-III	Data Structures using 'C'	22UCSQC3	4	2
III	Allied - II	Statistical Methods - I	22UCSAC3	5	5
IV	Skill Based - III	Industry 4.0	22UCSSQC3	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.	Digital Skills for Employability - I	22UCSQNEC1
Allied for II B.Sc. Statistics	'C' Programming - I	22USTAC3

IV SEMESTER

Part	Course	Course Title	Code	Hrs./ Week	Credits
I	Language - IV	Tamil/Hindi/Sanskrit - IV	22ULTC4/ 22ULHC4/ 22ULSC4	6	3
II	English - IV	Communicative English - IV	22ULEC3	6	3
III	Core Course - VI	Relational Database Management Systems	22UCSC6	5	5
III	Core Practical - IV	Database Lab	22UCSQC4	4	2
III	Allied - II	Statistical Methods - II	22UCSAC4	5	5
IV	Skill Based - IV	PHP with MySQL	22UCSSQC4	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.	Digital Skills for Employability - II	22UCSQNEC2
Allied for II B.Sc. Statistics	'C' Programming - II	22USTAC4

V SEMESTER

Part	Course	Course Title	Code	Hrs./Week	Credits
III	Core Course - VII	.NET Programming	22UCSC7	5	5
III	Core Course - VIII	Computer Architecture and Organization	22UCSC8	5	5
III	Core Course - IX	Operating Systems	22UCSC9	5	5
III	Elective - I	Software Engineering/ Artificial Intelligence/ Client Server Architecture/ Microprocessor	22UCSEC1/ 22UCSEC1A/ 22UCSEC1B/ 22UCSEC1C	4	4
III	Core Practical - V	.NET Programming Lab	22UCSQC5	4	2
IV	Core Practical - VI	Microprocessor and Operating System Lab	22UCSQC6	4	2
IV	Non-Major Skill Based -1			2	2
IV	Value Education		22UVENC	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	22UCSQNSC1
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VI SEMESTER

Part	Course	Course Title	Code	Hrs./Week	Credits
III	Core Course - X	Computer Graphics	22UCSC10	5	5
III	Core Course - XI	Data Mining	22UCSC11	5	5
III	Elective - II	Python Programming Language / Compiler Design/ Assembly Language Programming/ Grid Computing	22UCSEC2/ 22UCSEC2A/ 22UCSEC2B/ 22UCSEC2C	4	4
III	Elective - III	Computer Networks/ Web Designing using Open Source/ Mobile Communications/ System Analysis and Design/	22UCSEC3/ 22UCSEC3A/ 22UCSEC3B/ 22UCSEC3C	4	4
III	Core Practical – VII	Python Programming Lab	22UCSQC7	4	2
IV	Core Practical – VIII	Project	22UCSQC8	5	4
IV	Non-Major Skill Based -2			2	2
IV	Value Education		22UVENC	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	22UCSQNSC2
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Programme Title : B.Sc. Computer Science
Course Title : Core Course-I: Digital Computer Fundamentals
Course Code : 22UCSC1 **Hours/Week: 3** **Semester : I** **Credits: 3**

Course Objectives:

- It aims to train the student the basic concepts of Digital Computer Fundamentals
- To impart the in-depth knowledge of logic gates, Boolean algebra, combinational circuits and sequential circuits.

UNIT – I (Hours:7)

Number Systems and Codes: Number System - Base Conversion - Binary Codes - Code Conversion. Digital Logic: Logic Gates - Truth Tables - Universal Gates.

UNIT – II (Hours:10)

Boolean Algebra: Laws and Theorems - SOP, POS Methods - Simplification of Boolean Functions - Using Theorems, K-Map, Prime - Implicant Method - Binary Arithmetic: Binary Addition - Subtraction - Various Representations of Binary Numbers - Arithmetic Building Blocks - Adder - Subtractor.

UNIT – III (Hours:8)

Combinational Logic: Multiplexers - Demultiplexers - Decoders - Encoders - Code Converters - Parity Generators and Checkers.

UNIT – IV (Hours:10)

Sequential Logic: RS, JK, D, and T Flip-Flops - Master-Slave Flip-Flops. Registers: Shift Registers -Types of Shift Registers.

UNIT – V ((Hours:10)

Counters: Asynchronous and Synchronous Counters - Ripple, Mod, Up - Down Counters - Ring Counters - Memory: Basic Terms and Ideas - Types of ROMs - Types of RAMs.

