Fergusson College (Autonomous), Pune

Learning Outcomes-Based Curriculum

for 3/4 years B. Sc. / B. Sc. (Honours) Programme

as per guidelines of

NEP 2.0

for

F. Y. B. Sc. (Computer Science)

With effect from Academic Year

2024-2025

Programme Outcomes for B. Sc. Programme	
PO1	**Disciplinary Knowledge:** Demonstrate comprehensive knowledge of the disciplines that form a part of a graduate programme. Execute strong theoretical and practical understanding generated from the specific graduate programme in the area of work.
PO2	**Critical Thinking and Problem solving:** Exhibit the skills of analysis, inference, interpretation and problem-solving by observing the situation closely and design the solutions.
PO3	**Social competence:** Display the understanding, behavioural skills needed for successful social adaptation, work in groups, exhibits thoughts and ideas effectively in writing and orally.
PO4	**Research-related skills and Scientific temper:** Develop the working knowledge and applications of instrumentation and laboratory techniques. Able to apply skills to design and conduct independent experiments, interpret, establish hypothesis and inquisitiveness towards research.
PO5	**Trans-disciplinary knowledge:** Integrate different disciplines to uplift the domains of cognitive abilities and transcend beyond discipline-specific approaches to address a common problem.
PO6	**Personal and professional competence:** Performing dependently and also collaboratively as a part of team to meet defined objectives and carry out work across interdisciplinary fields. Execute interpersonal relationships, self-motivation and adaptability skills and commit to professional ethics.
PO7	**Effective Citizenship and Ethics:** Demonstrate empathetic social concern and equity centered national development, and ability to act with an informed awareness of moral and ethical issues and commit to professional ethics and responsibility.
PO8	**Environment and Sustainability:** Understand the impact of the scientific solutions in societal and environmental contexts and demonstrate the knowledge of and need for sustainable development.
PO9	**Self-directed and Life-long learning:** Acquire the ability to engage in independent and life-long learning in the broadest context of socio-technological changes.

PSO No.	Program Specific Outcomes (PSOs) Upon completion of this programme the student will be able to
PSO1	**Academic Competence:** (i) Understand various concepts of Computing, Statistics, Mathematics and Electronics appropriately to the discipline. (ii) Recommend computing solutions to solve the problems in different domains
PSO2	**Personal and Professional Competence:** (i) Apply the fundamental knowledge for professional software development as well as to acquire new skills. (ii) Develop strong problem solving, analyzing and decision-making abilities. Identify the information and apply their disciplinary knowledge and professional skills to design components , system or processes to meet required specification
PSO3	**Research Competence:** (i) Apply programming languages, tools and techniques to conduct research and demonstrate appropriate emerging skills to seek solutions to problems in various interdisciplinary fields. (ii) Integrate Computer Science, Electronics, Mathematical and Statistical knowledge to explore different domains' data for experimental and research purpose
PSO4	**Entrepreneurial and Social Competence:** (i) Use the knowledge and skills necessary to support their career in software development, web development, databases and entrepreneurship in recent trends like data analytics, artificial intelligence, Image processing, Networking, Embedded systems etc. (ii) Develop software based solutions for industry as well as research and development and develop skills required for social interaction.

Fergusson College (Autonomous), Pune
NEP 2.0 Subject Credit Distribution Structure 2024-25
Department of Computer Science

FYBSc Sem -I	Theory / Practical	Paper Code	Paper Title	Credits	Exam type
Discipline Specific Core, DSC	Theory	CSC-1001	Basic Programming using C	2	CE + ESE
Discipline Specific Core, DSC	Practical	CSC-1011	Computer Science Practical -1	2	CE + ESE
Open Elective-1 (For other faculty)	Theory	CSC-1021	IT Literacy	2	Only CE
(Minor)	Theory	MTS-1081	Foundation of Mathematics	2	CE + ESE
(Minor – Practical)	Practical	MTS-1091	Mathematics Practical -1	2	CE + ESE
OR					
(Minor)	Theory	ELS-1081	Basic Digital Electronics	2	CE + ESE
(Minor – Practical)	Practical	ELS-1091	Electronics Practical -1	2	CE + ESE
OR					
(Minor)	Theory	STS-1081	Fundamentals of Statistics	2	CE + ESE
(Minor – Practical)	Practical	STS-1091	Statistics Practical - 1	2	CE + ESE

