

Programme : B.Sc. Computer Science
Course Title : CORE: FUNDAMENTALS OF IT **Course Code** : 20UCS/USC1C01
Year : I **Semester** : I
Hours/Week :2 **Credit** : 2

COURSE OBJECTIVES

- To Understand the concept of Hardware Fundamentals.
- To Understand the concept of Operating Systems
- To Understand the concept of Fundamentals of Network

Course outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Know the basic components of computer and its functionality	K1
CO2	Know the concept of Windows operating systems	K1
CO3	Know the concept of networking and their techniques	K1
CO4	Know the basic concepts of Storage devices	K1

MAPPING WITH PROGRAMME OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PSO1	PS002	PSO3	PS04
CO1	L	L	M	M	M	L	L	M	L
CO2	L	L	M	M	M	L	L	M	L
CO3	L	L	M	M	M	L	L	M	L
CO4	L	L	M	M	M	L	L	M	L

UNIT1:

About PC data: Introduction - The PC system board -Introduction to the PC - Boot process, system bus - I/O busses, ISA bus - Chip sets - RAM About CPU's: - CPU - CPU improvements - CPU 5th & 6th generation - Over clocking the CPU's

About drives and other storage media:-Drives - Hard disks - Optic storage media - MO and ZIP drives - Tape streamers

UNIT2:

About expansion cards and interfaces: - Adapters and expansion cards - About interfaces: EIDE, Ultra DMA and AGP - SCSI, FireWire and USB

About operating and file systems:-File systems - Running and maintaining Windows 2000, XP, Win7, Win8.1- Relationship between operating system and hardware (BIOS, driver programs, etc.)

UNIT3:

Fundamentals of Network: Introduction to Networking -Networking Fundamentals - Application layer functionality and Protocols-OSI Transport Layer-OSI Network Layer-Addressing the Network-IPv4-OSI Data link layer-OSI Physical Layer-Ethernet-Planning and Cabling Networks-Configuring and Testing Your Network

Books for Study:

1. Gordon Davies , Networking Fundamentals, Packet Publishing, December 2019
2. **Michael B. Karbo. A complete illustrated Guide to the PC Hardware,1998**

Books for Reference:

1. **Rajaraman V and Adabala N, Fundamentals of Computers, Prentice Hall India Learning Private Limited, 2014.**
2. **Pradeep K Sinha, Computer Fundamentals, BPB Publications,2019.**

E –Resources:

1. <https://www.webopedia.com/reference/network-fundamentals-study-guide/>
2. <https://www.ibm.com/cloud/learn/networking-a-complete-guide>
3. <https://www.udemy.com/course/complete-networking-fundamentals-course-ccna-start/>
4. https://www.cisco.com/c/dam/global/fi_fi/assets/docs/SMB_University_120307_Networking_Fundamentals.pdf

Programme : B.Sc. Computer Science

Course Title : CORE: PROGRAMMING IN C Course Code : 20UCS/USC1C02

Year : I Semester : I

Hours/Week : 4 Credit : 4

COURSE OBJECTIVES

- To make the students aware of the basic concepts of C.
- To make them understand the benefits and applications of C.
- To develop the program writing and logical thinking skills.

Course outcomes

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

CO No.	CO Statement	Knowledge level
CO1	Know the logics of solving the problems	K1
CO2	Understand the concepts of C programming	K2
CO3	Analyze and discover bugs in the program	K4
CO4	Apply the concepts and develop programs to solve real-time problems	K3

MAPPING WITH PROGRAMME OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	M	S	M	S	M	S	S	M	L
CO2	M	S	M	S	M	S	S	M	L
CO3	S	S	M	S	M	S	S	S	S
CO4	S	S	M	S	M	S	S	S	S

Unit I

Overview of C – Introduction-Character set –C Tokens Keywords & identifiers - Constant – Variables - Data types- Declaration of Variables- Assigning values to variables-Defining Symbolic Constants. Operators and Expressions:-Arithmetic, Relational Logical, Assignment, Conditional Bitwise, Special, **Increment and Decrement operators**-Arithmetic Expressions-

Evaluation of expression-Precedence of arithmetic operators-**Type conversion in expression**-operator precedence & associative – mathematical functions. Managing Input and Output Operations: -Reading & writing a character – formatted input and output.

Unit II

Decision making and Branching: – Decision making with IF Statement-simple IF Statement-The IF ELSE statement-Nesting of IF—ELSE statement-Else if Ladder-Switch Statement--Conditional operator. Decision Making and Looping:- The WHILE statement- **Do Statement**-FOR Statement.

Arrays: The One Dimensional Array-Declarations – Initialization-Two Dimensional Array-Initialization- Multidimensional arrays. Character Arrays and strings: Declaring and initializing string variables- Reading strings from terminals-writing strings to screen -**Arithmetic operation on character-putting strings together**-comparison of two strings- string handling functions-table of Strings

Unit III

User defined functions: –need for user Defined functions- A multifunction program – Elements of User defined functions-Definition of functions—Return values and their types-Calling a function-Function declaration- Category of functions-No Arguments and no Return values- Arguments but no return values-Arguments with return values-No Arguments but Return the value- **Functions that return multiple values**- nesting of functions- Recursion- Passing arrays to functions- **Passing strings to functions**- The scope,visibilityand lifetime of variables

Unit IV

Structure and Union: Defining a structure-Declaring the structure variables– Accessing structure members-Structures initialization- Copying and comparing structure variables-Arrays of Structures - Arrays with in Structures- **Structures within structures** – Structures and functions- unions- Size of structures. Pointers:- Understanding pointers-Accessing the Address of a Variable – **Declaring and initializing pointers- Accessing a variable through its pointers-pointers expressions pointer increments and scale factor-pointers and arrays – pointers and character strings- pointers as functions arguments.**

Unit V

File management in C:- Defining and opening a file- closing file-I/O operations on files-Error handling during I/O operations-Random Access to files- Command line arguments –The Preprocessor: Macro substitution- File inclusion- **Complier control directives.**

Books for Study:

1. Jogamohan Medak and Parth Pratim Gogoi, Basics of C Programming, Kindle Edition, 2018.
2. Kamthane, Programming in C, Kindle Edition, 2019.
3. Balagurusamy.E, Programming in ANSI C, McGraw Hill, 6th Edition, 2012.

Books for Reference:

1. Yashavant Kanetkar, Let us C, Tata McGraw Hill, 11nd Edition, 2011.
2. Mullesh Cooper, Spirit of C, Tata McGraw Hill, 28th impression, 2006.

