Estd. 1962 "A⁺⁺⁺" Accredited by NAAC(2021) With CGPA 3.52

SHIVAJI UNIVERSITY, KOLHAPUR - 416 004, MAHARASHTRA

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शिवाजी विद्यापीठ, कोल्हापूर - ४१६ ००४,महाराष्ट्र

दूरध्वनी - ईपीएबीएक्स - २६०९०००, अभ्यासमंडळे विभाग दूरध्वनी ०२३१–२६०९०९३/९४



SU/BOS/Science/498

Date: 10/07/2023

To,

The Principal,	The Head/Co-ordinator/Director
All Concerned Affiliated Colleges/Institutions	All Concerned Department (Science)
Shivaji University, Kolhapur	Shivaji University, Kolhapur.

Subject: Regarding syllabi of B.Sc. Part-II (Sem. III & IV) as per NEP-2020 degree programme under the Faculty of Science and Technology.

Sir/Madam,

With reference to the subject mentioned above, I am directed to inform you that the university authorities have accepted and granted approval to the revised syllabi, nature of question paper and equivalence of B.Sc. Part-II (Sem. III & IV) as per NEP-2020 degree programme under the Faculty of Science and Technology.

B.ScII (Sem. III & IV) as per NEP-2020					
1.	Computer Science (Opt)	8.	Food Technology & Management (Entire)		
2.	Computer Science (Entire)	9.	Biochemistry		
3.	Animation (Entire)	10.	Biotechnology (Optional/Vocational)		
4.	Information Technology (Entire)	11.	Biotechnology (Entire)		
5.	Food Science and Technology (Entire)	12.	Environmental Science (Entire)		
6.	Food Science	13.	Pollution		
7	Food Science and Quality Control (Entire)				

This syllabus, nature of question and equivalence shall be implemented from the academic year 2023-2024 onwards. A soft copy containing the syllabus is attached herewith and it is also available on university website <u>www.unishivaji.ac.in</u>)

The question papers on the pre-revised syllabi of above-mentioned course will be set for the examinations to be held in October /November 2023 & March/April 2024. These chances are available for repeater students, if any.

You are, therefore, requested to bring this to the notice of all students and teachers concerned.

Thanking you,

Conv to.

Dy Registrar

Dr. S. M. Kubal

Copy			
1	The Dean, Faculty of Science & Technology	8	P.G. Admission/Seminar Section
2	Director, Board of Examinations and Evaluation	9	Computer Centre/ Eligibility Section
3	The Chairman, Respective Board of Studies	10	Affiliation Section (U.G.) (P.G.)
4	B.Sc. Exam/ Appointment Section	11	Centre for Distance Education

SHIVAJI UNIVERSITY, KOLHAPUR



NAAC "A++" Grade with CGPA 3.52

Choice Based Credit System with Multiple Entry and Multiple Exit Option (NEP-2020)

Syllabus for

Bachelor of Science (B.Sc.) (Entire) In Information Technology

Programme Structure

(Under Faculty of Science and Technology)

PART II SEMESTER III & IV

(Syllabus to be implemented from Academic year 2023-24)

B.Sc. Computer Science IT Entire Part-II

Year of Implementation: Revised Syllabus will be implemented from June 2023 Duration: Part- II shall be of one academic year consisting of two semesters. Pattern: Semester Pattern.

STRUCTURE OF THE SYLLABUS

Code	Course	Course Title		
Semester-III				
DSC-301	Computer Science	CPP Programming		
	Paper-IX			
DSC-302	Computer Science	System Analysis And Design and UML		
	Paper-X			
DSC-303	Computer Science	Web Technology using HTML		
	Paper-XI			
DSC-304	Computer Science	Operating System		
	Paper-XII			
DSC-305	Statistics Paper-I	Descriptive Statistics -I		
DSC-306	Statistics Paper-II	Probability Theory and Discrete		
		Probability Distributions		
AECC-	Environmental Studies	Theory		
SEC-I	SEC-I	PHP Part I		
	Semes	<u>ter-IV</u>		
DSC-401	Computer Science	Data structure using CPP		
	Paper-XIII			
DSC-402	Computer Science	Networking		
	Paper-XIV			
DSC-403	Computer Science	Python Programming		
	Paper-XV			
DSC-404	Computer Science	Linux Operating System		
	Paper-XVI			
DSC-405	Statistics Paper-III	Descriptive Statistics -II		
DSC-406	Statistics Paper-IV	Continuous Probability Distributions and		
		Testing of Hypothesis		
AECC	Environmental Studies	Project		
SEC-II	SEC-II	Project		
LAB COURSE Based on Computer Paper DSC-301 & DSC-401				
LAB COURSE Based on Computer Paper DSC-303,DSC-403, DSC-404				
LAB COURSE Based on Statistics Paper				
I,II,III,IV(DSC-305,DSC-306,DSC-405,DSC-406)				