Book for Study

1. V.Vijyendran, Digital Fundamentals, S.Viswanathan (Pinters& Publishers) Pvt., Ltd., 2007.
2. V.Rajaraman and T. Radhakrishnan, Digital Computer Design, Prentice Hall of India, 2001

Book for Reference

1. D.P.Leach and A.P.Malvino, Digital Principles and Applications – TMH – Fifth Edition – 2002.
2. M. Moris Mano, Digital Logic and Computer Design, PHI, 2001.
3. T.C.Bartee, Digital Computer Fundamentals, 6th Edition, Tata M4.
5. cGraw Hill, 1991.

Web Resources

1. <https://www.youtube.com/watch?v=7pCRYXEgMPQ>
2. <https://www.youtube.com/watch?v=OcmdxtRKS1k>

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the Number Systems and its Conversions	K1
CO2	To identify the digital logic gates and their functions	K2
CO3	Build the design of basic electronic circuits (combinational circuits)	K3
CO4	Analyse the Combinational logic circuits and counters	K4

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	S	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 - I : Programming in C
Course Code : 22UCSC2 Hours/Week : 4 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

UNIT - I (Hours: 10)

C fundamentals Character set - Identifier and keywords - data types - constants - Variables - Declarations - Expressions - Statements - Arithmetic, Unary, Relational and logical, Assignment and Conditional Operators - Library functions.

UNIT – II (Hours: 12)

Data input output functions - Simple C programs - Flow of control - if, if-else, while, do-while, for loop, Nested control structures - Switch, break and continue, go to statements - Comma operator.

UNIT – III (Hours: 12)

Functions - Definition - Proto-types - Passing arguments - Recursions. Storage Classes - Automatic, External, Static, Register Variables - Multi-file programs.

UNIT – IV (Hours: 12)

Arrays - Defining and Processing - Passing arrays to functions - Multidimension arrays - Arrays and String. Structures - User defined data types - Passing structures to functions - Self-referential structures - Unions - Bit wise operations.

UNIT – V (Hours: 14)

Pointers - Declarations - Passing pointers to Functions - Operation in Pointers - Pointer and Arrays - Arrays of Pointers - Structures and Pointers - Files: Creating Processing, Opening and Closing a data file.

Book for Study

1. E.Balagurusamy, “Programming in ANSI C”, Eighth Edition, Tata McGraw Hill, New Delhi 2021.

Book for Reference

1. B.W. Kernighan and D M.Ritchie, “The C Programming Language”, 2nd Edition, PHI, 1988.
2. H. Schildt, “C: The Complete Reference”, 4th Edition. TMH Edition, 2000.
3. Gottfried B.S, “Programming with C”, Second Edition, TMH Pub. Co. Ltd., New Delhi 1996.
4. Kanetkar Y., “Let us C”, BPB Pub., New Delhi, 1999.

Web Resources:

- <https://youtu.be/5Bn8h6Id14U>
- <http://www.learn-c.org/>
- <http://crasseux.com/books/tutorial/>

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
Course Code : 22UCSQ1 **Hours/Week:** 3
Semester : I **Credits:** 2
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

I Summation of Series

1. Sin(x), 2. Cos(x), 3. Exp(x) (Comparison with built in-functions)

II String Manipulation

1. Counting the number of vowels, consonants, words, white spaces in a line of text and array of lines.
2. Reverse a string and check for palindrome.
3. Sub string detection, count and removal.
4. Finding and replacing substrings.

III Recursion

1. nPr, nCr
2. GCD of two numbers
3. Fibonacci sequence
4. Maximum & Minimum

IV Matrix Manipulation

1. Addition and Subtraction
2. Multiplication
3. Transpose, and trace of a matrix
4. Determinant of a Matrix

V Sorting and Searching

1. Insertion Sort
2. Bubble Sort
3. Linear Search
4. Binary Search

VI Applications

1. Write a program for Simple Calculator.
2. Write a program to prepare a multiplication table.
3. Write a C program to calculate Gross Salary of an employee.
4. Write a C Program to display student details using structure members.

Web Resources:

- https://www.tutorjoes.in/c-programming_tutorial/index
- <https://www.w3schools.in/c-tutorial/>

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	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: Office Automation
Course Code : 22UCSSQC1
Semester : I

Hours/Week: 2
Credits: 2

COURSE OBJECTIVES

- To acquire knowledge on editor, spread sheet, slide preparation
- To improve creative thinking in presentation software

I. MS-WORD

1. Text Manipulation: Write a paragraph about your institution and Change the font size and type, Spell check, Aligning and justification of Text
2. Bio data: Prepare a Bio-data.
3. Find and Replace: Write a paragraph about yourself and do the following. Find and Replace - Use Numbering Bullets, Footer and Headers.
4. Tables and manipulation: Creation, Insertion, Deletion (Columns and Rows). Create a mark sheet.
5. Mail Merge: Prepare an invitation to invite your friends to your birthday party. Prepare at least five letters.