E-Resources:

1. <https://www.tutorialspoint.com/cprogramming/index.htm>
2. https://www.unf.edu/~wkloster/2220/ppts/cprogramming_tutorial.pdf
3. <https://www.coursera.org/specializations/c-programming>
4. <http://spoken-tutorial.org/>

Programme : B.Sc. Computer Science

Course Title : CORE : INTERNET OF THINGS Course Code : 20UCS/USC2C03

Year : I Semester : 2

Hours/Week : 2 Credit : 2

COURSE OBJECTIVES

- To Learn the basic concepts of IoT
- To Understand basic platforms in IoT
- To Understand the Sensing devices
- To Understand the basic tools in IoT

Course outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Know the concepts of IoT	K1
CO2	Can work with Arduino Board	K2
CO3	Understand the various sensors	K2
CO4	Apply the tools in IoT	K3

MAPPING WITH PROGRAMME OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	S	M	L	M	M	S	M	L	L
CO2	S	S	M	M	M	S	S	M	L
CO3	M	S	M	M	M	S	M	M	S
CO4	S	S	L	M	M	S	M	M	M

Unit – I

Introduction - Solution Patterns for the Internet of Things - Design Patterns and the IoT - Smart, Connected Products - Smart, Connected Operations - New and Innovative Experiences - The Edge of the IoT - Living on the Edge - Edge Architecture Examples

Unit -II

What is actually Arduino -Hardware and Software-Programming - Sensing Inputs Blinking LED-Alternately blinking LED-Fading LED -Light and sound-Push button and LED -RGB LED -Motion detector-Potentiometer

Outputs from sensing devices: Temperature measurement -Measurement of distance -Usage of an infrared remote -Control a servo -LCD Display -Relay shield -Stepper-Moisture sensor-Drop sensor -RFID Kit.

Unit -III

The Arduino Board - Get to know your tools - Spaceship interface - Love o Meter - Color Mixing lamp - Mood cup - Light Theremin - Keyboard instrument.

Books for Study:

1. J. Biron and J. Follett, "Foundational Elements of an IoT Solution", O'Reilly Media, 1st Edition, 2016. (Unit-I)
2. "Funduino Tutorials for Arduino", Funduino Service Team, Edition 2016 (Unit-II)
3. Scott Fitzgerald and Michael Shiloh, "The Arduino Projects Book", 3rd Edition, 2015 (Unit-III)

Books for Reference:

1. [Arsheep Bahga](#), [Vijay Madiseti](#), Internet Of Things: A Hands-On Approach, Orient Blackswan Private Limited, First edition 2015
2. [Adrian McEwen](#), [Hakim Cassimally](#), Designing the Internet of Things, Wiley; 1st edition, 2013

E-Resources:

1. <https://fdocuments.in/document/foundational-elements-for-iot-1.html>
2. <http://www.funduino.de/Arduino-tutorials-08092014.pdf>
3. <http://arduino-tutorials.eu/>

Programme : B.Sc. Computer Science

**Course Title : CORE : OBJECT ORIENTED PROGRAMMING
WITH C++**

Course Code : 20UCS/USC2C04

Year : I

Semester : 2

Hours/Week : 4

Credit : 4

COURSE OBJECTIVES

- To learn the basic concepts of OOPS.
- To develop programs in C++ using the concepts of OOPS.
- To develop programs for error handling and generic programs

Course outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the OOPS concepts.	K2
CO2	Learn data types and control structures in C++	K1
CO3	Demonstrate the Reusability by applying the types of Inheritance and know Polymorphism	K3
CO4	Demonstrate the use of pointers in virtual functions.	K3
CO5	Analyse the features of C++ including templates, exceptions and file handling.	K4

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	S	S	L	M	S	S	S	M	L
CO2	S	S	L	M	L	S	S	M	L
CO3	M	S	L	M	M	S	S	M	L
CO4	S	S	L	M	M	S	S	L	L
CO5	S	S	M	M	M	S	S	S	L

UNIT I

Object Oriented Programming Paradigm: Basic concepts — Benefits — **Application** — Structure of C++ program — Basic data types — User Defined Data types — Derived data types — Manipulators — Type cast operator — Conversions — **Control structures**

UNIT II

Functions: Function Prototyping — Call by reference — return by reference — Inline function — Default arguments.

Class & Objects: Specifying a class — Define member function — **Arrays within a class - Memory allocation** — Arrays of Object — Objects as function Arguments — Constructors Parameterized constructor — Copy Constructor — Dynamic constructor — Destructors.

UNIT III

Function Overloading(Type 1 & Type 2) -- Operator Overloading & type conversion: Define Operators Overloading — Overloading unary operators — Binary operators — **Type conversion.**

Inheritance: Defining derived class — Single inheritance — Multi level inheritance — Multiple inheritance — Hierarchical inheritance — **Hybrid inheritance** — Constructors in derived class.

UNIT IV

Pointers, Virtual functions and polymorphism: Pointer to Objects — this pointer — virtual functions — **Pure Virtual Functions – Friend functions.**

Files: Opening and Closing a File — Detecting end of file — File pointers and their manipulations — Command — line arguments.

UNIT V

Templates: Class templates — **Function templates** — Overloading of template function — Member function templates.

Exception Handling: Basics — Exception handling mechanism — Throwing mechanism — Catching mechanism — **Specify Exceptions.**

Books for Study:

1. E. Balagurusamy, Object Oriented Programming with C++,Tata McGraw Hill Education Private Limited, 8th Edition,N.Delhi, 2020.
2. Yashavant Kanetkar, Let us C++, bpb Publications, 17th Edition, 2020.

Books for Reference:

1. Robert Lafore, Object Oriented Programming in C++,Pearson Education,4th Edition, 2020.
2. Herbert Schildt, The Complete Reference : C++, Tata McGraw Hill Education Private Limited, 4th Edition, 2017.