B.Sc.-II Semester-III Information Technology (Entire)

Choice Based Credit System with Multiple Entry and Multiple Exit Option (NEP-2020) B. Sc. Information Technology (Entire)

Semester-III

<u>Course Code: DSC-301</u> <u>Course Name: Computer Science Paper-IX</u> <u>Course Title: CPP Programming</u> Theory: 36 hrs. (Lectures of 48 minutes) Marks-50 (Credits: 02)

Objectives:-

- Understand basic concepts of object oriented programming.
- Able to use various control structures to improve programming logic.
- Able to use constructor and destructor.
- Utilize the OOP techniques like operator overloading, inheritance, and polymorphism.

Unit I: Object Oriented Concepts:-

- Difference between POP and OOP. Concepts of OOP- Data abstraction, Encapsulation, Inheritance, Polymorphism.
- Basics data types. Operators in C++.Structure of C++ program.
- Input and output streams
- Dynamic Memory allocation (New and Delete), this pointer. Dynamic initialization of variable, reference variables.
- Control Structures-Branching and looping statements.
- Features of OOP:
- Classes and Objects-Definitions, class declaration. Member function-
- Access modifiers: private, public and protected, defining member functions, static data members.
- Array of objects, passing object parameter, inline function, reference arguments. Friend function and friend class.

Unit II: Object Oriented Concepts: -

- Constructors-
- Definition, types- Default constructor, Copy constructor, Parameterized constructor. Destructors.
- Operator overloading -Definition
- Overloading unary and binary operators. Overloading operators using friend function. Rules for overloading operator.
- Inheritance-Defining base and derived class. Types of Inheritance–Single, multiple, multilevel, hierarchical, hybrid.
- Polymorphism-Definition, Types of polymorphism. Virtual function.

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Books and References:-

- 1. Object oriented programming By E. Balagurusamy.
- 2. C++ Programming–By D. Ravichandran.
- 3. Let Us C++By Yashawant Kanetkar.
- 4. Object Oriented Programming in C++-Dr. G.T. Thampi, Dr. S. S. Mantha.

Practicals:-

- 1. Simple program
- 2. Programs based on branching
- 3. Programs based on looping statements.
- 4. Programs based on inheritance concept
- 5. Programs based on function overloading concept
- 6. Programs based on operator overloading concept
- 7. Programs based on member functions.
- 8. Programs based on use of constructor
- 9. Programs based on use of destructor
- 10. Programs based on friend function.
- 11. Programs based on friend function.
- 12. Programs based on virtual function

Course Code: DSC-302

<u>Course Name: Computer Science Paper-X</u> <u>Course Title: System Analysis And Design and UML</u> Theory: 36 hrs. (Lectures of 48 minutes) Marks-50 (Credits: 02)

Objectives:-

After completing this course the student will able to:

- Define a system
- Analyze and specify the requirements of a system.
- Design system components and environments.
- Provides a visual representation of an aspect of a system.

Unit I: - System Analysis and Design Overview

- Meaning, Definition and characteristics, Elements of System: Input, Output ,Control, Feedback, Environment, Boundaries and Interface, Types of System
- System Development Life Cycle- Classical Model, Waterfall Model
- Feasibility Study: Operational, Technical, Economical
- Role and skill of system analyst, System planning and initial investigation
- Fact Finding Technique- Interviews, Questionnaires, Record Interviews, Observation
- Data Flow Diagram-Levels of DFDs, Entity Relationship Diagram.

Unit II:-Testing and Introduction to UML

- Testing and Types of testing.
- Architecture of UML
- UML View
- Static View: Classifiers, Relationships Associations, Generalization,
- Realization, Dependencies, Constraint, Instances.
- Use Case Diagrams: Overview, Actor, communication and relationships, Use Case examples
- Class Diagrams: classes and object, association and links, multiplicity, Inheritance, example.
- Activity Diagrams: Activities, actions, decisions, control nodes, fork and join node

Books and References:-

1. Systems Analysis and Design by Goyal A

- 2. Systems Analysis and Design by Dennis and Wixom
- 3. The Elements of UML(TM) 2.0 Style
- 4. The Unified Modeling Language User Guide by Grady Booch et All.

