Bharatiya Vidya Bhavan

# BHAVAN'S VIVEKANANDA COLLEGE

OF SCIENCE, HUMANITIES AND COMMERCE
Sainikpuri
Autonomous College | Affiliated to Osmania University
Reaccredited with 'A' grade by NAAC

**PROGRAM NAME: B Sc (Honours) Data Science**

**COURSE NAME: English for Technical Communication I**

**Effective from academic Year 2025-26**

(60 Hours)

**COURSE CODE: HDS121** **PPW: 4**

**YEAR/SEMESTER: I/I** **NO. OF CREDITS: 4**

**COURSE OBJECTIVE:** To provide introduction to effective communication and to impart basic skills for Technical Communication

**UNIT-WISE COURSE OBJECTIVES:**

**COb1: to promote** effective communication by making students aware of the process, types and characteristics of effective communication; to **develop** reading comprehension and appropriate usage of Tenses

**COb2: to achieve** effective Oral and Written communication; to **develop** skills in Note Making and Précis, and appropriate usage of the rules of Subject-Verb Agreement

**COb3: to build** effective interpersonal communication skills; to **develop** skills in Group Discussion, and appropriate usage of Active and Passive Voice

**COb4: to highlight** the significance of Non-verbal Communication and Body Language; to **develop** skills in Email Writing, and appropriate usage of Punctuation and Capitalization

**Unit I**

1. Tenses
2. Communication Skills
   (Definition, Process, Types, Characteristics of Effective Communication)
3. Reading Comprehension

**Unit II**

1. Subject-Verb Agreement
2. Oral and Written Communication
   (Introduction, Examples, Barriers, Overcoming Barriers)
3. Note Making and Precis Writing

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**Unit III**

1. Voice (Active and Passive)
2. Interpersonal Communication (Johari Window, Styles of Communication and Emotional Quotient)
3. Group Discussion

**Unit IV**

1. Punctuation and Capitalization
2. Non-verbal Communication and Body Language
3. Email Writing

**SUGGESTED READING:**


1. V.R. Narayanaswamy. Strengthen Your Writing. Orient Blackswan.
2. Bhaskaran and Horsburgh. Strengthen Your English. Oxford University Press.
3. Wren and Martin. High School English Grammar and Composition. S Chand.
4. Sanjay Kumar and PushpLata. Communication Skills. Oxford University Press.
5. Rai and Rai. (2013). Business Communication. Himalaya Publishing House.
6. E. Suresh Kumar, Engineering English, Orient BlackSwan,2014


**COURSE OUTCOMES:**

At the end of the course students will be able to:

**CO1: demonstrate** an understanding of effective communication, reading comprehension and appropriate usage of Tenses.

**CO2: Apply** effective Oral and Written Communication Skills, Note Making and Précis Writing skills, and rules of Subject-Verb Agreement in framing sentences

**CO3: implement** effective Interpersonal Communication Skills, participate in Group Discussions, and make appropriate use of Active and Passive Voice

**CO4: exhibit** an understanding of Non-verbal Communication and Body Language, **compose** Emails, and **apply** appropriate Punctuation and Capitalization.

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**PROGRAM NAME: B.Sc (Honours) in Data Science**
**COURSE NAME: Differential Equations**
**Effective from academic Year 2024-25**

**COURSE CODE: HDS122** **PPW: 5L+1T**
**YEAR/SEMESTER: I/I** **NO. OF CREDITS: 5**

(75 Hours)

**COURSE OBJECTIVE:** This course is aimed at familiarising students with differential equations.

**UNIT-WISE COURSE OBJECTIVES:**

**COb1:** To identify and learn the first-order ODEs, methods of integrating factors and linear differential equations.
**COb2:** To acquire knowledge of solving Differential Equations first order but not of first degree.
**COb3:** To find the general solution of Higher order linear differential equations with constant coefficients.
**COb4:** To find the general solution of Higher order linear differential equations with nonconstant coefficients and Partial differential equations. Also learn about Indian Mathematicians.

**Unit- I Differential Equations of First Order and First Degree (25Hrs)**

Introduction, Equations in which Variables are Separable, Homogeneous Differential Equations, Differential Equations Reducible to Homogeneous Form, Linear Differential Equations, Differential Equations Reducible to Linear Form, Exact differential equations, Integrating Factors, Change in variables, Total Differential Equations, Simultaneous Total Differential Equations, Equations of the form $dx/P = dy/Q = dz/R$.

**Unit- II Differential Equations First Order but not of First Degree(17Hrs)**

Equations Solvable for p Equations Solvable for y, Equations Solvable for x, Equations that do not contain x (or y) Equations Homogeneous in x and y, Equations of the First Degree in x and y, Clairaut's equation.
Applications of First Order Differential Equations: Growth and Decay, Dynamics of Tumour Growth, Radioactivity and Carbon Dating, Compound Interest, Orthogonal Trajectories.

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**Unit- III Higher order Linear Differential Equation-I** **(18Hrs)**

Solution of homogeneous linear differential equations with constant coefficients, Solution of non-homogeneous differential equations P(D)y = Q(x) with constant coefficients by means of polynomial operators when Q(x) = $be^{ax}$, bsinax, bcosax, $x^k$, xv, $ve^{ax}$, Method of undetermined coefficients.

**Unit- IV Higher order Linear Differential Equation-II & Partial Differential Equations (15Hrs)**

Method of variation of parameters, Linear differential equations with non-constant coefficients The Cauchy-Euler Equation, Legendre's Linear Equations, and Miscellaneous Differential Equations. Partial Differential Equations: Formation and solution, Equations easily integrable.

**IKS**: Introduction to Ancient Indian mathematicians, Unique aspects of Indian mathematicians

**PRESCRIBED BOOK:**

"Differential Equations and Their Applications", Zafar Ahsan, Prentice Hall of India Learning Pvt .Ltd, 3rd Edition, 2016.

**Unit 1**- Chapters:2[2.1 to 2.12]
**Unit 2**- Chapters:3[3.1&3.2]; 4[4.1 to 4.4 & 4.20]
**Unit 3**-Chapters:5[5.1 to 5.4]
**Unit 4**-Chapters:5[5.5 to 5.8]; 9[9.1 to 9.4]

**REFERENCE BOOKS:**


1. Frank Ayres Jr, Theory and Problems of Differential Equations, Schaum Publishing Co. New York.
2. Ford, L.R ; Differential Equations, McGraw Hill Book Company.
3. Daniel Murray, Differential Equations,Longman , Green and Co..
4. S. Balachandra Rao, Differential Equations with Applications and Programs,Universities Press.
5. Stuart P Hastings, J Bryce Mc Lead; Classical Methods in Ordinary Differential Equations,American Mathematical Society.
6. George F. Simmons,Stevan G. Krantz, Differential Equations :Theory, technique and practice, New York, NY : McGraw-Hill Higher Education


**COURSE OUTCOMES:**

At the end of the course students will be able to:

**CO1:** Solve Differential equations of first order and first degree.
**CO2:** Calculate solutions of Differential Equations of first order but not of first degree and interpret applications of Differential Equations of first order & first degree.
**CO3:** Evaluate general solution of Higher order linear differential equations with constant coefficients.
**CO4:** Evaluate general solution of Higher order linear differential equations with non constant coefficients and formulate Partial Differential equations. Students know about ancient Indian Mathematicians.


