## Department of Computer Science

Discipline Specific Core Course: Computer Science

| Sem | Theory/ Practical | Course Title | Teaching/ Practical Instruction hour/week | Total Hours/Sem | Duration of Exam in hours | Assessment Marks | | | Credits |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Summative | Formative | Total | |
| V | Theory | Introduction to OS and Linux Programming | 4 | 60 | 3 | 80 | 20 | 100 | 4 |
| | Practical | Linux Programming Lab | 4 | 60 | 3 | 40 | 10 | 50 | 2 |
| | OR | | | | | | | | |
| | Theory | Python Programming | 4 | 60 | 3 | 80 | 20 | 100 | 4 |
| | Practical | Python Programming Lab | 4 | 60 | 3 | 40 | 10 | 50 | 2 |
| | Elective | Cloud Computing | 4 | 60 | 3 | 80 | 20 | 100 | 3 |

# SEMESTER: V (A)

| Course Code: CC 5.1 | Course Title: Introduction to OS and Linux Programming |
|---|---|
| Course Credits: 04 | Contact Hours per Week: 04 |
| Total Contact Hours: 64 | IA Marks: 20 |
| Exam Marks: 80 | Examination Duration: 03 Hours |

**Course Learning Objectives:**

1. This course introduces the concepts of Unix operating system and Linux programming.
2. Linux Commands.
3. Linux file system, file permission.
   Shell scripting

**Course Outcomes: On successful completion of the course, the students shall be able to**

1. Students will be able to explain the basic components of a Linux operating system.
2. Proficiency in using the Linux command line for basic tasks like file and directory management, navigating the file system, and searching for files.
3. Comprehend and manage file and directory permissions and ownership for security and access control.
4. Proficiency in using command-line text editors like Vi/Vim or Nano for creating and editing files.

**Unit-I** **16 Hrs.**

Operating Systems Overview: Definition, Evaluation of O.S, Components & Services of OS, Structure, Architecture, types of Operating Systems, Batch Systems, Concepts of Multiprogramming and Time Sharing, Parallel, Distributed and real time Systems. Operating Systems Structures: Operating system services and systems calls, system programs, operating system structure, operating systems generations.

**Unit-II** **16 Hrs.**

Introduction: The unix operating system, The Unix Architecture, Features of UNIX, POSIX and Single UNIX specification, Locating commands, Internal and External commands, Command Structure, Flexibility of command Usage, man command, cal command, date command, echo, printf, bc, script, passwd, who, uname, tty, stty. The File System : The file, The Parent-Child Relationship, The HOME Variable, pwd, cd, mkdir, rmdir, Absolute Pathname, Relative Pathname, ls.

**Unit-III** **16 Hrs.**

The Linux File system, cat, cp, rm, mv, more, Thelp subsystem: Printing a File, wc, od, cmp, comm, diff, compressing and archiving files, gzip, and gunzip, tar, zip and unzip. Basic File Attributes: Listing file attributes, listing directory attributes, File Ownership, File Permissions, changing file permissions, Directory Permissions, Changing File Ownership. Application Program Interface to Files, Linux Kernel Support for Files, Relationship of C Stream Pointers and File Descriptors, Directory Files, Hard and Symbolic Links.

**Unit-IV** **16 Hrs.**

The Shell: The shell's Interpretive Cycle, Pattern Matching, Escaping and Quoting, Redirection,

/dev/null and /dev/tty, Pipes, tee, Command Substitution, Shell variables, Shell scripts, read, using command line arguments, exit and exit status of command, the logical operators && and ||-conditional execution, the if conditional, using test and [] to evaluate expressions, the case conditional, expr, $0: calling a script by different names, for, while statement. Advanced Shell Programming: The sh command, export, cd, the Command, expr, Conditional Parameter Substitution, Merging Streams, Shell Functions, eval, exec Statement.

Text books:


1. K.R. Venugopal, M.T. Somasheara, G. Aamalorpavam: Introduction to Linux and Shell Scripting, Khanna Publishing House, New Delhi, 2021
2. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne (2006), Operating System Principles, 7th edition OR Later edition, Wiley India Private Limited, New Delhi.