Course Code: DSC-303

Course Name: Computer Science Paper-XI

<u>Course Title: Web Technology using HTML</u> Theory: 36 hrs. (Lectures of 48 minutes) Marks-50 (Credits: 02)

Course Outcomes:-

- Adapt knowledge for creating effective web pages.
- Explain various tags used for designing website
- Apply skills for designing websites.

Unit:-I Introduction – Internet, Website and HTML

- Internet-Basics, Internet Protocols(HTTP,FTP,IP)
- World Wide Web(WWW)
- HTTP, DNS, IP Address
- Working of Website
- Web Browser, Web Server, Types
- Types of Websites(Static and Dynamic Websites)
- Web Development lifecycle
- Basics of web hosting
- Introduction to HTML, History, Features
- HTML tags & attributes
- HTML Form elements
- HTML Frameset
- Limitations of HTML

Unit:-II CSS and JavaScript

- Basics of CSS, Syntax
- Types of CSS, Importance of CSS
- CSS Selectors-Group, id, class
- CSS properties- Border, background, list, image, margins
- Advantages and limitations of CSS
- Introduction to JavaScript.
- Difference between client side and server side scripting.
- Identifier & operators
- Control structure
- Dialog boxes
- Functions
- Event Handling
- Objects
- Form Validation

Books and References:-

- 1. Complete HTML-Thomas Powell.
- 2. HTML and JavaScript–Ivan Bayross.
- 3. Javascript: The Complete Reference by Thomas Powell, Fritz Schneider.
- 4. HTML Black Book- Steven Holzner.

Practical's:-

- 1. To learn simple web page using text formatting tags.
- 2. To learn a simple web page using text list tags.
- 3. To learn a web page using table tags.
- 4. To learn a web page using frame tags and their attributes.
- 5. Design a web page to list a table of contents and navigate within the pages.
- 6. Design a time table and display it in tabular format.
- 7. Design a CSS to create menu.
- 8. Design a bio- data web page using CSS.
- 9. To design table & list using CSS

<u>Course Code: DSC-304</u> <u>Course Name: Computer Science Paper-XII</u> <u>Course Title: Operating System</u> Theory: 36 hrs. (Lectures of 48 minutes) Marks-50 (Credits: 02)

Objectives:-

- Learners must understand proper working of operating system.
- To provide a sound understanding of Computer operating system, its structures, functioning and algorithms.
- To provide a understanding of operating system, its structures and functioning.
- Develop and master understanding of algorithms used by operating systems for various purposes

Unit:-I Introduction and Operating-Systems Structures

- Definition of Operating system, Operating System's role, Operating-System Operations, Functions of Operating System, Computing Environments
- Operating-System Structures: Operating-System Services, User and Operating-System Interface, System Calls, Types of System Calls, Operating-System Structure
- Processes: Process Concept, Process Scheduling, Operations on Processes, Inter process Communication
- Threads: Overview, Multi core Programming, Multithreading Models

Unit:-II Introduction and Operating-Systems Structures

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- Process Synchronization: General structure of a typical process, race condition, The Critical-Section Problem, Peterson's Solution, Synchronization Hardware, Mutex Locks, Semaphores, Classic Problems of Synchronization, Monitors
- CPU Scheduling: Basic Concepts, Scheduling Criteria, Scheduling Algorithms(FCFS, SJF, SRTF, Priority, RR, Multilevel Queue Scheduling, Multilevel Feedback Queue Scheduling), Thread Scheduling
- Deadlocks: System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock

Books and References:-

- 1. Operating System Concepts by Avi Silberschatz and Peter Galvin
- 2. Operating System: A Design-oriented Approach by Charles Crowley
- 3. Operating Systems" by Archer J Harris

<u>Course Code: DSC-305</u> <u>Course Name: Statistics-I</u> <u>Course Title: Descriptive Statistics-I</u> Theory: 36 hrs. (Lectures of 48 minutes) Marks-50 (Credits: 02)

Objectives:-

- Apply various types of sampling methods to data collection.
- Understand and use the terminology of probability.
- Recognize, describe, and calculate the measures of the spread of data: variance, standard deviation, and range.