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**Department of Mathematics and Statistics**
**Syllabus-B Sc I Year/Semester I**
**Effective from academic Year 2024-25**
**Programme Name: B Sc (Honours) in Data Science**
**Course Name:** Computational Statistics-**Course Code:** HDS123
(60 Hours)

**HPW: 4** **Credits:4**

**Course Objective:** *The main objective of this course is to provide both theoretical and practical knowledge in the field of descriptive statistics. incorporated with data science fields and its applications.*

**Course Objectives:** The objective of this course is to expose descriptive statistics and probability by practical application of quantitative analysis and data visualization

**COb1:**To perceive the basic concepts in Statistics
**COb2:**To calculate and interpret the various descriptive measures of centrality, dispersion and higher-order measures of location.
**COb3:** To apply basic concepts of probability theory and theorems in simple, conditional and posterior probability.
**Cob4:** Understand the concept of random variables, how to identify them and use them to solve probabilistic problems.

## UNIT –I

**Introduction:**Importance of statistics, concepts of statistical population and a sample - quantitative and qualitative data - collection of primary and secondary data,designing a questionnaire and a schedule. Measurement scales- nominal, ordinal, interval and ratio.Classification, tabulation, and visualization of data. **(15)**

## UNIT-II

**Descriptive Statistics:** Measures of central tendency or location (mean, median, mode, geometric mean and harmonic mean) with simple applications. Absolute and relative measures of dispersion (range, quartile deviation, mean deviation and standard deviation) with numerical problems.

**Moments** - Importance of moments, central and non-central moments, and their interrelationships, Sheppard's corrections for moments for grouped data. Measures of Skewness based on quartilesand moments and kurtosis based on moments with numerical problems. **(15)**

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## UNIT-III

**Probability:**Basic concepts in probability - deterministic and random experiments, trail, outcome, sample space, event and operations of events, mutually exclusive and exhaustive events, equally likely and favorable outcomes with examples. Mathematical, Statistical and Axiomatic definitions of probability with merits and demerits. Conditional probability and Independent events. Addition and multiplication theorem for two, three events. and Bayes' Theorem – numerical problems. **(15)**

## UNIT- IV

**Random Variables:** Definition of random variable, discrete and continuous random variables, probability mass function and probability density function with illustrations and Distribution function , its properties(only statements). Expectation of a random variable and its properties. Definition of moment generating function (m.g.f), cumulant generating function (c.g.f), probability generating function (p.g.f) and characteristic function (c.f) and statements of their properties with numerical problems. Chebyshev's, and Cauchy-Schwartz's inequalities and their applications. **(15)**

**Course Outcomes:**

After completeing this course students will be able to:

**CO1:** Develop skills in presenting quantitative and qualitative data using appropriate diagrams, tabulations and construction of frequency distributions.

**CO2:** Evaluate data using measures of central tendency, dispersion and interpret the higher order measures of cental tendency.

**CO3:** Calculate probabilities by applying probability laws and theory.

**CO4:** Apply key concepts of probability, including discrete and continuous random variables, Probability functions, Generating functions, expectations and variances.

**Text Books:**


1. V.K.Kapoor and S.C.Gupta: Fundamentals of Mathematical Statistics, Sultan Chand &Sons,New Delhi.
2. William Feller: Introduction to Probability theory and its applications. Volume- I, Wiley Publication
3. Hogg,Tanis,Rao:Probability and Statistical Inference.7$^{th}$edition.Pearson Publication.


**List of Reference Books:**


1. Schaum's Outline of Probability and Statistics by Murray R Spiegel, John J. Schiller, R. Alu Srinivasan.
2. GoonAM,Gupta and Das Gupta B:Fundamentas of Statistics,Vol-I,the World press pvt.Ltd.,Kolkota
3. HoelP.G:Introduction to Mathematical Statistics, Asia Publishing house.
4. Sanjay Arora and BansiLal:New mathematical Statistics: Satya Prakashan,New Delhi
5. Hogg,Tanis,Rao:Probability and Statistical Inference.7$^{th}$edition, Pearson Publication.
6. Statistics for B.Sc I year, Telugu Academy.
7. Statistics for Management - Levin & Rubin


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**PROGRAM NAME:B.Sc. (Honours) in Data Science**
**COURSE NAME: Computational Statistics Practicals using Spreadsheet**
**Effective from academic Year 2024-25**

**COURSE CODE: HDS122P** **PPW: 2**
**YEAR/SEMESTER: I/I** **NO. OF CREDITS: 1**

**COURSE OBJECTIVE:** This course will provide practical knowledge to the students on Descriptive statistics and visualization of data elaborated in this course. MS- Excel is introduced in this practical

**COb1:** Analyze and interpret the first, second, and higher-order measures of central tendency Using MS-Excel.
**COb2:** Analyze and interpret the diagrams and graphs.

1. Computation of Measures of Central tendency Using MS Excel.
2. Computation of Measures of dispersion Using MS Excel.
3. Graphical Presentation of data (Histogram, Frequency polygon, Ogives) Using MS Excel
4. Diagrammatic Presentation of data (Bar and Pie), Box plot using MS Excel.
5. Computation of moments Using MS-Excel.
6. Computation of co-efficient of Skewness and Kurtosis – using MS Excel.

**COURSE OUTCOMES:**
Upon successful completion of the course, students able to:

**CO1:** knowledge of various types of data, their organization and evaluation of summary measures such as measures of central tendency and dispersion etc.
**CO2 :** able to learn how to draw different diagrams, graphs and interpret from that using MS-Excel..

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**PROGRAM NAME: B.Sc (Honours) in Data Science**
**COURSE NAME:** Programming in 'C'
**Effective from Academic Year 2024-25**
(60 Hours)

**COURSE CODE: HDS124** **PPW: 4**
**YEAR/SEMESTER: I/I** **NO. OF CREDITS: 4**

**COURSE OBJECTIVE:** To foster the students to develop C Programs.

**UNIT-WISE COURSE OBJECTIVES**:
**CObj1**: To discuss the computer software, Algorithms and basics of C language.
**CObj2**: To illustrate control statements, arrays, strings.
**CObj3**: To explain the usage of functions, pointers and dynamic memory allocation.
**CObj4**: To construct structures, unions, enumerated data types and file concepts.