E-Resources:

1. https://www3.ntu.edu.sg/home/ehchua/programming/cpp/cp3_OOP.html
2. <https://www.udemy.com/course/c-programming-oops-concepts/>
3. <https://www.geeksforgeeks.org/object-oriented-programming-in-cpp/>

Course Title : CORE: DATABASE MANAGEMENT SYSTEM **Course Code** : 20UCS/USC3C05
Year : II **Semester** : III
Hours/Week : 4 **Credit** : 4

Course Objectives

- To understand database systems and its structure
- To apply normalization techniques to normalize the database
- To understand the use of Structured Query Language (SQL).
- To understand and learn the PL/SQL programming language for database processing

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	know and practice the data models and schemas in DBMS	K1
CO2	develop the database designs and apply normalization techniques to normalize the database	K4
CO3	use SQL to structure the database to handle data	K3
CO4	use PL/SQL to create, secure, populate, maintain, and query a database.	K3

MAPPING WITH PROGRAMME OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PSO1	PS002	PSO3	PSO4
CO1	S	M	S	M	S	S	M	M	M
CO2	S	S	L	M	S	S	M	S	S
CO3	S	S	S	M	S	S	S	S	M
CO4	S	S	M	L	S	S	S	S	S

UNIT I

Introduction: – Database System Applications – purpose of database systems - View of Data – Data Models – Database Languages – Relational databases – data storage and querying – Database architecture - **Database Users and Administrators** – Structure of Relational databases – keys.

UNIT II

The Entity – Relationship model – Entity Relationship Diagram – Relational Database Design: Atomic Domains and First Normal Form – Decomposition using Functional Dependencies (Second Normal Form) – Boyce-Codd Normal Form – Third Normal Form – Decomposition using Multivalued Dependencies - Fourth Normal Form - **More Normal Forms.**

UNIT III

Interactive SQL: Table fundamentals: Oracle Data types – DDL,DML Commands-create table – viewing data in the tables – Eliminating duplicate rows when using a select statement – Inserting data into a table from another table – **Delete operations** – Updating the contents of a table – Modifying the structure of tables – **Renaming tables – Truncating tables – Destroying tables.** Data constraints – types of data constraints - defining different constraints on a table

UNIT IV

Introduction to PL/SQL Data base objects: Advantages of PL/SQL – The generic PL/SQL block – the PL/SQL execution environment - **PL/SQL - The character set – Literals - PL/SQL data types – variables – constants** – LOB types – logical comparisons - displaying user messages on the VDU Screen – comments – Control structures – what is a cursor? – Types of Cursor- Implicit and Explicit cursor.

UNIT V

PL/SQL database objects: what are procedures/ functions? Advantages of using procedure or function- procedures versus function – deleting a stored procedures or functions – oracle packages – database triggers – **types of triggers.**

Books for study:

1. A.Silberschatz, H.Korth and S.Sudarsan, Database System Concepts, TATA McGraw Hill Inc, Seventh Edition, 2019.
2. Ivan Bayross, SQL, PL/SQL the programming language of ORACLE, BPB Publications, 4th revised edition, 2020

Books for reference:

1. Ramez Elmasri and Shamkant Navathe, Fundamentals Of Database Systems, Pearson India, 7th Edition, 2017
2. C.J.Date, An Introduction to Database Systems, Addition – Wesley, eighth edition, 2007.
3. Majumdar& Bhattacharya, Database Management System, TMH, 2007.
4. P.S. Deshpande, SQL & PL/SQL for Oracle 11g Black Book, Dreamtech Press, 2011

E-Resources:

Programme : B.Sc. Computer Science

Course Title : CORE: DATA STRUCTURES AND ALGORITHMS Course Code : 20UCS/USC3C06

Year : II

Semester : III

Hours/Week : 5

Credit : 5

Course Objectives

1. To understand linear and non linear data structures
2. To understand the operation on Array, Stack, Queue, Linked list, Trees, Graphs
3. To aware of internal and external sorting techniques
4. To know about files, file organization and indexing techniques

Course Outcome

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

CO Number	CO Statement	Knowledge Level
CO1	Know the characteristics of various data structure.	K1
CO2	Understand and develop applications using various data structures	K2
CO3	Apply appropriate internal sorting methods	K3
CO4	Analyze the concept of files and its various organization	K4

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	S	S	L	M	M	S	S	M	L
CO2	S	S	L	M	M	S	S	M	L
CO3	S	S	L	M	M	S	S	M	L
CO4	S	S	M	S	M	S	S	S	M

UNIT I

Introduction: Over view — Creation and analyses of programs — Arrays: Basics — Representation of arrays — Sparse Matrices — Stacks: Basics — Functions — Evaluation of expressions— Multiple Stacks — Queues: Basics — Functions — Circular Queues — **Multiple Queues.**

UNIT II

Linked Lists: Single Linked Lists — Linked Stacks and Queues — Storage Pool — Applications — Polynomial Addition — Equivalence Relations — Double Linked Lists: Dynamic Storage Management — **Garbage collection and Compaction.**

UNIT III

Trees: Basic Terminology — Binary Trees — Representation and Traversals — Threaded Binary trees — In order traversal — **Binary tree representation of Trees** — Sets — Union, Find algorithms — Graphs: Transitive Closure — Warshall 's Algorithm — Shortest path problem: Djikstra's algorithm — Minimum Spanning Trees: Prim's algorithm.

UNIT IV

Searching Techniques: **Binary, Sequential** and Fibonacci searches — Sorting Techniques: Internal sorting with tapes and disks — balanced merge sort — Polyphase merge sort.

UNIT V

Symbol Tables: Static tree and dynamic tree implementations — Hash tables. **File Organizations** — **Sequential, ISAM, Random - Linked File organizations: Multilists** — Inverted Files — Cellular Partitions.

Books for Study:

1. Ellis Horowitz and Sartaj Sahni Sushan Anderson- Freed, Fundamentals of Data Structures, Silicon Press, Reprint 2019 (UNITS — I, II, III First Paragraph, IV, V).
2. Tanenbaum A. M. and Augestein M. J, Data Structures Using C, 2019 (UNIT — III Second Paragraph).

Books for Reference:

1. Yashwant Kanetkar, Data Structures through C, BPB publications, 2003.
2. Thareja Reema, Data Structures through C, OUP India, 2nd Edition 2014
3. Mark Allen Weiss Data Structures & Algorithm Analysis in C, Addison Wesley, 4th Edition Reprint 2015.

E-Resources:

1. <https://www.programiz.com/dsa/graph>
2. https://www.tutorialspoint.com/data_structures_algorithms/dsa_quick_guide.htm

Programme : B.Sc. Computer Science

Course Title : CORE: JAVA PROGRAMMING

Course Code : 20UCS/USC3C07

Year : II

Semester : III

Hours/Week : 5

Credit : 4

Course Objectives

- To understand and write programs for Packages and Interfaces
- To learn and write programs for Multithreaded Programming concepts
- To learn the Applets, AWT controls
- To learn the database connectivity using JDBC

Course Outcome

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

CO Number	CO Statement	Knowledge Level
CO1.	Understand the Packages and Multithreaded applications	K2
CO2.	Write Applet programs	K2
CO3.	apply AWT controls in the Applications	K3
CO4.	Demonstrate database applications using JDBC	K4

MAPPING WITH PROGRAMME OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	S	S	M	M	M	S	M	M	M
CO2	S	S	M	M	M	S	S	M	L
CO3	S	M	M	M	M	S	M	M	M
CO4	S	S	L	M	M	S	M	M	M

UNIT I

Introduction to java – Overview of Java - Introduction to Classes- Inheritance Concepts- Packages and Interfaces: Packages – Access protection Importing packages – interfaces. Exception Handling: Fundamentals – **Exception types** – Using Try and Catch – **nested Try** – statements – throw, throws, finally.