References:


1. Andrew S Tanenbaum, Modern Operating Systems, Third Edition, Prentice Hall India.
2. Sumitabha Das, UNIX Concepts and Applications, 4th Edition, Tata McGraw-Hill

# SEMESTER: V (A) (Practical)

| | |
|---|---|
| Course Code:LAB 5.1 | Course Title: Linux Programming Lab |
| Course Credits: 02 | Contact Hours per Week: 04 |
| Total Contact Hours: 64 | IA Marks: 10 |
| Exam Marks: 40 | Examination Duration: 03 Hours |

**List of Assignments**

1. Working with LINUX Commands
2. Working with Pipes and Filters.
3. Working with Editors.
4. Programs on Networking.
5. Working with memory, file and disk related commands.
6. Working with UNIX / LINUX Administration commands.
7. Programs on Shell Programming.

**Examination:**

- Student has to answer and execute Two programs

**Evaluation Scheme for Lab Examination:**

| Criteria | Marks |
|---|---|
| Writing Program | 10 |
| Execution | 20 |
| Record+Viva-Voce | 10 |
| IA | 10 |
| Total | 50 |

# SEMESTER: V (B)

| Course Code: CC 5.2 | Course Title: Python Programming |
|---|---|
| Course Credits: 04 | Contact Hours per Week: 04 |
| Total Contact Hours: 64 | IA Marks: 20 |
| Exam Marks: 80 | Examination Duration: 03 Hours |

**Course Learning Objectives:**

1. Develop modular Python programs.
2. Apply suitable Python programming constructs, built-in data structures using Python libraries to solve a problem.
3. Understand basic Data visualization and File handling in Python.

**Course Outcomes: On successful completion of the course, the students shall be able to**

1. Understand Python syntax and semantics.
2. Use variables, data types, and operators appropriately.
3. Implement control flow using conditional statements and loops.
4. Work with data structures such as lists, tuples, sets, and dictionaries.
5. Define and call functions with parameters and return values.
6. Handle exceptions and perform basic debugging.
7. Perform file input and output operations.
8. Apply object-oriented programming concepts (classes, objects, inheritance).
9. Use standard and third-party Python libraries/modules.
10. Develop basic real-world applications using Python.

**Unit-I** **16 Hrs.**

Introduction: History and Application areas of Python; Structure of Python Program; Identifiers and Keywords; Operators and Precedence; Basic Data Types and type conversion; Statements and expressions; Input/Output statements. Strings: Creating and Storing Strings, Built-in functions for strings; string operators, String slicing and joining; Formatting Strings. Control Flow Statements: Conditional Flow statements; Loop Control Statements; Nested control Flow; continue and break statements, continue, Pass and exit.

**Unit-II** **16 Hrs.**

Functions: Built-In Functions, Function Definition and call; Scope and Lifetime of Variables, Default Parameters, Command Line Arguments; Lambda Functions; Assert statement; Importing User defined module; Mutable and Immutable objects: Lists, Tuples and Dictionaries; Commonly used Functions on Lists, Tuples and Dictionaries. Passing Lists, tuples and Dictionaries as arguments to functions. Using Math and Numpy module for list of integers and arrays.

**Unit-III** **16 Hrs.**

Files: Types of Files; Creating, Reading and writing on Text and Binary Files;The Pickle Module, Reading and Writing CSV Files. Reading and writing of csv and JSON files.

**Unit-IV** **16 Hrs.**

Exception Handling: Try-except-else-finally block, raise statement, hierarchy of exceptions, adding exceptions. Data visualization: Plotting various 2D and 3D graphics; Histogram; Pi charts; Sine and cosine curves.

Text books:


1. Venkatesh, Nagaraju Y, Introduction to Python Programming, Khanna Publishing House, 2021.
2. Jeeva Jose, Introduction to Computing & Problem Solving With PYTHON, Khanna Publishing House, 2023.
3. Sheetal Taneja & Naveen kumar: Python Programming a Modular approach – A Modular approach with Graphics, Database, Mobile and Web applications, Pearson, 2017.


References:


1. Think Python, by Allen Downey, 2 nd edition, 2015, O'Reilly. https://drive.google.com/file/d/1p9Pul6d5UvnQrO9-Q-LE2_p4YvMk5cIg/view
2. An introduction to Python for absolute beginners, by Bob Dowling, Cambridge Univ.
3. Introduction to Computation and Programming using Python, by John Guttag, 2 nd edition, 2016, PHI India.