**Unit – I: Introduction to Software, Algorithms, Programming Concepts and Basics of C, Input/output and Control Statements.**

**Introduction to Software:** Programming Languages, Compiling, Linking and Loading a program.
**Introduction to Algorithms and Programming Concepts:** Algorithm and Flowcharts.
**Basics of C:** Developing Programs in C, A Simple C Program, Structure of a C Program, Concept of a Variable, Data Types in C, Tokens, Operators and Expressions, Type Conversion in C.
**Input and Output:** Non-formatted Input and Output, Formatted Input and Output Functions.
**Control Statements:** Selection Statements, The Conditional Operator, The Switch Statement.

**Unit – II: Iterative Statements, Arrays, Strings and Multidimensional Arrays.**

**Iteration**: while Construct, for Construct, do-while construct, goto statement, Special Control Statements: return, break, continue, Nested Loops.
**Arrays and Strings:** One-dimensional Array: Declaration of a One-dimensional Array, Initializing Integer Arrays, Accessing Array Elements, Working with One-dimensional Array.
**Strings:** One-dimensional Character Arrays: Declaration of a String, String Initialization, Printing Strings, String Input, Character Manipulation in the String, Character Functions in ctype.h (Table 11.2), String manipulation, functions in string.h (Table 11.3).
**Multidimensional Arrays:** Declaration of Two-dimensional Array, Initialization of a Two-dimensional Array, Accessing Two-dimensional Arrays, Working with Two-dimensional Array.

**Unit – III: Functions, Pointers and Dynamic Memory Allocation.**

**Functions:** Concept of Function, Using Functions: Function Prototype Declaration, Function Definition, Function Calling, Call by Value Mechanism, Storage Classes: Storage Class Specifiers for Variables (Auto, Register, Static and Extern), Recursion.
**Pointers in C:** Introduction, Address of Operator (&), Pointer: Declaring a Pointer, Initializing Pointers, Indirection Operator and Dereferencing, Use of Pointers.
**Dynamic Memory Allocation:** Static memory allocation, Dynamic memory allocation, Freeing Memory, How malloc() and free() work.

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**Unit – IV: User-defined Data Types, User-defined Variables and Files.**

**User-defined Data Types and Variables**: Structures: Declaring a Structure and Structure Variables, Accessing the Members of a Structure, Initialization of Structures, Nesting of Structures, Array of Structures, Arrays within Structure, Union: Declaring a Union and its Members, Accessing and Initializing the Members of a Union, Structure versus Union, Enumeration Types.
**Files in C**: Introduction, Using Files in C: Declaration of File pointer, Opening a File, Closing and Flushing Files, Working with Text Files: Character Input and Output, End Of File (EOF), Detecting the End Of File using the feof() function.

**PRESCRIBED BOOK:**
PradipDey, Manas Ghosh, Computer Fundamentals and Programming in C(2e), June 2013.

**REFERENCE BOOKS:**

1. Ivor Horton, Beginning C, March 2013.
2. Ashok Kamthane, Programming in C, January 2015.
3. Herbert Schildt, The Complete Reference C, July 2017.
4. Paul Deitel, Harvey Deitel, C How To Program, Pearson Education Limited 2016.
5. Byron S. Gottfried, Theory and Problems of Programming with C, 1996.
6. Brian W. Kernighan, Dennis M. Ritchie, The C Programming Language, March 1988.
7. B. A. Forouzan, R. F. Gilberg, A Structured Programming Approach Using C, January 2007.


**COURSE OUTCOMES:**

At the end of the course students will be able to:

**CO1**: Develop Algorithms and Simple C programs.

**CO2**: Implement different control statements.

**CO3**: Develop C programs using functions and pointers.

**CO4**: Apply the concepts of structures, unions, enumerated data types and files.


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**PROGRAM NAME: B.Sc (Honours) in Data Science**
**COURSENAME: PROGRAMMING IN 'C' LAB**
**Effective from Academic Year 2024-25**

**COURSE CODE: HDS124P** **PPW: 2**
**YEAR/SEMESTER: I/I** **NO. OF CREDITS: 1**

**COURSE OBJECTIVE:** To impart knowledge on 'C' Programming.
**COb1:** To implement 'C' programs for Control Statements.
**COb2:** To implement 'C' programs for Functions, Arrays, Structures, Pointers and Files.

1. Program to demonstrate arithmetic operators.
2. Program to find the sum of digits of a number.
3. Program to reverse of a given number.
4. Program to check whether the given number is even or odd.
5. Program to display Fibonacci numbers.
6. Program to display the sum of harmonic series.
7. Program to demonstrate arithmetic operators using switch statement.
8. Program to find greatest of three numbers.
9. Program to display multiplication table of a given number.
10. Program to display prime numbers between given range.
11. Program to find the factorial of a given number.
12. Program to check the given number is Armstrong or not.
13. Program to check the given number is Palindrome or not.
14. Program to check whether the given number is prime or not.
15. Program to find the roots of a quadratic equation.
16. Program for sorting i) an integer array ii) strings.
17. Program to demonstrate i) Character functions ii) String functions.
18. Program for matrix i) addition, subtraction ii) matrix multiplication.
19. Program to display the transpose of a given matrix.
20. Program to display the trace of a given matrix.
21. Program to find factorial of a given number using function.
22. Program to demonstrate i) call by value and call by address mechanisms.
    ii)using recursion.
23. i) Program to demonstrate to declare a pointer and initialize a pointer.
    ii) Program to demonstrate dereferencing operator.
24. Program to demonstrate passing i) an array to a function ii) arrays of pointers.
25. Program to demonstrate i) pointer to array ii) Dynamic Memory Allocation functions.
26. Program to demonstrate Structures.
27. Program to demonstrate Nesting of Structures.
28. Program to demonstrate i) array of structures ii) arrays within structures.
29. Program to demonstrate i)Union ii) Enumerated data types.
30. Program to demonstrate basic text-file I/O operations.

**COURSE OUTCOMES:**
By the end of the course, Students will be able to:
**CO1**: Execute 'C' programs for various Control Statements.
**CO2**: Execute 'C' programs for Functions, Arrays, Structures, Pointers and Files.