UNIT II

Multithreaded programming: Thread model – Creating a thread, creating multiple threads – Using Alive () and join () – synchronization – Inter threaded communication. String Handling: String constructors – **string operations** – character extraction – **string comparison** – searching – modification.

UNIT III

Input/ Output: File – Stream classes – Byte streams – character streams – The Applet Class: Applet Basics - Applet Architecture - **Applet Skeleton**-Applet Initialization and Termination-**Applet Display Methods**-The HTML APPLET Tag-Passing Parameters to Applets.

UNIT IV

Introduction the AWT: AWT Classes-Window Fundamentals- Creating Frame Window in an Applet- Handling Events in a Frame Window- Working with Graphics-**Working with Color-Working with Fonts**-Using AWT Controls: Control Fundamentals.AWT Menus: Menu Bars and Menus -Dialog Boxes-Image Fundamentals:Creating, Loading, and Displaying.

UNIT V

JDBC: Environment- Driver Types- Connections-Statements Object - **Data Types** - Create Database-Select Database-Drop Database-Create Tables-**Drop Tables** – Insert Records-Update Records – Delete Records

Books for Study:

1. Herbert Schildt, The Complete Reference -java 2, TATAMcGraw Hill, 11th Edition, 2018. (Units I,II,III,&IV)
2. [George Reese](#), Database Programming with JDBC and Java, 2ndEdition, 2000.

Books for Reference:

1. E.Balagurusamy , Programming with Java, , TATAMcGraw Hill, Third Edition,2018
2. Patrick Naughton, Herbert Schildt , Java 2: The Complete Reference, McGraw-Hill Osborne Media, 2001.

E – Resources:

1. <https://www.tutorialspoint.com/jdbc/index.htm>
2. <https://nptel.ac.in/courses/106/105/106105191>
3. <https://gfgc.kar.nic.in/sirmv-science/GenericDocHandler/138-a2973dc6-c024-4d81-be6d-5c3344f232ce.pdf>

Programme : B.Sc. Computer Science

Course Title : CORE: .NET TECHNOLOGY (C#) Course Code : 20UCS/USC4C08

Year : II Semester : IV

Hours/Week : 5 Credit : 4

Course Objectives

- To Learn the basic concepts of C# fundamentals
- To understand the concepts of controls and windows working environment
- To understand concepts of ADO.Net and its Applications
- To Understand the Working Environment in Web platform

Course Outcome

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

CO Number	CO Statement	Knowledge Level
CO1.	Learn the fundamental concepts in C#	K1
CO2.	Develop the Windows Applications using controls	K4
CO3.	Work with ADO.Net and its Applications	K3
CO4.	Develop Web Applications	K4

MAPPING WITH PROGRAMME OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	S	M	M	L	M	S	M	M	L
CO2	S	M	M	M	M	S	S	M	L
CO3	S	S	M	M	M	S	S	M	L
CO4	S	S	M	L	M	S	S	S	M

Unit I

Console Application: Introduction to C# (1-5) – Understanding .Net: The C# Environment (11-16) – Overview of C# – Adding Comments – Command Line Arguments (18-25) – Literals, **Variables and Data Types**(34-49) - Classes and Objects (212-233).

Unit II

Graphical User Interfaces with Windows Forms: Introduction – Windows Forms – Event Handling – Control Properties and Layout– Labels, Text Boxes and Buttons – Group Boxes and Panels – Check Boxes and **Radio Buttons** – Picture Boxes – Tooltips – Numeric Up Down Control – Mouse-Event Handling – **Keyboard-Event Handling**(399-440)

Unit III

Menus – Month Calendar Control – Date Time Picker Control – Link Label Control – List Box Control – Checked List Box Control – Combo Box Control –Tree View Control – **List View Control** – **Tab Control** – Multiple Document Interface (MDI) Windows – Visual Inheritance (441-501)

Unit IV

ADO.NET Overview (685-687) – Using Database Connections (688-692) – Fast Data Access: The Data Reader – Managing Data and Relationships: The Data Set Class (701-714)-Populating a Data Set – **Persisting Data Set Changes** – Working with ADO.NET (721-733) –The DataGrid Control (735-749) - Data Binding – Visual Studio.Net and Data Access (750-769)

Unit V

Web Forms Programming: ASP.NET Introduction – ASP.Net WEB Forms: ASP.NET Sever Controls – ADO.NET and Data Binding: **Updating the Event** – Data Binding with Application. (871-901)

Text Books

1. E.Balagurusamy, Programming in C#, 4th Edition, Tata McGraw-Hill, 2017. (UNIT I)
2. Paul Deitel and Harvey Deitel, C# 2010 for Programmers, 4th Edition, Pearson, 2011.(UNIT II& III)
3. Simon Robinson, Christian Nagel, Karli Watson, Jay Glynn, Professional C#, 3rd Edition, Wrox Publisher, 2007. (UNIT IV&V)

Reference Books

1. Geetanjali Arora, Balasubramaniam Aiswamy ,and Nitin Pandey, Microsoft C# Professional Projects,Prentice Hall of India Private Limited, 2002.
2. **Herbert Schildt, C# 4.0 Complete References, 1st Edition, Tata McGraw-Hill, 2010.**

WEB REFERENCE

1. <https://www.microsoft.com/en-in/download/details.aspx?id=7029>

Programme : B.Sc. Computer Science

**Course Title : CORE: COMPUTER ORGANIZATION
AND ARCHITECTURE**

Course Code : 20UCS/USC4C09

Year : II

Semester : IV

Hours/Week : 5

Credit : 4

Course objectives

- To understand number systems and basic logic gates
- To learn the concept of CPU organization, stack organization, instruction formats and addressing modes.
- To learn the I/O and Memory organization

Course Outcomes

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

CO Number	CO Statement	Knowledge level
CO1.	know the number systems and basic logic gates	K1
CO2.	understand the CPU, I/O and Memory organizations	K2
CO3	Understand the input/output Organization Methods	K2
CO4	Understand the concepts of memory and its storing techniques	K2

WITH PROGRAMME OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PSO1	PSO02	PSO3	PSO4
CO1	S	M	L	M	M	S	L	M	L
CO2	M	M	M	M	M	S	L	M	M
CO3	M	M	M	M	M	S	L	M	L
CO4	M	M	L	M	M	S	L	M	M

UNIT I

Number systems: Binary Number System –Octal Numbers – Hexadecimal Numbers – Number system Conversion from one to another - The Excess-3 Code – The Gray Code. Basic logic gates: AND, OR, NOT – **Universal logic gates: NOR, NAND.**

UNIT II

Boolean laws and theorems - Multiplexers – Demultiplexers – Decoder – Encoders – **Half-Adder** – Full-Adder – half subtractor – full subtractor - RS Flip flop - JK Flip-flop.