II. MS-EXCEL

1. Data sorting-Ascending and Descending (both numbers and alphabets)
2. Mark list preparation for a student
3. Individual Pay Bill preparation.
4. Applying Filters
5. Drawing Graphs. Take your own table.

III. MS-POWERPOINT

1. Create a slide show presentation for a seminar.
2. Preparation of Organization Charts.
3. Create a slide show with animation effects.
4. Use different presentation template different transition effect for each slide.

Web Resources:

1. <https://ptgmedia.pearsoncmg.com/images/9780735623026/samplepages/9780735623026.pdf>
2. https://www.dit.ie/media/ittraining/msoffice/MOAC_Excel_2016_Core.pdf
3. <https://ptgmedia.pearsoncmg.com/images/9780735697799/samplepages/9780735697799.pdf>

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

CO Number	CO Statement	Knowledge Level
CO1	Understand text documents, editing and formatting documents	K2
CO2	Apply formulas and make what if analysis in spread sheet	K3
CO3	Examine slide show presentation concepts and explore the MS PowerPoint environment	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 - Low

Programme Title : B.Sc., Computer Science
Course Title : Core Course - II: Object Oriented Programming with Java
Course Code : 22UCSC2 **Hours/Week: 3**
Semester : II **Credits: 3**

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 Course-IV: Cyber Security

Course Code : 22UCSC4

Hours/Week: 3

Semester : II

Credits : 2

Course Objectives:

1. Provide fundamental knowledge about cyber security
2. Familiarize the different types of cyber crime
3. Provide basic knowledge about cyber threats and laws

SYLLABUS

UNIT - I (Hours: 15)

Defining Cyberspace and Overview of Computer and Web-technology, Architecture of cyberspace, Communication and web technology, Internet, World wide web, Advent of internet, Internet infrastructure for data transfer and governance, Internet society, Regulation of cyberspace, Concept of cyber security, Issues and challenges of cyber security

UNIT - II (Hours: 15)

Classification of cyber crimes, Common cyber crimes- cyber crime targeting computers and mobiles, cyber crime against women and children, financial frauds, social engineering attacks, malware and ransomware attacks, zero day and zero click attacks, Cybercriminals modus-operandi, Reporting of cyber crimes, Remedial and mitigation measures, Legal perspective of cyber crime, IT Act 2000 and its amendments, Cyber crime and offences, Organisations dealing with Cyber crime and Cyber security in India, Case studies.

UNIT - III (Hours: 15)

Introduction to Social networks. Types of Social media, Social media platforms, Social media monitoring, Hashtag, Viral content, Social media marketing, Social media privacy, Challenges, opportunities and pitfalls in online social network, Security issues related to social media, Flagging and reporting of inappropriate content, Laws regarding posting of inappropriate content, Best practices for the use of Social media, Case studies.

UNIT - IV (Hours: 15)

Definition of E- Commerce, Main components of E-Commerce, Elements of E-Commerce security, E-Commerce threats, E-Commerce security best practices, Introduction to digital payments, Components of digital payment and stake holders, Modes of digital payments- Banking Cards, Unified Payment Interface (UPI), e-Wallets, Unstructured Supplementary Service Data (USSD), Aadhar enabled payments, Digital payments related common frauds and preventive measures. RBI guidelines on digital payments and customer protection in unauthorised banking transactions. Relevant provisions of Payment Settlement Act,2007,

UNIT - V: (Hours: 15)

End Point device and Mobile phone security, Password policy, Security patch management, Data backup, Downloading and management of third party software, Device security policy, Cyber Security best practices, Significance of host firewall and Ant-virus, Management of host firewall and Anti-virus, Wi-Fi security, Configuration of basic security policy and permissions.