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**PROGRAM NAME: B.Sc (Honours) in Data Science**
**COURSE NAME: OPERATING SYSTEMS**
**Effective from Academic Year 2024-25**
**(60 Hours)**

**PAPER CODE: HDS125** **PPW: 4**
**YEAR/SEMESTER: I/I** **NO. OF CREDITS: 4**

**COURSE OBJECTIVE:** To familiarize the students with the concepts of Operating Systems, Process Management, Deadlocks and Memory Management

**UNIT-WISE COURSE OBJECTIVES:**

**COb1:** To explain the basics of Operating Systems and its structure.
**COb2:** To acquire knowledge on the Process scheduling algorithms
**COb3:** To be able to determine the best disk scheduling algorithm and the deadlock handling method.
**COb4:** To explain the importance of Memory and Virtual Memory Management.

**UNIT-I: Introduction, Operating - System Structures.**

**Introduction-** What Operating Systems Do – User View – System View, Computer System Organization - Computer-System Operation - Storage Structure, Computer System Architecture - Single Processor Systems - Multi Processor Systems - Clustered Systems.
**Operating - System Structures**: Operating - System Services, System Calls, Operating- System Structure- Simple Structure - Layered Approach – Microkernels – Modules - Hybrid Systems.

**UNIT-II: Processes and CPU Scheduling.**

**Processes**: Process Concept - The Process - Process State - Process Control Block - Threads. Process Scheduling - Scheduling Queues – Schedulers - Context Switch.

**CPU Scheduling:** Basic Concepts - CPU–I/O Burst Cycle - CPU Scheduler - Preemptive Scheduling - Dispatcher, Scheduling Criteria, Scheduling Algorithms- FCFS – SJF - Priority Scheduling - Round-Robin Scheduling.

**UNIT-III: Deadlocks and Mass Storage Structure.**

**Deadlocks:** System Model, Deadlock Characterization- Necessary Conditions - Resource-Allocation Graph, Methods for Handling Deadlocks, Deadlock Prevention - Mutual Exclusion - Hold and Wait - No Preemption - Circular Wait.
**Mass Storage Structure:** Overview of Mass-Storage Structure - Magnetic Disks, Disk Scheduling- FCFS Scheduling - SSTF Scheduling - SCAN Scheduling - C-SCAN Scheduling, RAID Structure - RAID levels (RAID Level 0, RAID Level 1, RAID Level 0+1, RAID Level 1+0).

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**UNIT-IV: Memory Management Strategies and Virtual Memory Management.**

**Memory Management Strategies:** Background- Basic Hardware - Address Binding - Logical vs Physical Address Space - Dynamic Loading - Dynamic Linking & Shared Libraries, Swapping- Standard Swapping - Swapping on Mobile systems, Contiguous Memory Allocation - Memory Protection - Memory Allocation – Fragmentation, Segmentation- Basic Method - Segmentation Hardware, Paging- Basic Method.
**Virtual Memory Management:** Demand Paging - Basic Concept,Page Replacement- Basic Page Replacement - FIFO Page Replacement - LRU Page Replacement.

**PRESCRIBED BOOK:**

1. Operating System Concepts by Abraham Silberschatz, Peter B Galvin, Gerg Gagne, Wiley India Pvt. Ltd.(9 e), Copyright © 2013.

**REFERENCE BOOKS:**


1. Naresh Chauhan, Principles of Operating Systems Thomas W. Doeppner, Operating Systems in Depth Andrew S. Tanenbaum, Modern Operating Systems, 1992.
2. William Stallings, Operating Systems – Internals and Design Principles, 2018.
3. Dhananjay M. Dhandhere, Operating Systems – A Concept Based Approach, 2003.


**COURSE OUTCOMES:** At the end of the course students will be able to:

**CO1:** Paraphrase the basic concepts of Operating Systems and its Structure.
**CO2:** Summarize the various Process Management Services and process scheduling algorithms.
**CO3:** Determine the Process Scheduling Algorithm or the Deadlock Handling Method to be used.
**CO4:** Discuss the process of Memory and Virtual Memory Managements.

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**PROGRAM NAME: B.Sc (Honours) in Data Science**
**COURSE NAME: OPERATING SYSTEMS Lab**
**Effective from Academic Year 2024-25**

**COURSECODE: HDS125P** **PPW:2**
**YEAR/SEMESTER: I/I** **NO.OFCREDITS: 1**

**Course Objective**: **To acquire knowledge on UNIX commands & shell Programming**.
**COb1**: To gain knowledge of the basic UNIX commands.
**COb2**: To execute UNIX shell scripts.

Familiarity of LINUX shell commands

mkdir,cd,ls,cat,touch,rmdir,man,pwd,mv,cp,rm,cut,cal,date,factor,who,whoami,finger,wc,sort,grep,head,tail,

more,banner,mail,write,wall,ps,kill,nice.

1. Write a shell program to perform arithmetic operations.
2. Write a shell program to display sum, sum of square and sum of cube of 1-10 numbers using expressions.
3. Write a shell program to check whether the given number is even or odd.
4. Write a shell program to display days of a week using case statement.
5. Write a program to find factorial of a number using for loop.
6. Write a shell program to check whether the given number is prime number or not.
7. Write a program to check whether the given number is perfect or not using until loop.
8. Write a shell program to check whether the given number is palindrome or not.
9. Write a shell program to display sum of the digits of a given number using until loop.
10. To wish salutation depending upon time.
11. Program using system calls.
12. Write a CPU scheduling algorithm for FCFS.
13. Write a CPU scheduling algorithm for SJF.

**COURSE OUTCOMES:**
By the end of the Course, Students will be able to:

**CO1**: Execute various UNIX commands.
**CO2**: Practice shell programming.

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**PROGRAM NAME: B Sc (Honours) Data Science**

**COURSE NAME: English for Technical Communication II**

**Effective from academic Year 2025-26**

(60 Hours)

**COURSE CODE: HDS221** **PPW: 4**

**YEAR/SEMESTER: I/II** **NO. OF CREDITS: 4**

**COURSE OBJECTIVE:** To impart advanced skills for effective Technical Communication for professional enhancement

**UNIT-WISE COURSE OBJECTIVES:**

**COb1: to promote** awareness of Data/Professional Ethics, ability to Interpret Data and Transfer Information, and appropriate usage of Conditionals

**COb2: to enable** students to Set Goals, Write Reports and use Technical Vocabulary

**COb3: to impart** Time Management skills and Presentation Skills, and make students aware of Common Errors and Misappropriations

**COb4: to develop** Critical Thinking, ability to write Application for Job and Resume, and frame questions appropriately

**Unit I**

1. Conditionals
2. Data/Professional Ethics
3. Data Interpretation and Information Transfer

**Unit II**

1. Technical Vocabulary (Computer Science)
2. Goal Setting
3. Report Writing

**Unit III**

1. Common Errors and Misappropriations
2. Time Management
3. Presentation Skills (PowerPoint Presentation - Formal)

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**Unit IV**

1. Framing questions (including question tags)
2. Critical Thinking
3. Application for Job and Resume Writing

## SUGGESTED READING:


1. R. C. Sharma and Krishna Mohan. Business Correspondence and Report Writing. Tata McGraw-Hill
2. Sanjay Kumar and PushpLata. Communication Skills. Oxford University Press.
3. Rai and Rai. (2013). Business Communication. Himalaya Publishing House.
4. V.R. Narayanaswamy. Strengthen Your Writing. Orient Blackswan.
5. Bhaskaran and Horsburgh. Strengthen Your English. Oxford University Press.