UNIT III

Central Processing Unit - Stack organization - Instruction formats — Addressing Modes - Data transfer and manipulation — **program control** – parallel processing — pipelining.

UNIT IV

Input/output Organization: I/O Bus and interface modules — i/o versus memory bus - isolated and memory mapped I/O - **asynchronous data transfer** – strobe control - handshaking - Direct memory access.

UNIT V

Memory Organization — memory hierarchy – **main memory** - auxiliary memory — Associative memory — Cache memory – Virtual memory.

Books for Study:

1. Smruti Ranjan Sarangi, Computer Organisation and Architecture, McGraw Hill Education, 2017
2. Donald P Leach, Albert Paul Malvino and Goutam Saha, Digital Principles and Applications, Special Indian edition, 7th Edition, 2011.
3. M. Morris Mano, Computer System Architecture, Pearson Education Inc, Third Edition, 2009.

Books for Reference:

1. Dorling Kindersley, Computer organization and architecture Designing for performance, Pearson Education, , 10th Edition, 2016
2. David A. Patterson and John L. Hennessy, Computer Organization and design: The hardware/ Software Interface, Morgan Kaufmann, 4th Edition, 2011.
3. Nicholas P. Carter, Computer Architecture and organization, McGrawHillIndia, 2nd Edition, 2017.

E-Resources:

<https://www.geeksforgeeks.org/computer-organization-and-architecture-tutorials/>

<https://www.javatpoint.com/computer-organization-and-architecture-tutorial>

<https://nptel.ac.in/courses/106/105/106105163/>

Programme : B.Sc. Computer Science

Course Title : CORE: ANDROID PROGRAMMING Course Code : 20UCS/USC4C10

Year : II Semester : IV

Hours/Week : 4 Credit : 4

Course objectives

- To learn configuring and developing applications for mobile devices
- To apply the tool(Eclipse) required to develop applications
- To understand the concept of activities, intents, menus and content provider in android
- To know the various application designs with animation, graphics

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	understand the concept of android development platform, and configuring and creating android applications.	K2
CO2	create an activity, intents, different event handling methods and menus	K4
CO3	know working with views, view groups and content provider	K1
CO4	apply the concept of graphics and animation in developing android application	K3

MAPPING WITH PROGRAMME OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	S	S	M	L	L	S	L	L	L
CO2	S	S	M	S	M	S	M	S	L
CO3	M	S	S	S	M	S	S	M	M
CO4	M	S	S	M	M	S	M	S	S

UNIT I

Introducing android (listing the version history of android platform - discussing android APIs - Describing the android architecture - application framework - exploring the features of android) - The Manifest file.

Downloading and installing android (downloading and installing the android SDK - setting up android virtual device - setting up android physical device)

Developing and executing the first android application (using eclipse IDE to create an application - running your application - exploring the application - using command line tools)

UNIT II

Working with Activities: Creating an activity - starting an activity - managing the lifecycle of an activity - **applying themes and styles to an activity.**

Using intents: Exploring intent objects - linking the activities using intent - obtaining results from intent - passing data using an intent object.

UNIT III

Working with the user interface using Views and View Groups: Working with View Groups - The Linear Layout layout - the Relative Layout layout - **the Scroll View layout - the Table Layout layout - the Frame Layout layout.**

Working with Views (Using the Text View - using Edit Text view - using the Button view - using the Radio Button view - using the Check Box view - using the Image Button view - using the Toggle Button view - using the Rating Bar view)

Creating menus - the option menu - the context menu - **the submenus**

UNIT IV

Notifying the user:- Creating the Toast notification - Creating the status bar notification - creating the Dialog notification.

Introducing the data storage options: Using Preference - using the internal storage: Exploring the methods used for internal storage- Using the SQLite database: Creating the database helper class.

UNIT V

Working with content providers:- Exploring the android provider package - creating user-defined content provider - consuming user-defined content provider.

Working with Animations:-The Property Animation - View Animation - Drawable Animation.

Books for study:

1. Pradeep Kothari, Android application development (with KitKat Support) Black Book, dreamtech press, 2018

Books for reference:

1. S. Sydhani begum, Mobile App Development - Android Programs Using Eclipse:

- Android Programs Using Eclipse Indigo, Notion Press, 2019
2. Wallace Jackson, Android Applications for Absolute Beginners, Apress, 3rd Edition, 2014.
 3. W. Frank Ableson, RobiSen, Chris King, “Android in Action”, Manning Publications, 2nd Edition, 2011.
 4. Shawn Van Every, ‘Pro Android Media: Developing Graphics, Music, Video, and Rich Media Apps for Smartphones and Tablets ‘, Apress Publisher, 2016.

E-Resources:

1. <https://www.javatpoint.com/how-to-setup-android-for-eclipse-ide>
2. <https://info448-s17.github.io/lecture-notes/resources-and-layouts.html>
3. <https://www.tutorialspoint.com/android/index.htm>
4. <https://www.codeproject.com/Articles/825700/Beginners-Guide-to-Android-Animation-Graphics>
5. <https://www.geeksforgeeks.org/android-app-development-fundamentals-for-beginners/>

Programme : B.Sc. Computer Science

Course Title : CORE: OPERATING SYSTEM Course Code : 20UCS/USC5C11

Year : III Semester : V

Hours/Week : 5 Credit : 5

Course Objectives

1. learn the basic concepts of operating system and its types
2. learn the various functions such as process management, storage management, file management and disk management
3. know the concepts of Windows2000 and Windows XP

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	know the usage of various operating systems	K1
CO2	Understand the functions of process management and file management to know the various file operations and how these files are processed	K2
CO3	Understand the concept and difference between storage management and disk management	K2
CO4	Apply the knowledge of the Windows2000 and Windows XP for utilizing other operating systems	K3