Unit I: - Nature of data and Measures of Central Tendency

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- Definition, Introduction, importance, scope and limitations of Statistics.
- Population and Sample: Concept of statistical population with illustrations, concept of sample with illustrations. Methods of sampling: Simple Random Sampling and Stratified Random Sampling (description only).
- Data Condensation: Raw data, Attributes and variables, discrete and continuous variables, classification and construction of frequency distribution.
- Graphical Representation: Histogram, Frequency polygon, Frequency curve, Ogive curves, uses of Histogram and Ogive curves. Simple Bar Diagram and Pie Chart Examples and Problems.
- Concept of Central Tendency, Criteria for good measures of central tendency.
- Arithmetic Mean: Definition, computation for ungrouped and grouped data, combined mean, weighted mean, merits and demerits.
- Median: Definition, computation for ungrouped and grouped data, graphical method, merits and demerits.
- Mode: Definition, computation for ungrouped and grouped data, graphical method, merits and demerits.
- Illustrative Examples.

Unit II:- Measures of Dispersion and Moments

- Concept of dispersion and measures of dispersion, absolute and relative measures of dispersion.
- Range and Quartile Deviation: Definition for ungrouped and grouped data and their coefficients, merits and demerits.
- Mean Deviation: Definition for ungrouped and grouped data, minimal property (statement only).
- Standard Deviation and Variance: Definition for ungrouped and grouped data, coefficient of variation, combines S.D. and variance for two groups, merits and demerits.
- Illustrative Examples.

Books and References:-

- 1. Statistics by-Robert S. Witte and John S. Witte
- 2. Categorical Data Analysis Agresti, Alan

<u>Course Code: DSC-306</u> <u>Course Name: Statistics-II</u> <u>Course Title: Probability Theory and Discrete Probability Distributions</u> Theory: 36 hrs. (Lectures of 48 minutes)

Marks-50 (Credits: 02)

Objectives:-

- Understand and use the terminology of probability.
- Understand the importance and application of normal distribution.
- Practical Exposure to the fitting of discrete and continuous distribution by using MS-EXCEL.

Unit I: - Probability

- Idea of permutation and combination, concept of random experiments.
- Definitions: sample space (finite and count ably infinite), equiprobable sample space, events, types of events, power set (sample space consisting at most 3sample points), examples.
- Classical (apriori) definition of probability of an event, simple examples of probability of an events based on permutations and combinations, axiomatic definition of probability with reference to finite and countably infinite sample space, examples.
- Theorems on probability:
 - i) $P(\Phi)=0$, ii) P(A')=1-P(A), iii) $P(AUB)=P(A)+P(B)-P(A\cap B)$ iv) If $A \le B$ then $P(A)\le P(B), v)0\le P(A\cap B)\le P(A)\le P(AUB)\le P(A)+P(B)$. Definition of conditional probability of an event, examples.
- Partition of sample space, Baye's theorem (only statement) and examples.
- Concept of independence of two events, examples.
 - Proof of the result that if A and B are independent events then
 - i) A and B', ii) A' and B, iii) A' and B' are also independent.
- Pair wise and complete independence of three events.
- Illustrative Examples.

Unit II: - Discrete probability distributions

- Definitions: discrete random variable, probability mass function (p.m.f.), cumulative distribution function (c.d.f.), properties of c.d.f., median, mode and examples.
- Definition of expectation (mean) and variance of a random variable, expectation and variance of a function of random variable.

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- Results on expectation:
- i) E(c) =c, where c is constant.
 ii) E (aX+b)= aE(X)+b, where a and b are the constants.
- Theorems on Variance: i) V(c) = 0, where c is constant.
 - ii) $V(aX+b)=a^2V(X)$, where a and b are the constants.
- Discrete uniform distribution: p.m.f., mean and variance, examples.
- Binomial distribution: p.m.f., mean and variance, additive property of Binomial variates, recurrence relation for probabilities, examples.
- Poisson distribution: p.m.f., mean and variance, additive property, recurrence relation for probabilities, examples.

Books and References:-

- 1. Introduction to Probability, Second Edition by Joseph K. Blitzstein, Jessica Hwang
- 2. Introduction to Probability and Statistics for Engineers and Scientists, Fifth Edition by Sheldon M. Ross

<u>Lab Course based on SEC-I SEMESTER - III</u> <u>Skill Enhancement Course – I</u> <u>Course Code: SEC- I</u> <u>Course Title: PHP Part I</u> Marks-50 (Credits: 02)

Course outcomes:-

After completion of this course student will be able to

- 1. Identify basic PHP syntax
- 2. Create basic PHP scripts
- 3. Know how to send data to the Web Browser

<u>Unit: - I</u>

- Installation of PHP
- Installation Of Apache
- Binding PHP to Apache
- XAMPP Installation, XAMPP Control Panel Folder Structure, Upgrading PHP in XAMPP
- Installing Multiple Version of PHP on Single machine in XAMPP
- PHP and Apache Configuration Files
- WAMP Installation
- WAMP menu and folders structure
- Executing PHP Programs on ellipse