## COURSE OUTCOMES:

At the end of the course students will be able to:

**CO1:** **demonstrate** Data/Professional Ethics, ability to Interpret Data and Transfer Information, and appropriate usage of Conditionals.

**CO2:** **set** Goals, **compose** Reports and **apply** Technical Vocabulary.

**CO3:** **exhibit** Time Management skills and Presentation Skills, and avoid Common Errors and Misappropriations.

**CO4:** **apply** Critical Thinking, **compose** Applications for Job and Resumes, and **demonstrate** the ability to use well-framed questions to elicit information.

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**Effective from academic Year 2024-25**

**PROGRAM NAME: B.Sc (Honours) in Data Science**

**COURSE NAME: REAL ANALYSIS**

**PAPER CODE: HDS222** **PPW: 5L+1T**
**YEAR/SEMESTER: I/II** **NO. OF CREDITS: 5**

(75 Hours)

**COURSE OBJECTIVES:** This course is aimed at familiarising students with concepts of Real Analysis.

**Course Objectives:** This course is aimed at familiarising students with concepts of Real Analysis.

**COb1:** To learn basic properties of Sequences of Real numbers and their limits.

**COb2:** To acquire knowledge about Series, Continuity and Limits of Real functions.

**COb3:** To explain the concepts of Derivatives of a Real function.

**COb4:** To analyse concepts of Riemann Integration.

**Unit- I Sequence (17Hrs)**

Sequences: Limits of Sequences, A Discussion about Proofs, Limit Theorems for Sequences, Monotone Sequences and Cauchy Sequences; Subsequences, Lim sup's and Lim inf's.

**Unit- II Series and Continuity (23Hrs)**

Series: Alternating Series and Integral Tests.

Continuity: Continuous Functions, Properties of Continuous Functions, Uniform Continuity, Limits of Functions.

**Unit- III Differentiation (20Hrs)**

Differentiation: Basic Properties of the Derivative, The Mean Value Theorem, L'Hospital Rule, Taylor's Theorem.

**Unit- IV Integration (15Hrs)**

Integration: The Riemann Integral, Properties of Riemann Integral(Theorems without proof), Fundamental Theorem of Calculus.

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**Prescribed Text Book:**

Elementary Analysis –The Theory of Calculus, Kenneth A Ross, 2nd Edition, Springer Publishers.

**Unit 1-**Chapters: 2--7,8,9(no proofs);10.1 to 10.11(no proofs 10.4 to 10.7); 11.1 to 11.8(no proofs 11.2 ); 12(no proofs)]

**Unit 2-** Chapters: 2--14,15

Chapters: 3 --17.1to 17.5( no proofs); 18.1 to 18.6(no proofs 18.1,18.3,&18.6); 19.1 to 19.5; 20.1 to 20.10(no proofs)]

**Unit 3-** Chapters:5---28.1,28.2; 29.1 to 29.8(no proofs-29.4 to 29.8); 30.1, 30.2(no proof); 31.1 to 31.6(no proofs 31.4 to 31.6)

**Unit 4-** Chapters:6--32.1 to 32.9(no proof 32.7); 33.1,33.2,33.5,33.7, 34.1

**Reference Text Book:**

1. Introduction to Real Analysis by Robert G. Bartle& Donald R. Sherbert, John Wiley & Sons, Inc. (Third Edition)
2. A course of Real Analysis by Shanti Narayanan & PK Mittal.
3. William. F. Trench , Introduction to Real Analysis.
4. Lee Larson, Introduction Real Analysis.

**Course Outcomes:**

After completion of course students will be able to:

**MT321 CO1:** Interpret properties of Sequences of Real numbers.

**MT321 CO2:** Interpret the convergence and divergence of the series and also Analyse Continuity, Uniform continuity of Real functions and evaluate their Limits.

**MT321 CO3:** Interpret the concept of Derivability of Real Functions.

**MT321 CO4:** Summarise and synthesise the concepts of Riemann Integration.

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**Department of Mathematics and Statistics**
**Syllabus-B Sc I Year/Semester II**
**Effective from academic Year 2024-25**
**Programme Name: B Sc (Honours) in Data Science**
**Course Name:** Probability and Statistical Methods **-Course Code:** HDS223
(60 Hours)

**HPW: 4** **Credits:4**

**Course Objective :** *The course explores the basic concepts of bivariate probability and its applications for decision-making in business, and other fields of social sciences. Our everyday lives, as well as economic and business activities, are full of uncertainties and probability and distribution theory offer useful techniques for quantifying these uncertainties. The course is heavily oriented towards the formulation of mathematical concepts on probability and probability distributions and densities with practical applications.*

**Course Objectives:**
The objective of this course is to provide a foundation exposure to probability distributions and statistical analysis mostly used in varied practical real time applications.

**COb1:** To learn the basic concepts of bivariate random variables, and derive its marginal and conditional distributions.
**COb2:** Apply concepts of various discrete probability distributions to various real life applications.
**COb3:** Apply concepts of various Continuous probability distributions to various real life applications.
**COb4:** The concept of association between two variables and forecast future values by regression equations.

## UNIT-I

**Bivariate Random variables:** Notion of bivariate random variable, bivariate distribution and statement of its properties. Joint, marginal and conditional distributions. Independence of random variables. Statement and applications of weak law of large numbers and central limit theorem for identically and independently distributed (i.i.d) random variables with finite variance. **(15)**

## UNIT- II

**Discrete Distributions:** Uniform, Bernoulli, Binomial, Poisson distributions. Properties of these distributions such as m.g.f, c.f., Reproductive property wherever exists and moments up to fourth order and their real life applications with numerical problems. **(15)**

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## UNIT-III

**Continuous distributions**: Rectangular, Exponential, Gamma, Beta and Normal distributions. Importance of Normal distribution. Properties of these distributions such as m.g.f, c.f., and moments up to fourth order, their real life applications with numerical problems. **(15)**

## UNIT-IV

**Correlation & Regression**: Product moment correlation coefficient and its properties. Bivariate data, scattered diagram, computation of correlation coefficient for ungrouped data, Spearman's Rank correlation coefficient and its properties. Partial and multiple correlation coefficients (only for three variables). Simple linear regression, lines of regression, properties of regression coefficients, co-efficient of determination, correlation verses regression. **(15)**

**Course Outcomes:**

Students able to :

**CO1:** Solve the real life problems related to bivariate random variable.
**CO2:** Understand various discrete distributions, with real time applications.
**CO3:** Understand various Continuous distributions, with real time applications.
**CO4:** Compute an interrelation between the variables using Correlation and regression analysis.