MAPPING WITH PROGRAMME OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	L	L	L	L	L	S	L	L	L
CO2	S	L	M	M	L	S	L	M	L
CO3	M	L	M	M	L	S	L	M	L
CO4	M	L	M	M	L	S	L	M	M

Unit I

INTRODUCTION: What is an Operating System?-Mainframe Systems-Desktop Systems-Multiprocessor Systems-Distributed Systems-Clustered System-Real-Time Systems-Handheld Systems. Operating-System Structures:-System Components-Operating-System Services-System Calls-System Programs-System Structure-Virtual Machines.(Pages 3-19, 55-80)

Unit II

PROCESS MANAGEMENT: Process Concept-Process Scheduling-Operations on Processes-Cooperating Processes-Inter process Communication. CPU Scheduling:-Basic

Concepts-Scheduling Criteria- Scheduling Algorithms-Multiple-Processor Scheduling-Real-Time Scheduling. Deadlocks:-System Model-Deadlock Characterization-Methods for Handling Deadlocks-Deadlock Prevention- Deadlock Avoidance- Deadlock Detection-Recovery from Deadlock. (Pages 95 – 109, 151-170, 243 - 264)

Unit III

STORAGE MANAGEMENT: Memory Management:-Background-Swapping-Contiguous Memory Allocation-Paging-Segmentation- Segmentation with Paging. Virtual Memory:-Background-Demand Paging-Process Creation-Page Replacement-Allocation of Frames-Thrashing. (Pages 273-309, 317 – 348)

Unit IV

File-System Implementation:-File-System Structure- File-System Implementation-Directory Implementation-Allocation Methods-Free-Space Management. Mass-Storage Structure:-Disk Structure-Disk Management-Swap-Space Management-RAID Structure-Disk Attachment-Stable-Storage Implementation-Tertiary-Storage Structure. (Pages 411 – 430, 491 – 516)

Unit V - CASE STUDIES:

The Linux system: History- Design Principles – kernel Modules –Process management- Scheduling – Memory Management- File system – Input and Output- Inter process Communication- Network Structure

Windows2000: History-Design Principles-System Components-Environmental Subsystems-File System-Networking-Programmer Interface. (Pages 695-739,743-787)

Books for study:

1. SILBERSCHATZ, GALVIN and GAGNE, OPERATING SYSTEM CONCEPTS, Wiley India Edition, tenth edition, 2018.

Books for reference:

1. Stuart E. Madnick, John J.Donovan, Operating Systems, Tata McGraw Hill, Eighth edition, 2017.
2. Deitel, Deitel and Choffnes, Operating Systems, Pearson Education, third edition, 2003.

E-Resources:

1. https://en.wikipedia.org/wiki/Operating_system
2. <https://www.geeksforgeeks.org/types-of-operating-systems/>
3. https://www.tutorialspoint.com/operating_system/os_overview.htm
4. <https://nptel.ac.in/courses/106/108/106108101/>

Programme : B.Sc. Computer Science

Course Title : CORE: WEB TECHNOLOGY

Course Code : 20UCS/USC5C12

Year : III

Semester : V

Hours/Week : 5

Credit : 4

Course Outcomes

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

CO Number	CO Statement	Knowledge level
CO1.	Know the basic concepts of HTML	K1
CO2.	Understanding form designing using HTML with CSS	K2
CO3	Apply various controls in PHP	K3
CO4	Develop Web Applications	K4

MAPPING WITH PROGRAMME OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PSO1	PS002	PSO3	PS04
CO1	M	S	M	M	M	S	L	L	L
CO2	M	S	S	S	M	M	L	S	M
CO3	S	S	S	S	M	M	S	S	M
CO4	S	S	S	S	S	M	S	S	S

HTML

Unit I

Overview of HTML5 – HTML5 and its Essentials – Exploring New Features of HTML5 – Fundamentals of HTML – Working with Text – Organizing Text in HTML – Working with Links and URLs – Creating Tables – Working with Forms – Working with Multimedia.

XML AND CSS

Unit II

XML Document: Hello XML- Creating, saving, loading XML document- Attributes – Empty Element tags- XSL. Document type definition: DTD files- Internal and External DTDs- Element Declaration.

CSS layouts: CSS units- The Display property- Box properties- Size – Positioning – CSS Text styles: Fonts- Color- Text- Backgrounds.

Web Services: WSDL, XML Schema and SOAP.

PHP

Unit III

Introduction to PHP: Creating first PHP page – variables- constants-types- Operators and Flow Control: Operators- Conditional Statements- Looping - arrays.

Unit IV

Reading Data in Web Pages: Handling Text Fields, Text Area, Checkboxes, Radio Buttons, List Boxes, Password Controls, Hidden Controls, Image Maps, File Uploads, Buttons.

Unit V

Working with Databases: Creating MYSQL Database, New Table, Putting Data into the New Database, Accessing the Database in PHP, Inserting, Deleting, Updating the Data items into a database using PHP.

Books for Study:

1. Laura Lemay, Rafe Colburn and Jennifer Kyrnin, Mastering HTML, CSS & Javascript Web Publishing , BPB Publications, 2016
2. Ritesh Kumar , Learn HTML in Easy Way, Ganpati Book Centre, 2019
3. Kogent Learning Solutions Inc., HTML5 Black Book Covers CSS3, JavaScript, XML, XHTML, AJAX, PHP and JQuery, 2012 (Unit I)
4. Ellistte Rusty Harold, XML1.1. Bible, IDG Books Pvt Ltd, 3rd Edition, 2007. (Unit II)
5. Steven Holzner, The Complete Reference PHP, McGrawHill Education Private Limited, 2010. (Unit III,IV& V)

Books for Reference:

1. Heather Williamson, The Complete Reference XML, TATA McGraw Hill, Fifth Edition, 2002.
2. VikramVaswani, A Beginner's Guide PHP, Tata McGraw Hill, Fifth Edition, 2011.