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

CO Number	CO Statement	Knowledge Level
CO1	Recall the cyber security threat landscape	K1
CO2	Understand the various types of cyber attacks, cyber crimes, vulnerability and remedies.	K2
CO3	Apply the preventive measures in digital world	K3
CO4	Ability to analyze and evaluate existing legal framework and laws on cyber security	K4

Mapping of Cos with Pos and PSOs:

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 – Light

Programme Title : B.Sc., Computer Science
Course Title : Core Practical- II: Java Programming
Course Code : 22UCSQC2 **Hours/Week: 3**
Semester : II **Credits: 2**

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: Cyber Security Skills Development
Course Code : 22UCSSQC Hours/Week : 2 Semester : II Credits : 2

COURSE OBJECTIVES:

1. Deliver the fundamental understanding of Cyber Security.
2. Familiarize basic methods in Cyber Security
3. Explain various Cyber Security applications in society
4. Identify the key issues in online modes and safety methods used.

SYLLABUS

1. Checklist for reporting cyber crime at Cyber crime Police Station.
2. Checklist for reporting cyber crime online.
3. Reporting phishing emails.
4. Demonstration of email phishing attack and preventive measures.
5. Basic checklist, privacy and security settings for popular Social media platforms.
6. Reporting and redressal mechanism for violations and misuse of Social media platforms.
7. Configuring security settings in Mobile Wallets and UPIs.
8. Checklist for secure net banking.
9. Setting, configuring and managing three password policy in the computer (BIOS, Administrator and Standard User).
10. Setting and configuring two factor authentication in the Mobile phone.
11. Security patch management and updates in Computer and Mobiles.
12. Managing Application permissions in Mobile phone.
13. Installation and configuration of computer Anti-virus.
14. Installation and configuration of Computer Host Firewall.
15. Wi-Fi security management in computer and mobile.

COURSE OUTCOMES (CO): On Completion of course the Students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Outline the concepts of Cyber security	K2
CO2	Apply the skill to practice the Cyber security platforms	K3
CO3	Analysed the extensive procedures for Cyber security	K4
CO4	Predict the performance of real time applications in Cyber security	K5

Mapping of COs with POs:

COs	POs					
	PO1	PO2	PO3	PO4	PO5	PO6
CO1	S	S	S	S	S	S
CO2	S	S	S	S	S	S
CO3	S	S	S	S	S	S
CO4	S	S	S	S	S	S

S - Strong, M - Medium, L - Low

Programme Title : B.Sc. Computer Science
Course Title : Core Course -V :Data Structures and Algorithms
Course Code : 22UCSC5 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 - (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, Debasis Samanta, PHI, Second Edition
3. Fundamentals of Data Structures, Ellis Horowitz, Sartaj Sahni, 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

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

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 (CBCS)
Course Title : Core Practical - III: Data Structures Using “C”
Course Code : 22UCSQC3
Semester : III
Course Objectives :

Hours / Week : 4
Credits: 2

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 : 22UCSSQC3
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 :

Cos	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-II :
Digital Skills for Employability - I
Course Code : 22UCSQNEC2
Semester : IV

Hours/Week: 2
Credits : 2

Course Objectives:

- To learn Document Preparation
- To use Excel for Data Analysis

List of Exercises:

Word

1. Design E-book cover pages / Magazine front/ books front/back page using the cover page option in Insert Menu.
2. Use smart art and create organizational charts and showcase relations.
3. Create a book index and content page.
4. Create different header and footer.
5. Insert the image into the shape.
6. Practice hyperlinking and creating links between Word documents.
7. Design a birthday invitation using Word Art
8. Get the newspaper and see the text-based advertisement and Design that advertisement in Microsoft Word
9. Create a letterhead, Identity card of any company or institution that you got and insert the Watermark with that company name in the document.
10. Decorate a Word document with a page border, and content border, add patterns, and write beautiful text in it.
11. Insert Images and Practice on Format Menu and Image Options.
12. Prepare an Invitation and use mail merge to send it to different People.

Excel

1. Apply different formatting in the Worksheet.
2. Demonstrate Filling Options.
3. Apply different types of Filters.
4. Removing Duplicates
5. Sorting
6. Creating and Editing Charts
7. Searching and VLOOKUP

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the importance of MS Word as a Productivity Skill	K1
CO2	Recall the uses of Ribbon tabs and how it makes work simpler	K2
CO3	Navigate to a page or heading without scrolling the whole document.	K3
CO4	Understand the features of data entry and storing large numeric data in a tabular format.	K4
CO5	Apply insert, store, update, and analyze data in worksheets.	K6

Programme Title : B. Sc. Statistics
Course Title : Allied : 'C' Programming - I
Course Code : 22USTAC3
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 'C' Language	K1
CO2	Interpret the meaning of 'C' programs with decision making looping and arrays	K2
CO3	Develop simple 'C' programs with decision making, looping and arrays	K3
CO4	Examine simple 'C' programs for errors	K4