# SEMESTER: V (B) (Practical)

| | |
|---|---|
| Course Code: LAB 5.2 | Course Title: Python Programming Lab |
| Course Credits: 02 | Contact Hours per Week: 04 |
| Total Contact Hours: 64 | IA Marks: 10 |
| Exam Marks: 40 | Examination Duration: 03 Hours |

**List of Assignments**

1) Maximum of three numbers in Python
2) Python Program for factorial of a number
3) Python Program for simple interest
4) Python program to check whether a number is Prime between range
5) Python program to swap two elements in a list
6) Python program to a list and print all even numbers in a list
7) Python program to add two Matrices
8) Python program to multiply two matrices
9) Python program to find GCD of two numbers using function
10) Python program to calculate area of room using class and objects
11) Python program to handle exceptions
12) Python program to demonstrate functions on numpy array

**Examination:**

- Student has to answer and execute Two programs

**Evaluation Scheme for Lab Examination:**

| **Criteria** | **Marks** |
|---|---|
| Writing Program | 10 |
| Execution | 20 |
| Record+Viva-Voce | 10 |
| IA | 10 |
| **Total** | **50** |

# SEMESTER: V (Elective)

| Course Code: OE1 | Course Title: Cloud Computing |
|---|---|
| Course Credits: 03 | Contact Hours per Week: 04 |
| Total Contact Hours: 64 | IA Marks: 20 |
| Exam Marks: 80 | Examination Duration: 03 Hours |

**Course Learning Objectives:**

1. Define cloud computing and its key characteristics.
2. Differentiate between traditional IT and cloud computing models.
3. Identify and describe IaaS (Infrastructure as a Service).
4. Understand PaaS (Platform as a Service) and its use cases.
5. Analyze SaaS (Software as a Service) and its advantages.
6. Navigate major cloud platforms such as AWS, Microsoft Azure, or Google Cloud.

**Course Outcomes: On successful completion of the course, the students shall be able to**

1. Demonstrate a clear understanding of cloud computing concepts, models, and services.
2. Compare and contrast different cloud deployment models (public, private, hybrid, community).
3. Apply cloud service models (IaaS, PaaS, SaaS) in real-world scenarios.
4. Set up and manage resources on major cloud platforms (e.g., AWS, Azure, or Google Cloud).

**Unit-I** **16 Hrs.**

Introduction to Cloud Computing, why cloud computing used, Benefits and Characteristics of cloud computing, History of CC, Architecturer of CC, working of CC, Basic concepts of CC, types of cloud with advantages and disadvantages, grid computing v/s CC, grid computing v/s utility computing.

**Unit-II** **16 Hrs.**

Introduction to Virtualization and its types , how Virtualization works in CC, Different Web Services used in Cloud: Communication-as-a-Service, Infrastructure-as-a-Service, Monitoring-as-a-Service, Platform-as-a-Service, Software-as-a-Service, advantages and disadvantages of web service models.

**Unit-III** **16 Hrs.**

Federation in the Cloud, four levels of federation, Privacy and its Relation to Cloud-Based Information Systems, Cloud Security controls, Common Standards in the Cloud, End-User Access to the Cloud Computing.

**Unit-IV** **16 Hrs.**

Introduction, Advancing towards a Utility Model, Evolving IT infrastructure and types of

managed infrastructure, Continuum of Utilities and its different levels, Standards Bodies and Working Groups, Service Oriented Architecture, Business Process Execution Language, Interoperability Standards for Data Center Management, Utility Computing Technology, Virtualization, Hyper Threading, Blade Servers, Automated Provisioning, Data Center and its components.

Text Books & References:

1. John W. Rittinghouse and james F. Ransome, "Cloud Computing Implementation, Management and Security", 2010, CRC Press, Taylor & Francis Group, Boca Raton London New York. [Unit -I and Unit II]

2. Alfredo Mendoza, "Utility Computing Technologies, Standards, and Strategies", Artech House INC, 2007. [Unit III to Unit V]

3. Cloud Computing " A practical Approach" Anthony T. Velte,Toby J Velte, Robert Elsenpeter. McGraw-Hill.