**Text Books:**


1. V.K.Kapoor and S.C.Gupta: Fundamentals of Mathematical Statistics, Sultan Chand &Sons,New Delhi.
2. William Feller: Introduction to Probability theory and its applications. Volume- I, Wiley Publication
3. Hogg,Tanis,Rao:Probability and Statistical Inference.7th edition.Pearson Publication.


**List of Reference Books:**


1. GoonAM,Gupta and Das Gupta B:Fundamentas of Statistics,Vol-I,the World press Pvt Ltd., Kolkota.
2. Introduction to probability and statistics : principles and applications for engineering and the computing sciences / J. Susan Milton, Jesse C. Arnold.
3. Schaum's Outline of Probability and Statistics by Murray R Spiegel, John J. Schiller, R. Alu Srinivasan.
4. HoelP.G:Introduction to Mathematical Statistics, Asia Publishing house.
5. M.Jagan Mahon Rao and Papa Rao:A Textbook of statistics paper-I.
6. Sanjay Arora and BansiLal:New mathematical Statistics: Satya Prakashan,New Delhi.
7. Beginning R: The statistical programming language – Dr. Mark Gardener
8. Hands on Programming with R – Garrett Grolemund Shroff publishers and distributes private limited
9. R for Everyone: Advanced Analytics and Graphics – Jared P.Lamder – Pearson education India
10. R Cookbook -Paul Teetor, Shroff Publishers and Distributors PVT.LTD.


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**PROGRAM NAME: B.Sc (Honours) in Data Science**
**COURSE NAME: Exploratory Data Analysis Practicals using R Programming**

**COURSE CODE: HDS223P** **PPW: 2**
**YEAR/SEMESTER: I/II** **NO. OF CREDITS: 1**

**COURSE OBJECTIVE:** *This course will provide practical knowledge to the students on Descriptive statistics, visualization of data and probability distributions elaborated in this course. R- Programming is introduced in this practical*

**COB1**: Analyze and interpret the first, second and higher-order measures of central tendency Using R-Programming.
**COB2:** apply standard discrete and Continuos probability distribution to different situations

Introduction – R Programming, Writing Code/Setting Working Directory, Data types, Reading data from external sources, storing data to external files.

1. Mathematical operations(addition, subtraction, multiplication, division, log x, ex, inverse) including problems
2. Computation of Measures of central tendency and dispersion using R
3. Data visualization and interpretation using R
4. Computation of Binomial Probabilities using R
5. Computation of Poisson Probabilities using R
6. Computation of Normal Probabilities using R
7. Computation of Exponential Probabilities using R
8. Computation of correlation coefficient for raw data Using R
9. Computation of simple regression equation using R
10. Computation of coefficient of determination using R

**COURSE OUTCOMES:**
Upon successful completion of the course, students able to:

**CO1:** Analyze various types of data, their organization, and evaluation of summary measures such as central tendency and dispersion measures, etc.
**CO2:** Learn how to fit various discrete and Continuous probability distributions through R-Programming.

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**PROGRAM NAME: B.Sc (Honours) in Data Science**
**COURSE NAME: Database Management Systems**
**Effective from Academic Year 2024-25**
**(60 Hours)**

**PAPER CODE: HDS224** **PPW: 4**
**YEAR/SEMESTER: I/II** **NO. OF CREDITS: 4**

**COURSE OBECTIVE:** The objective of the course is to present an introduction to database management systems, with an emphasis on how to organize, maintain and retrieve - efficiently, and effectively - information from a DBMS.
**UNIT-WISE COURSE OBJECTIVES**:

**COb1: To impart knowledge of database concepts.**
**COb2: To get equipped with E-R and EER model.**
**COb3: To have the knowledge about Relational model and Normalization.**
**Cob4: To get information about database administration.**

**UNIT-I: Database Environment and Development Process.**

Basic concepts and definitions, traditional file processing systems-Disadvantages of File processing system, Database Approach, Advantages of database approach, Costs and Risks of Database Approach-, Components of Database Environment. The Database Development Process-System Development Life Cycle - Three schema Architecture for Database Development -Range of Database Applications.

**UNIT-II: Modeling Data in the Organization.**

**E-R Model** – Sample E-R model, E-R model Notation.
**Modeling the Rules of the Organization**: Overview of the Business Rules –Scope of the Business rule-Data Names and Definition.
**Modeling Entities and Attributes:** Entities-Attributes-Modeling Relationships-Basic Conceptsand Definition in Relationships-Degree of Relationships - Cardinality constraints-minimum, maximum cardinality.(Case Study).
**Enhanced E-R model** – Representing Super type, Sub type, Representing Specialization and Generalization, Specifying Completeness Constraints, Specifying Disjointness Constraints, Specifying Subtype discriminators, Defining Super type /Subtype Hierarchies. (Case Study).

**UNIT-III: Logical Database Design and the Relational Model**

**Relational model** – Definitions-Relational Data Structure-Relational keys-properties of Relation, Integrity Constraints, Well Structured Relations.
**Transforming EER diagrams into Relations**-Map Regular entities-Map Weak entities-Map Binary relationship-Map Associative Entities-Map Unary Relationships.
**Normalization** –Steps in Normalization-Functional Dependencies-Convert to First Normal Form-Convert to Second Normal Form-Convert to Third Normal Form(Case Study), Merging Relations-Denormalization.

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**UNIT-IV: Data and Database Administration**

The Roles of Data and Database Administrators – Traditional Data administration-Traditional Database Administration-Trends in Database Administration. Managing Data Security-Threats to Data security-Establishing Client/Server Security.

**Basic Recovery Facilities** – Backup Facilities, Journalizing Facilities, Checkpoint Facility, Recovery Manager.

**Recovery and Restart Procedures** –Disk Mirroring, Restore/Rerun, Maintaining Transaction integrity, Backward Recovery and Forward Recovery.

**Types of Database Failures**- Aborted Transactions, Incorrect data, System Failure, Database destruction.

**PRESCRIBED BOOK:**

1. Jeffrey A Hoffer, V Ramesh, HeikkiTopi - *Modern Database Management*, 12 edition, Pearson, 2016.

**REFERENCE BOOKS:**


1. Fred R Mc Fadden, Jeffrey A Hoffer, Mary B Prescott - *Modern Database Management*, 6th edition, Pearson Education, 2002.
2. Database System Concepts by Peter Rob and Carlos Coronel, 2002.
3. Database Management Systems Concepts by AviSilberschatz, Henry F.Korth, 2020.
4. C.J.Date, A.Kannan, S.Swamynathan, An Introduction to Database Systems, 8th edition, Pearson Education, 2006.