Programme Title : B. Sc. Computer Science
Course Title : Core Course - VI : Relational Database Management Systems
Course Code : 22UCSC6 **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 : 22UCSQC4

Hours / Week : 4

Semester : IV

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 : 22UCSSQC4

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 . A . / B . S c . / B . C o m .
Course Title : Non-Major Elective - II: Digital Skills for Employability - II
Course Code : 22UCSQNEC2 **Hours/Week: 2**
Semester : IV **Credit: 2**

Course Objectives:

- To create power point presentation
- Sharing Document with One Drive
- Create new meetings in Outlook, appointments, tasks, and contacts

List of Exercises:

Power Point:

1. Create a power point presentation using Bullets and Organization charts.
2. Create Power point Presentation using Smart Arts and Charts
3. Creating Master Slide
4. Apply different Slide Transitions and Animation

MS Teams:

1. Schedule a call on MS Teams
2. Scheduling Assistant
3. Uploading Files and Folders
4. Sharing access on One Drive with Password Protection
5. Applying different features of share points

Outlook

1. Create new meetings in Outlook, appointments, tasks, and contacts.
2. Prepare a task list.
3. Send an Email with Quick Parts.
4. Sharing Calendars.

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

CO Number	CO Statement	Knowledge Level
CO1	Able to prepare presentation with different fonts and inserting shapes	K1
CO2	Understand the features of cloud storage	K2
CO3	Organizing email messages using calenders, contacts and tasks in outlook	K3

Programme Title : B. Sc. Statistics
Course Title : 'C' Programming - II
Course Code : 22USTAC4
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 on Characters- 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 VII: .NET PROGRAMMING

Course Code : 22UCSC7

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/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	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 - VIII: Computer Architecture and Organization
Course Code : 22UCSC8 **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 -IX : Operating Systems

Course Code : 22UCSC9

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/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 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 : 22UCSEC1 **Hours / Week : 4**
Semester : V **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 : 22UCSEC1A

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 - Baye's 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://ciml.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 : 22UCSEC1B

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 : **22UCSEC1C** **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 – DhanpatRai publication – 2001.

Books for Reference

1. Microprocessor Architecture, programming and application with the 8085/8080A – RomeshS.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 – Low

Programme Title : B.Sc. Computer Science

Course Title : Core Practical - V: .NET PROGRAMMING LAB

Course Code : 22UCSQC5

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 - Low

Programme Title : B.Sc. Computer Science

Course Title : Core Practical - VI: Microprocessor and Operating System Lab

Course Code : 22UCSQC6

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 -call command to display calendar of the specified month.
6. Write a shell script to modify -call 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

S - Strong M - Medium L - Low

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 - X : Computer Graphics

Course Code : 22UCSC10 Hours/Week : 5 Semester : VI Credits: 5

Course Objectives:

1. Explain the basic concepts of computer graphics and it's 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 it's 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 - XI : Data Mining
Course Code : 22UCSC11
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 : 22UCSEC2

Semester : VI

Hours/Week: 4

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. Aurelien Geron, –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

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 – Low

Programme Title : B.Sc. Computer Science
Course Title : Elective-II : Compiler Design
Course Code : 22UCSEC2A
Semester : VI

Hours/Week : 4
Credit : 4

Course Objectives:

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. Louden, "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 – Low

Programme Title : B. Sc. Computer Science
Course Title : Elective-II : Assembly Language Programming
Course Code : 22UCSEC2B **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 Levanthal, "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 : 22UCSEC2C
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 – Low

Programme Title: B.Sc. Computer Science

Course Title : Elective-III : Computer Networks

Course Code : 22UCSEC3

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 – Low

Programme Title : B.Sc., Computer Science

Course Title : ELECTIVE - III :Web Designing Using Open Source

Course Code : 22UCSEC3A

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 : 22UCSEC3B **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 – Low

Programme Title : B.Sc., Computer Science

Course Title : ELECTIVE - III : System Analysis and Design

Course Code : 22UCSEC3C

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 – Low

Programme Title: B.SC., Computer Science

Course Title : Core Practical- VII: Python Programming Lab

Course Code : 22UCSQC7

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 Course Outcomes 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 - Low

Programme Title : B.Sc., Computer Science
Course Title : Core Practical- VIII : Project
Course Code : 22UCSQC8
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 : 22UCSQNSC2

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