<u>Unit: - II</u>

- Introduction to PHP
- What is PHP?
- What does PHP do?
- Benefits of using PHP MYSQL ,PHP Scripts Work, PHP syntax
- First PHP Program
- Embed PHP in HTML / HTML in PHP
- Data Types ,variables, , PHP Constants type Casting ,operators, PHP strings
- Unit-III Control Structure :
 - o If Statement
 - o If Else statement
 - o If..... if else Statement
 - $\circ\,\text{Nested}$ if statement
 - \circ Switch statement
- Looping Structure :-
 - For loop
- While loop
- Do.....while loop
- For each loop

Books and References:-

- 1. PHP Concepts Unleashed For Novice Vol I by Dr. Poornima G. Naik , Dr. Kavita S. Oza
- 2. PHP Concepts Unleashed For Novice Vol II by Dr. Poornima G. Naik , Dr. Kavita S. Oza

<u>Semester-IV</u> <u>Course Code: DSC-401</u> <u>Course Name: Computer Science Paper-XIII</u> <u>Course Title: Data Structure Using CPP</u> Theory: 36 hrs. (Lectures of 48 minutes) Marks-50 (Credits: 02)

Objectives:-

- At the end of this course, student should be able understand the most basic aspects of data structures including Stacks, Queue, Linked list and Tree.
- Should able to understand different sorting and searching algorithms.

Unit:-I Introduction to Data structure

- Concepts of Data structure, Concept of Data, Data Object, Types of Data- Atomic Data, Non-atomic Data, Concept of Data Structure, Abstract data type (ADT)
- Array Definition, Array Operations, Applications of Array (Polynomial evaluation and addition of two polynomials), Multi-dimensional arrays.
- Algorithm Analysis, Space complexity, time complexity, Asymptotic notation (Big O, Omega Ω, Theta Θ) Searching algorithms-Linear search, binary search and their algorithms, Sorting algorithm –Bubble Sort, insertion sort, selection sort, quick sort and their algorithms.

Unit: - II Stack, Queue, Linked List and Tree

- Stack- Concept of Stack, Operations on Stack, Array implementation of Stack, Linked List implementation of Stack, Applications of Stack-Recursion, Infix, Prefix, Postfix, conversion from Infix to Prefix and Infix to Postfix
- Queue- Concepts of queue, Operations on Queue- Insert, Delete, peek, Array implementation of queue, Linked List Implementation of Queue, Types of Queue-Linear, Circular and Priority Applications of Queue
- Linked List- Concept of Linked List, Memory representation of Linked List, Operations on Linked List (Insertion, Deletion, Display and Search) Types of Linked List -Singly, Doubly Linked List & Circular Linked List
- Tree- Concept of Tree, Tree terminology (root, child, parent, sibling, descendant, ancestor, leaf/external node, branch node/internal node, degree, edge, path, level, depth, height of node, height of tree, forest)
- Binary Tree-definition, types (Full/Proper/Plane, Complete, Perfect Skewed, Balanced)

Books and References:-

- 1. Data structure through C++- Yashwant Kanitkar (BPB Publications)
- 2. Principles of Data structures using C++- Vinu V.Das (New Age International Publication)
- 3. Data Structures with C-SEYMOURLIPSCHUTZ(Tata McGraw-Hill)
- 4. Data structures, Algorithms and Applications in C++, S. Sahni, University Press (India) Pvt. Ltd, 2ndedition, Universities Press Orient Longman Pvt. Ltd.

Practicals:-

- 1. Write a C++ programs to implement recursive i)Linear search ii) Binary search
- 2. Write a C++ programs to implement i) Bubble sort ii) Selection sort iii) quick sort iv) insertion sort
- 3. Write a C++ programs to implement the following using an array.

a) Stack ADT b) Queue ADT

4. Write a C++ programs to implement list ADT to perform following operations:

a) Insert an element into a list.

- b) Delete an element from list
- c) Search for a key element in list
- d) Count number of nodes in list

5. Write a C++ programs to implement the following using a singly linked list.

a) Stack ADT b) Queue ADT

6. Write a C++ programs for implementing the following sorting methods: insertion sort, bubble sort, selection sort, quick sort

<u>Course Code: DSC-402</u> <u>Course Name: Computer Science Paper-XIV</u> <u>Course Title: Data Communication and Networking</u> Marks-50 (Credits: 02)

Objectives:-

- Understand OSI Model and Networking protocols
- Understand different communication modes.
- Familiar with network basic concepts like protocols, topology etc.