**COURSE OUTCOMES:**

**CO1:** Acquire knowledge on database concepts.
**CO2:** Understands about E-R and EER model.
**CO3:** Aware of Relational model and Normalization.
**CO4:** Understand technical and management roles of database administration & data administrator.

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**PROGRAM NAME: B.Sc (Honours) in Data Science**
**COURSENAME: Database Management Systems Lab**
**Effective from Academic Year 2024-25**

**COURSECODE: HDS224** **PPW: 2**
**YEAR/SEMESTER: I/II** **NO.OFCREDITS:1**

**COURSE OBJECTIVE:** To acquire knowledge on SQL Commands, SQL Operators, Joins, nested queries, views.

**COb1:** To impart basic concepts of SQL.

**COb2:** To get equipped with the concepts of Joins, nested queries, views.

- SQL Data types, DDL
- DDL, DML & DCL
- Column Constraints
- Functions in SQL (String, Date)
- Functions in SQL (Numeric, Aggregate)
- Group by and Order by Clauses, Set Operators.
- Joins (Cartesian, Equi)
- Joins(Outer, Self)
- Nested Queries, Indexes
- Views, Sequences

**Queries relating to the above concepts using the Employee database.**

An Enterprise wishes to maintain a database to automate its operations. Enterprise is divided into certain departments and each department consists of employees. The following two tables describes the automation schemas.

**Dept (deptno, dname, loc)**
**Emp (empno, ename, job, mgr, hiredate, sal, comm, deptno)**

**Queries**

1. Find out the details of top 3 earners of company.
2. Display those employees who joined the company before15th of the month?
3. Print a list of employees displaying 'less salary' if less than 1500 if exactly1500 display as 'Exact salary' and if greater than1500 display 'more salary'?
4. Update the employee salary by15%, whose experience is greater than 10 years.
5. Delete the employees, who completed 30years of service.
6. Determine the minimum salary of an employee and his details, who joined on the same date.
7. Determine the count of employees, who are taking commission.
8. Create a view to display employee details of SALES department.
9. Determine the employees, who are located at the same place.
10. Determine the department which does not contain any employees.

**COURSE OUTCOMES:**

By the end of the course, Students will be able to:

**CO1**: Execute various SQL commands and operators.

**CO2**: Practice SQL functions, Joins, nested queries and views.

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**PROGRAM NAME: B.Sc (Honours) in Data Science**
**COURSE NAME: Programming in Java**
**Effective from Academic Year 2024-25**
**(60 Hours)**

**COURSE CODE: HDS225** | **PPW: 4**
**YEAR/SEMESTER: I/II** | **NO. OF CREDITS: 4**

**COURSE OBJECTIVE:** To enable students with the concepts of Java Programming and develop GUI applications.

**UNIT-WISE COURSE OBJECTIVES:**

**COb1**: To discuss the features of Java and construct class programs with methods.
**COb2**: To illustrate types of Inheritance, Interfaces, Packages and Arrays concepts.
**COb3**: To explore the concepts of Exception handling, Multithreading and Input/Output.
**COb4**: To learn the concepts of AWT and Swings.

**UNIT-I: Getting started with Java, Java Programming Constructs and Classes and Objects.**

**Getting started with Java:** Java Essentials, JVM, Java Features, Structure of Java Program, Creation and Execution of Programs.
**Java Programming Constructs:** Data Types, Type Casting.
**Classes and Objects:** Principles of Object-Oriented Languages, Classes, Objects, Class Declaration, Creating Objects.
Method Declaration and Invocation, Method Overloading, Constructors – Parameterized Constructors, Constructor Overloading, Cleaning-up unused Objects.
Class Variables &Methods-static Keyword, this Keyword, and Command-Line Arguments.

**UNIT-II: Inheritance, Interfaces, Packages and Arrays.**

**Inheritance:** Introduction, Types of Inheritance, extends Keyword, Examples, Method Overriding, super, final Keyword, Abstract classes.
**Interfaces and Packages:** Interfaces, Abstract Classes Verses Interfaces, Creating and Using Packages, Access Protection.
**Arrays:** One-Dimensional Arrays, Two-Dimensional Arrays, Wrapper Classes, String Class.

**UNIT-III: Exception, Multithreading and Input/output.**

**Exception**: Introduction, Types, Exception Handling Techniques-try, catch, multiple catch, User-Defined Exception.
**Multithreading**: Introduction, Main Thread and Creation of New Threads –By Inheriting the Thread Class, Thread Lifecycle, Thread Priority.
**Input/Output:** Introduction, java.io Package, Reading and Writing Data- Reading/Writing Console User Input, Scanner Class.

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**UNIT-IV: AWT, Event Handling and Swings.**

**AWT:** Introduction, Components, Containers, Button, Label, Checkbox, Radio Buttons, TextField and TextArea.
**Event Handling:** Introduction, Event Delegation Model, Events Classes- ActionEvent, KeyEvent, MouseEvent, MouseWheelEvent. Event Listeners-ActionListener, KeyListener, MouseListener, MouseWheelListener.
**Swings:** Introduction, Differences between Swing and AWT, JFrame, JPanel.

**PRESCRIBED BOOK:**

Sachin Malhotra, Saurabh Choudhary, Programming in Java (2e), Oxford University Press, 2019.

**REFERENCE BOOKS:**

1. Bruce Eckel, Thinking in Java (4e), March 2006.
2. Herbert Schildt, Java: The Complete Reference (9e), June 2014.
3. Y. Daniel Liang, Introduction to Java Programming (10e), January 2014.
4. Paul Deitel, Harvey Deitel, Java: How To Program (10e), February 2014.
5. Cay S. Horsttnann, Core Java Volume I –Fundamentals (10e), December 2015.

**COURSE OUTCOMES:**

At the end of the course students will be able to:

**CO1**: Comprehend the features of Java and construct class programs with methods.
**CO2**: Apply the concepts of Inheritance, Interfaces, Packages and Arrays concepts.
**CO3**: Program the concepts of Exception handling, Multithreading and Input/Output.
**CO4**: Develop GUI programs using AWT and Swings.

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**PROGRAM NAME: B.Sc. (Honours) in Data Science**
**COURSE NAME: Programming in Java Lab**
**Effective from Academic Year 2024-25**

**COURSE CODE: HDS225P** **PPW: 2**
**YEAR/SEMESTER: I/II** **NO. OF CREDITS: 1**

**COURSE OBJECTIVE:** To enable students to apply Object-Oriented Concepts and develop GUI applications.

**COb1**: Learn to program concepts of OOPs, Arrays, Exception handling.
**COb2**: To illustrate the concepts of Multithreading, Input/Output, AWT and Swings.