E-Resources:

1. <https://html.com/>
2. <https://www.w3schools.com/html/>
3. <https://www.khanacademy.org/computing/computer-programming/html-css>

4. <https://www.khanacademy.org/computing/computer-programming/html-css/html-tags-continued/pt/html-links>
5. <https://www.w3schools.com/php/DEFAULT.asp>
6. <https://www.tutorialspoint.com/php/index.htm>
7. <http://spoken-tutorial.org/>
8. <http://tutorialspoint.com> – Bootstrap Tutorial

Programme : B.Sc. Computer Science

**Course Title : CORE: OBJECT ORIENTED MODELLING
AND DESIGN WITH UML AND SOAD**

Course Code : 20UCS/USC5C13

Year : III

Semester : V

Hours/Week : 5

Credit : 4

Course Objectives

1. To understand the basic concepts of requirements modelling and package diagram.
2. To know the mapping from design to code and refine logical architecture into specific layouts.
3. To Identify the Service Oriented Architecture and associated technologies

Course Outcomes

On completion of this Course, the student will be able to

CO Number	CO Statement	Knowledge level
CO1	Learn design, document the requirements through usecase, state, and class driven approach.	K1
CO2	Analyze and modeling the structural and behavioral concepts of the system.	K4
CO3	Transform the SOAD conceptual model into various scenarios and applications.	K2
CO4	Understand the Cloud Technologies using SOA by REST and SOAP	K2

MAPPING WITH PROGRAMME OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	S	S	L	M	L	S	M	S	L
CO2	S	S	M	M	L	S	M	S	L
CO3	M	M	L	M	L	M	S	M	L
CO4	M	L	L	M	L	S	M	L	L

UNIT-I

Introduction-Objects and classes-Data Abstraction-Inheritance and Generalization-Disinheritance-Data Encapsulation-Aggregation-Abstract Classes-Polymorphism-Association and Links-Discriminators-Metaclass-Metadata-Reification-Constraints-Container class- Generic function.(page nos: 2-58).

UNIT-II

Unified Modeling Language: Introduction - Object Relationships- UML Building Blocks-UML Diagrams. (Page nos:90-102)

Object-Oriented Analysis: Introduction-Object Modeling Technique(OMT)-Object diagram-State Diagram-Data flow Diagram-Analysis-Domain Class Model Analysis . (Page nos:136-154).

UNIT-III

Object Oriented Design: Introduction-Consolidating Three Models to get operations on Classes- Design Algorithms-Design Optimization-Implementation of control for External Interactions. Page nos (170-175).

Object-Oriented Databases: Introduction-Relation vs Object -Oriented Data bases-Advantages and disadvantages of Object -Oriented Data bases-Comparison between OODBMS and RDBMS-Architecture of Object -Oriented Data bases-Users of Oriented Data base Management Systems-Commercial object oriented Database Management Systems-Modeling a Logical Database Schema. (Page nos: 227-240).

UNIT-IV

Design Patterns: Introduction- Design Pattern-Activities in Applying Design Patterns-Classification of Design patterns-Describing Design Pattern-Implementation of Design Patterns-Anti-patterns-Refactoring.

(Page nos:280-300).

Case Study: ATM Machine- Library Management System-Passport Automation system.

(Page nos:307-344)

UNIT-V

SOAD: Key Components of SOA-Service Oriented Enterprise Applications: Considerations, Patterns-Service Oriented Analysis & Design (SOAD):Principles, design of services: Activity, Data, Client, business process, CLOUD-Technologies for SOA:REST, SOAP.

Books for Study:

1. Ugrasen Suman, Sanjeev Kumar Sharma, Maya Rathore, "Object-Oriented Analysis and Design using UML", Cengage Learning India Pvt.Ltd publications , 2019.
2. Shankar Kambhampaty, "SOA for Enterprise & Cloud Applications", Wiley India, 2nd Edition, 2012

Books for Reference:

1. Craig Larman, “Appying UML and Patterns-An Introduction to Object Oriented analysis and design and iterative development”, Pearson Education, 3rd Edition, 2016.
- 2.Erich Gamma , Richard Helm, Ralph Johnson, John Ullissides, Design patterns:” Elements of Reusable object oriented Software Engineering, Pearson Education, 2016.
3. Alan Shaloway, James R.Trott, Design Patterns Explained: “ A new perspective on Object oriented design, Pearson Education, 2010.

E-Resources:

[https:// www.w3computing.com/systems analysis/object-oriented-sad-uml](https://www.w3computing.com/systems_analysis/object-oriented-sad-uml).

[https://www. ibm.com/cloud/learn/soa](https://www.ibm.com/cloud/learn/soa)

<https://www.conceptdraw.com/examples/class-diagram-generalisation-inheritance>

http://en.wikipedia.org/wiki/Object-modeling_technique

Programme : B.Sc. Computer Science

Course Title : CORE: SOFTWARE ENGINEERING Course Code : 20UCS/USC6C14

Year : III Semester : VI

Hours/Week : 5 Credit : 5

Course Objectives:

- To understand software engineering process framework
- To understand various software process models.
- To learn software requirements and different software architectural styles.
- To know the various software testing strategies.
- To understand software risks and software quality.

COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Apply software engineering techniques.	K3
CO2	Develop, maintain and evaluate software systems.	K4
CO3	Identify efficient, reliable, robust and cost-effective software solutions.	K1
CO4	Develop independent research and analysis and work with the software team	K4

MAPPING WITH PROGRAMME OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	S	M	S	M	L	S	M	M	L
CO2	S	S	M	M	M	S	S	M	S
CO3	S	S	M	M	M	S	S	S	M
CO4	S	M	L	S	M	S	M	S	S

UNIT I

Defining Software - Software Application Domain - Legacy Software (3-9) Process Model - Waterfall Model - Incremental Process Models - Spiral Model - Specialized Process Models - The Unified Process(39-56)

UNIT II

Requirements Engineering: Establishing The Groundwork - Eliciting Requirements - Developing Use Cases - Building The Requirements Model - Negotiating Requirements - Validating Requirements(120-145)

UNIT III

Design Concepts: The Design Process - Design concepts - Design Model(215- 238) Architectural Design: Software Architecture - Architectural Genres - Architectural Styles - Architectural Design - Assessing Alternative Architectural Designs - Architectural Mapping Using Data Flow (243- 273)

UNIT IV

Software Testing: Software Testing Fundamentals - White Box Testing - Basis Path Testing - Control Structure Testing - Black Box Testing - Graph based testing method- Equivalence Partitioning - Boundary value analysis - Orthogonal Array Testing.(482 - 502)

Web Application Testing: Testing Concepts for Web Apps - Content Testing - User Interface Testing - Configuration Testing - Component Level Testing - Navigation Testing - Performance Testing.(529 - 553)

UNIT V

Risk Management: Software Risks - Risk Identification - Risk Projection - Risk Refinement - RMMM (745-759).

Software Quality Assurance - Background Issues - Elements of SQA - SQA Tasks - Formal Approaches to SQA - Statistical Software Quality Assurance - Software Reliability -The SQA Plan(432 - 446).