Unit I: - Basics of Data communication

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- Data Communications
- Concept- Components-sender, receiver, message, transmission media
- Data Flow- simplex, half-duplex, or full-duplex
- Networks Definition, Advantages and disadvantages
- Categories of Networks- LAN WAN. MAN
- Network Architecture-Client-Server and Peer to peer
- Transmission Media Guided Media -Twisted-Pair Cable ,Coaxial Cable ,Fiber-Optic Cable Unguided Media: Wireless, Radio Waves, Microwaves, Infrared

Unit II : Layers and services

• Physical layer: Digital-to-analog conversion: concept, Amplitude Shift Keying, Frequency Shift Keying, Analog-to-digital conversion: Pulse Code Modulation (PCM), Delta Modulation (DM)

- Data link layer- Design issues, Framing, error detection and correction, Protocols: Sliding window protocol: one bit sliding window protocol, protocol using go back, protocol using selective repeat
- Network layer-Network layer: Design issue, Concept of routing, Routing algorithm (shortest path, Flooding, distance vector), Congestion control algorithms (Leaky bucket, Token Bucket)

Books and References:-

- 1. Tanenbaum A.S. "computer Network", 3rd Edition, Prentice Hall of India
- 2. Behrouz A. Forouzan- Data Communications And Networking (4th edition) McGraw-Hill
- 3. Tanenbaum A.S. "computer Network", 3rd Edition, Prentice Hall of India Stalling W, "computer communication Network".(4th edition). Prentice hall of India 1993

<u>Course Code: DSC-403</u> <u>Course Name: Computer Science Paper-XV</u> <u>Course Title: Python Programming</u> Marks-50 (Credits: 02)

Objectives:-

- Express proficiency in the handling of strings and functions.
- Interpret the fundamental Python syntax and semantics and be fluent in the use of Python control flow statements.
- Determine the methods to create and manipulate Python programs by utilizing the lists.

Unit I: - Introduction to Python

- Introduction- The Python Programming Language, features, Installing Python, Running Python program, Debugging : Syntax Errors, Runtime Errors, Semantic Errors, Experimental Debugging, Formal and Natural Languages, The Difference Between Brackets, Braces, and Parentheses
- Variables and Expressions- Values and Types, Variables, Variable Names and Keywords, Type conversion, Operators and Operands, Expressions, Interactive Mode and Script Mode, Order of Operations.
- Conditional Statements- if, if-else, nested if –else
- Looping- for, while, nested loops
- Control statements- Terminating loops, skipping specific conditions

Unit II: - Functions, Strings and Lists

- Functions- Function Calls, Type Conversion Functions, Math Functions, Composition, Adding New Functions, Definitions and Uses, Flow of Execution, Parameters and Arguments, Variables and Parameters Are Local, Stack Diagrams, Fruitful Functions and Void Functions, Why Functions? Importing with from, Return Values, Incremental Development, Composition, Boolean Functions, More Recursion, Leap of Faith, Checking Types
- Strings- A String Is a Sequence, Traversal with a for Loop, String Slices, Strings Are Immutable, Searching, Looping and Counting, String Methods, The in Operator, String Comparison, String Operations.
- Lists- Values and Accessing Elements, Lists are mutable, traversing a List, Deleting elements from List, Built-in List Operators, Concatenation, Repetition, In Operator, Built-in List functions and methods

Books and References:-

- 1. Think Python- Allen Downey(O'Reilly)
- 2. Python GUI Programming Cookbook- Jason Montojo, Jennifer Campbell, Paul Gries(SPD)
- 3. Python GUI Programming Cookbook- Burkhard A. Meier(Packt)

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Practicals:-

- 1. Enter the number from the user and depending on whether the number is even or odd, print out an appropriate message to the user.
- 2. Write a program to generate the Fibonacci series.
- 3. Write a function that reverses the user defined value.
- 4. Write a function to check the input value is Armstrong and also write the function for Palindrome.
- 5. Write a recursive function to print the factorial for a given number.
- 6. Write a function that takes a character (i.e. a string of length 1) and returns True if it is a vowel, False otherwise.
- 7. Define a function that computes the length of a given list or string.
- 8. Define a fuction histogram () that takes a list of integers and prints a histogram to the screen. For example, histogram([4, 9, 7]) should print the following:

```
*******
```

- 9. A pangram is a sentence that contains all the letters of the English alphabet at least once, for example: The quick brown fox jumps over the lazy dog. Your task here is to write a function to check a sentence to see if it is a pangram or not.
- 10. Take a list, say for example this one: a = [1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89] and write a program that prints out all the elements of the list that are less than any given number.
- 11. Write a program that takes two lists and returns True if they have at least one common member.