1. Write a java program to demonstrate nested-if-else ladder.
2. Write a java program to demonstrate while loop.
3. Write a java program to demonstrate do-while loop.
4. Write a java program to demonstrate one-dimensional array.
5. Write a java program to demonstrate two-dimensional array.
6. Write a java program to demonstrate Method overloading.
7. Write a java program to demonstrate types of constructors.
8. Write a java program to demonstrate Method overriding.
9. Write a java program to demonstrate Single Inheritance.
10. Write a java program to demonstrate Multi-Level Inheritance.
11. Write a java program to demonstrate Hierarchical Inheritance.
12. Write a java program for the implementation of multiple inheritance.
    using Interface to calculate the area of a rectangle and triangle.
13. Write a java program to demonstrate of user-defined package creation.
14. Write a java program to demonstrate try and catch in exception handling.
15. Write a program for the following string operations:
    a. Compare two strings b. concatenate two strings c. Compute length of a string.
16. Write a java program to demonstrate Multithreading.
17. Write a java program to demonstrate FileInputStream and FileOutputStream Class.
18. Write a java program to display the following graphics using AWT.
    a. Lines b. Rectangles c. Circles d. Ellipses e. Arcs f. Polygons.
19. Write a java program to demonstrate KeyListener Interface.
20. Write a java program to demonstrate MouseListener Interface.
21. Write a java program to demonstrate Button, Checkbox, TextField in AWT.
22. Write a java program to demonstrate JFrame in Swings.

**COURSE OUTCOMES:**
At the end of the course students will be able to:

**CO1**: Apply OOPs Concepts, Arrays and Exception handling.
**CO2**: Implement Multithreading, Input/Output, AWT and Swings.

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**PROGRAM NAME: B Sc (Honours) Data Science**
**(W.e.f. 2024-25)**
**COURSE NAME: Fundamental of Computers & PC Maintenance**

**COURSE CODE: AECC** **PPW: 2**
**YEAR/SEMESTER: I/II** **NO. OF CREDITS: 2**

**COURSE OBJECTIVE:** To enrich student's knowledge in the field of emerging technologies which play a very major role in the mankind progress and to familiarize the students with concepts of PC Maintenance.

**UNIT-WISE COURSE OBJECTIVES:**

**CObl:** To provide a comprehensive introduction to computers, to know the basics of windows environment and to implement MS Word and MS Power Point Modules

**Cob2:** To examine PC components, features, system design, motherboards functioning, to build a pc and upgraded systems.

**UNIT-I: Introduction to Computers, Windows Environment, Word and Power Point** **15 Hrs.**

**Introduction to Computers:** what is a computer, characteristics of Computers, Generations of Computers, input devices and output devices.

**Introduction to windows environment:** Desktop, Task Bar, Icons, Files and Folders, My Computer and Windows Explorer, My Documents, Recycle Bin, Internet Explorer, Control Panel

**Microsoft word**: Introduction, Word Processing Basics, Opening ,Saving ,Printing and Closing Documents ,Text Creation and Manipulation ,Formatting Text , Insert Pictures , Insert Shapes , Insert Text Box , Table Manipulation , Mail Merge, Headers and Footers.

**Microsoft Power Point**: Introduction – Basics, using PowerPoint, Components of Presentation window Creation of Presentation, Preparation of Slides, Presentation of Slides, Providing Aesthetics, Slide Slow.
(**Prescribed Book1:** Ch-1,2,12,13,15)

**Practicals:**
1. Identify various windows components.
2. Identify browser bare bones (case study: internet explorer).
3. Create a visiting card using MS Word.
4. Create a letter head using MS Word
5. Create a Power Point Presentation with minimum 5 slides for Traffic Rules/various courses in BVC.
6. Create a Power Point Presentation to implement various slide show options with suitable example.

**UNIT-II: PC Components, Features, System Design, Motherboards and Buses, input devices, Building or Upgrading Systems** **15 Hrs.**

**PC Components, Features and System Design:** What is a PC, Who Controls PC Software, Who Controls PC Hardware, PC Design Guides, System Types, and System Components.

**Processor Types:** Microprocessor History, Processor, Processor Socket and Slot Types, Intel Family: Intel P6 (686) Processors, Pentium III, Celeron, Intel Pentium 4 Processors, Pentium 4 Extreme Edition, Intel Core Processors, Others: AMD K6 Processors, AMD K7 Processors, AMD K8 Processors.

**Motherboards and Buses:** Motherboard Form Factors, Chipsets (Intel Chipsets, North/South Bridge Architecture, Fifth-Generation (P5 Pentium Class) Chipsets, Sixth-Generation (P6 Pentium Pro/II/III Class) Chipsets, Seventh/Eighth-Generation (Pentium 4/D, Core 2, and Core i) Chipsets, Third-Party Chipsets for Intel Processors, Chipsets for AMD Processors, Motherboard Connectors, System Bus Types, Types of I/O Buses.

**Input Devices:** Keyboards, Optical Mice, Pointing Device Interface Types, Wireless Input Devices.
**Building or Upgrading Systems:** System Components, System Assembly and Disassembly, Installing the OS, Troubleshooting New Installations.

(**Prescribed Book2:**Ch-2,3,4, 6,19)

**Practicals:**

1. Identifying external ports and interfacing of peripherals (Such as Monitor, Keyboard, Mice, Speakers, Printers, Modem)
2. Identifying PC cards such as memory board, display card, NIC card and Sound Blaster card.
3. Identifying the ports on cards.
4. Disassembling and assembling of PC
5. Loading windows operating system and device drivers
6. Installation of application software

**Prescribed Books:**

1. Fundamentals of Computers by Reema Thareja, Second Edition, Oxford higher Education
2. Scott Mueller –*Upgrading and repairing PCs*–20$^{th}$Edition, QUE (PHI) –2011.

**Reference Books:**

1. V. Rajaraman, 6$^{th}$ Edition Fundamentals of Computers, Neeharika Adabala.
2. Anita Goel, Computer Fundamentals.
3. IBM PC Clones by Govindarajalu, 2$^{nd}$ edition, McGraw-Hill education, 2008.
4. PC Upgrade & Repair Black Book by Ron Gilster.

**COURSE OUTCOMES:**

At the end of the course students will be able to:

**CO1:** To develop a foundational understanding of computers, to acquire knowledge on windows environment and to demonstrate MS office modules using MS Word and MS Power Point.

**CO2:** To recognize and understand the various components of a PC, including system design, motherboards, buses, to understand the process of installation and up-gradation of systems.

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