Books for study:

1. ROGER S.PRESSMAN, SOFTWARE ENGINEERING A practitioner's Approach, McGRAW-HILL, 7thEdition, 2014.
2. Ian Sommerville, Software Engineering, Tenth Edition, Pearson, 2017

Books for reference:

1. Richard fairly, Software Engineering concepts, TATA McGRAW HILL, 2017.
2. Hans van Vliet , Software Engineering: Principles and Practice, Wiley, Edition 3, 2008
3. Robert E Beasley , Software Engineering: Principles and Practices, CreateSpace Independent Publishing Platform; 2nd edition 2015

E-Resources:

1. https://www.tutorialspoint.com/software_engineering/
 2. https://en.wikipedia.org/wiki/Software_engineering
 3. <https://www.javatpoint.com/software-engineering-tutorial>
 4. <https://www.geeksforgeeks.org/software-engineering/>
-

Programme : B.Sc. Computer Science

Course Title : CORE: PYTHON PROGRAMMING Course Code : 20UCS/USC6C15

Year : III Semester : VI

Hours/Week : 5 Credit : 5

Course Objectives:

1. To learn the concepts of Python
2. To understand the concept NumPy applications
3. To understand the Pandas and Sci-kit applications

Course Outcomes

On completion of this Course, the student will be able to

CO Number	CO Statement	Knowledge Level
CO1	knows the various data types and control structures	K1
CO2	Apply the concepts of NumPy and Pandas	K3
CO3	Develop the Python program using Matplotlib	K4
CO4	Develop Sci-kit applications	K4

MAPPING WITH PROGRAMME OUTCOMES

COS	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	S	M	L	M	M	S	M	M	L
CO2	S	M	L	M	L	S	S	M	L
CO3	S	M	M	M	M	S	M	M	M
CO4	S	M	M	M	M	S	M	M	M

Unit – I

Variables – Data Types: String, Numeric, Tuples, Sets, Dictionaries,

Control Structures: if, **while**, **for**, break and continue, lists.

Unit – II

NumPy: Introduction to NumPy – The Basics of NumPy arrays–Computation on NumPy Arrays–Aggregations: **Min. Max**, and Everything in Between – Computation on Arrays.

Unit – III

Pandas: Introduction to pandas - Data manipulation with pandas–Operating on null values, hierarchical indexing – Combining Datasets – Aggregation and **Grouping**.

Unit – IV

Matplotlib: Introduction to Matplotlib– Visualization with Matplotlib – Simple line plots – scatter plots – visualizing errors – Histograms, **binnings and density** – Customizing plots – Multiple sub plots – Text annotation.

Unit – V

Sci-kit Learn: Introduction to Scikit Learn: Data representation – Hyper parameters & Validation: Selecting the best model – Learning Curves. – Correlation - Linear Regression: **Simple Linear Regression**.

Books for Study:

1. Mark Summerfeld, “Programming in PYTHON 3: A Complete introduction to the Python language, Addison – Wesley, 2009.
2. Jake VanderPlas, “Python for Data Science Hand Book”, 1st Edition, O’Reilly, 2016.

Books for References:

1. William McKinney, “Python for Data Analysis: Data Wrangling with Pandas, NumPy, and Ipython”, 2nd Edition, Shroff/O’Reilly, 2017.
2. Prateek Gupta, “Data Science with Jupiter: Master Data Science skills with easy-to-follow Python examples”, 1st Edition, BPB Publications, 2019.

E-Resources:

1. <https://static.realpython.com/python-basics-sample-chapters.pdf>
2. <https://www.guru99.com/python-tutorials.html>
3. <https://github.com/wesm/pydata-book>

Programme : B.Sc Computer Science

Course title: **CORE: COMPUTER NETWORKS AND CYBER-SECURITY**

Year: III

Course Code: 20UCS/USC6C16

Semester: VI

Hours / week: 5

Credits: 5

COURSE OBJECTIVES:

1. To learn uses, structures and Models of Computer Networks
2. To understand Analog and Digital Transmissions and Switching techniques
3. To become aware of Cyber Crimes and Cyber laws

Course Outcomes

On completion of this Course, the student will be able to

CO Number	CO Statement	Knowledge Level
CO1.	Understand the various topologies and the importance of layers	K2
CO2.	Explore Analog and Digital Transmissions and Switching techniques	K4
CO3.	Apply the concepts of Routing and Congestion	K3
CO4.	Apply the concepts of Network Security	K3
CO5.	Know about Cyber Crimes and Cyber laws	K1

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	S	M	L	S	M	M	M	M	L
CO2	S	S	L	M	M	S	M	M	M
CO3	S	S	L	M	M	S	M	M	M
CO4	S	S	M	S	S	S	M	M	L
CO5	M	L	S	M	S	S	M	M	L

UNIT I

Uses of Computer Networks — Applications of networks —, network structure — network architectures — ISO reference model example networks.

UNIT II

Transmission and multiplexing — analog transmission — digital transmission — X.21 digital interface — circuit, packet switching — terminal. handling — telephone, wireless and satellite communication systems.

UNIT III

Data link layer: Elementary data link protocols — sliding window protocols protocols efficiency and verification. Network layer: Virtual circuits and datagram's — routing algorithms — congestion.

UNIT IV

Transport and Session layers: Transport protocol design issues — interconnection of packets switching networks — session layer design issues teammate procedure call.

UNIT V

Introduction to cyber crime and law: Cyber crimes, Types of Cyber Crime, Hacking, Attack vectors, Cyberspace and Criminal Behavior, Clarification of terms, Traditional problems associated with Computer Crime, Introduction to incident response, Digital forensics, Computer language, Network language, Realms of the cyber world, A brief history of the internet, Recognizing and defining computer crime, Contemporary crimes, Computers as targets, Contaminants and destruction of data, Indian IT ACT 2000.

Books for Study:

1. Andrew S. Tanenbaum, "Computer networks", Prentice Hall of India Pvt. Ltd, 5th Edition 2015.
2. Nina Godbole and Sunit Belpure, Cyber security understanding cyber crimes, Computer forensics and legal perspectives, Wiley Publication India, 2nd Edition, 2011.

Books for Reference:

1. Behrouz Forouzan, Data communication and Networking, Mc Graw Hill, 4th Edition, 2017
2. Mike Shema, Anti-Hacker Tool kit, Publication Mc Graw Hill, 4th Edition, 2014.

E-Resources:

1. <https://www.ibm.com/cloud/learn/networking-a-complete-guide>
2. https://www.tutorialspoint.com/data_communication_computer_network/data_communication_computer_network_tutorial.pdf