12. Write a Python program to print a specified list after removing the 0th, 2nd, 4th and 5th elements.

<u>Course Code: DSC-404</u> <u>Course Name: Computer Science Paper-XVI</u> <u>Course Title: Linux Operating System</u> Marks-50 (Credits: 02)

Objectives:-

- Familiarize students with the Linux environment, and able to run commands on a standard Linux operating system.
- Provide the skills needed to develop and customize Linux shell programs and to make effective use of a wide range of standard Linux programming and development tools.

Unit:- I Introduction, Handling Linux commands

- History and development of Linux
- Features of Linux
- Concept of shell, kernel, Kernel-shell relationship

- Login, logout and remote login
- Different GPU (cal , date, wc, who)
- Concept of file, types, file system tree, file handling- ls ,cat ,cp, mv , rm . lp commands , listing file names using meta characters (*, ?,[]).
- Concept of directory , home directory , directory handling- cd , mkdir , rmdir
- Basic file attributes , change file/directory access permissions –ls –l ,chmod command.
- Basic filters -head, tail, sort, grep, different options and expressions for grep

Unit: - VI editor and shell programming

- Editor, use of VI, features of VI
- Vi basics, different modes and working with VI
- Command mode -cursor movements(k,j,h,l), delete(character, line, word), Screen up , down use of repeat factor , joining lines (J)
- Input mode- switching with (I, o, r, s, a, I,O,R,S,A),ex mode saving (w, x, q), writing selecting lines to another file.
- searching for pattern (/ and ?), Search and replace
- Shell Script , running a shell script
- Statements read, echo, test, if case, exit, expr
- Loops- while , until , for
- manipulating positional parameters set and shift
- Here document (<<), Exit status of a command 13

Books and References:-

- 1. Unix concept and applications by Sumitabha Das
- 2. Linux programming- Foreword by Alan Cox
- 3. Red Hat Linux 718 Bill Ball, David Pitts
- 4. Unix shell programming- Yashwant Kanetkar

Practicals:-

- 1) Remote login procedure through telnet- login, logout
- 2) Display, copy, move, delete and print files from different directories
- 3) Change file access permissions using chmod and confirm using ls -l command
- 4) Creating text files using VI editor
 - Shell scripts
 - i. Write a shell script to get any number and display its square, cube sum of its digits .
 - ii. Write a script to display sequences such as 2 4 6 8 10
 - 0 112358
 - iii. Use of set and shift in a script to use positional parameters.
- 5) Write a script using case structure to validate inputs
 - i. Accept only two digit number.
 - ii. Accept employee code such as first character of code must be a letter
 - iii. Accept only four character long string.

<u>Course Code: DSC-405</u> <u>Course Name: Statistics Paper-III</u> <u>Course Title: Descriptive Statistics– II</u> Theory: 36 hrs. (Lectures of 48 minutes) Marks-50 (Credits: 02)

Objectives:-

- Students will be able to draw the descriptive statistics for the data and interpret the data with the appropriate graphs.
- Learn how to calculate measures of central tendency and measures of dispersion

Unit:-I Correlation and Regression (for ungrouped data)

18

- Concept of bivariate data, scatter diagram, concept of correlation, positive correlation, negative correlation, cause and effect relation.
- Karl Pearson's coefficient of correlation, properties of correlation coefficient, interpretation of correlation coefficient.
- Spearman's rank correlation coefficient (formula with and without ties).
- Concept of regression, Derivation of lines of regression by method of least squares.
- Regression coefficients and their significance, Properties of regression coefficients. Illustrative Examples.

Unit:-II Multiple Regression and Multiple, partial Correlation (For Trivariate Data) 18

- Concept of multiple regressions, Yule's Notations. Fitting of multiple regression planes, Partial regression coefficients, interpretations.
- Concept of multiple correlations: Definition of multiple correlation coefficients and its formula.
- Properties of multiple correlation coefficients (statements only).
- Interpretation of multiple correlation coefficients when it is equal to zero and one.
- Concept of partial correlation. Definition of partial correlation coefficient and its formula.
- Properties of partial correlation coefficient (statements only).
- Examples and problems.

Books and References:-

- 1. Text Book of Correlations and Regression by A.K. Sharma
- 2. Correlation and Regression Analysis: A Historian's Guide by Thomas J. Archdeacon

<u>Course Code: DSC-406</u> <u>Course Name: Statistics Paper-IV</u> <u>Course Title: Continuous Probability Distributions and Testing of Hypothesis</u> Theory: 36 hrs. (Lectures of 48 minutes) Marks-50 (Credits: 02)

Objectives:-

- Derive various descriptive statistics and verify the existence of reproductive property of distribution using generating functions, their limitations and advantages of discrete distributions.
- Distinguish between discrete and continuous distribution.

Unit I: - Continuous Univariate Distributions

- Definitions: infinite sample space with illustrations, continuous random variable, probability density function (p.d.f.), cumulative distribution function (c.d.f.), properties of c.d.f.
- Expectation of random variable, expectation of function of a random variable, variance and examples.
- Uniform distribution: p.d.f., c.d.f., mean, variance and examples.
- Exponential distribution: p.d.f., c.d.f., mean, variance, lack of memory property and examples.
- Normal distribution: p.d.f., standard normal distribution, properties of normal curve, distribution of aX + bY, where X and Y are independent normal variates, examples.
- Introduction to simulation, Model sampling from uniform and exponential distribution, Model sampling from normal distribution using Box-Muller transformation.
- Chi-squaredistribution:Definition,chi-squarevariateasthesumofsquareof i. i.d. S.N.V (statement only), p.d.f., mean, variance, additive property, examples.
- Student's t-distribution: Definition, nature of probability curve, mean and variance, examples. Snedecor's F-distribution: definition, mean and variance, inter-relationship between chi-square, t and F distributions, examples.

Unit II: - Testing of hypothesis

18

- Definitions: Sample, parameter, statistic, standard error.
- Simple and composite hypothesis, Null and alternative hypothesis, type I and type II error, critical region, level of significance, one and two tailed tests, general procedure of testing of hypothesis.
- Large sample tests
 - Test for population mean $H_0:\mu=\mu_0$,
 - Test for equality of population means $H_0:\mu_1=\mu_2$,
 - Test for population proportion $H_0:P=P_0$.
 - Test for equality of population proportions $H_0:P_1=P_2$.
- Chi-square test:
 - Test for goodness of fit
 - Test for population variance $H_0:\sigma=\sigma_0$
 - Test for independence of attributes

- t-test:
- Test for population mean H₀: $\mu = \mu_0$
- F-test:
- Test for equality of two population variances $H_0:\sigma_1=\sigma_2$

Books and References:-

- 1. Testing of Statistical Hypothesis by E L. Lehmann.
- 2. 100Statistical Tests by G.K.Kanji

LAB COURSE Based on DSC-305, DSC-306, DSC-405, DSC-406 Marks-100 (Credits: 04)

Practicals:-

- 1) Fitting of Binomial and Poisson Distributions.
- 2) Model sampling from Binomial and Poisson Distributions.
- 3) Fitting of Uniform and Exponential Distributions.
- 4) Fitting of Normal Distribution.
- 5) Model sampling from Uniform and Exponential Distributions.
- 6) Model sampling from Normal Distribution using:i) Normal table and ii) Box-Muller transformation.
- 7) Large sample tests for means.
- 8) Large sample tests for proportions.
- 9) Tests based on Chi-square Distribution.
- 10) Tests based on t-Distribution.
- 11) Tests based on F-Distribution.
- 12) Construction of frequency distributions and graphical methods.
- 13) Measures of central tendency.
- 14) Measures of dispersion.
- 15) Moments, skewness, kurtosis.
- 16) Correlation coefficient.
- 17) Fitting of lines of regression (Ungrouped data).
- 18) Fitting of regression planes and estimation.
- 19) Multiple Regressions.
- 20) Multiple and partial correlation coefficients.

<u>Lab Course based on SEC-II SEMESTER - IV</u> <u>Skill Enhancement Course – II</u> <u>Course Code: SEC- II</u> <u>Course Title: Project</u> Marks-50 (Credits: 02)

This paper is for 50 marks. In this paper, students in group of maximum two work on software project. The Project is concerned with using Web Technology or PHP. At the end of the work, project report will be prepared with every aspect of software engineering is concerned. This project work is expected to follow all the professional guidelines for software development. Project viva-voce examination will be conducted before theory examination by university appointed external examiner panel.

The marks distribution for project viva-voce examination is as below:

1) Documentation	10 Marks
2) Online Presentation	10 Marks
3) Viva Voce	30 Marks