FYBSc Sem -II	Theory / Practical	Paper Code	Paper Title	Credits	Exam type
Discipline Specific Core, DSC-3	Theory	CSC -1002	Advance Programming using C	2	CE + ESE
Discipline Specific Core, DSC-4	Practical	CSC -1012	Computer Science Practical -2	2	CE + ESE
Open Elective-2 (For other faculty)	Theory	CSC -1022	Handling Data with Excel	2	Only CE
Skill Enhancement Course, SEC-1	Theory/ Practical	CSC -1032	Basics of Web Technologies	2	Only CE
(Minor- Theory)	Theory	MTS-1082	Graph Theory	2	CE + ESE
(Minor – Practical)	Practical	MTS-1092	Mathematics Practical -2	2	CE + ESE
OR					
(Minor)	Theory	ELS-1082	Sequential Logic circuits	2	CE + ESE
(Minor – Practical)	Practical	ELS-1092	Electronics Practical -2	2	CE + ESE
OR					
(Minor)	Theory	STS-1082	Introduction to Probability and Statistics	2	CE + ESE
(Minor – Practical)	Practical	STS-1092	Statistics Practical - 2	2	CE + ESE

**** OE – Open Elective, SEC- Skill Enhancement Course***

Teaching and Evaluation (Only for FORMAL education courses)

Course Credits	No. of Hours per Semester Theory/Practical	No. of Hours per Week Theory/Practical	Maximum Marks	CE 40 %	ESE 60%
1	15 / 30	1 / 2	25	10	15
2	30 / 60	2 / 4	50	20	30
3	45 / 90	3 / 6	75	30	45
4	60 / 120	4 / 8	100	40	60

Fergusson College (Autonomous), Pune
NEP 2.0 Paper Weightage Distribution 2024-25
Department of Computer Science

Class: F. Y. B. Sc. Sem. I

Paper Code: CSC- 1001 **Paper Title**: Basic Programming using C **Number of Credits:** 2

Sr. No.	Course Outcome	Blooms Taxonomy level	Weightage in %
1	CO-1: Identify and define appropriate solutions to problems in the field of computer science and other related disciplinary areas.	Remember	30%
2	CO-2: Illustrate the solutions to the problems in the form of simple algorithms and flowcharts.	Understand	20%
3	CO-3: Apply various computer programming language concepts and strategies to write and execute efficient and structured computer programs	Apply	20%
4	CO-4: Analyze and compile the programs to detect any errors, debug and correct the programs	Analyze	10%
5	CO-5: Test and perform critical evaluation of the program outcome to validate the program logic	Evaluate	10%
6	CO-6: Integrate the concepts of control structures, functions and arrays to create more complex programming solutions.	Create	10%

	Title and contents	CO	Weightage % (No. of Hours)
Unit-1	**Introduction to Programming Languages** 1.1 Computer Software and Classification 1.2 Computer Languages: Machine Language, Assembly Language, High-Level Language 1.3 Compiler and Interpreter	CO1	7% (2 Hrs)
Unit-2	**Problem Solving Principles** 2.1What is Problem Solving? 2.2 Problem solving using computer 2.3 Algorithm 2.4 Flowchart	CO1, CO2, CO3	7% (2 Hrs)
Unit-3	**Overview of C** 3.1 History of C 3.2 Features of C 3.3 Structure of a C Program 3.4 C Program Development Lifecycle	CO1, CO2,	7% (2 Hrs)

	3.5 First C Program 3.6 Applications of C		
Unit-4	**Fundamentals of C** 4.1 Character Set in C 4.2 C Tokens 4.3 Keywords, Identifiers, Variables 4.4 Constants: Integer, Character, Float 4.5 Datatypes 4.6 Operators, Precedence and Associativity of Operators 4.7 Input and Output operations 4.8 Escape Sequences	CO1, CO2, CO3	20% (6 Hrs)
Unit-5	**Decision Making: Branching and Looping** 5.1 Introduction to Decision Making 5.2 Branching Statements 5.3 Simple if statement a. if..else statement b. nested if..else c. else..if ladder d. switch-case 5.4 Conditional operator 5.5 Looping Statements 5.6 while statement 5.7 do..while statement 5.8 for loop 5.9 Nested loops 5.10 Jump Statements: break, continue, goto, exit()	CO2, CO3, CO5	23% (7 Hrs)
Unit-6	**Functions** 6.1 What is function? 6.2 Advantages of functions 6.3 Standard Library Functions 6.4 User-defined functions: Declaration, Definition, Function call, parameter Passing 6.5 return statement 6.6 Scope of variables 6.7 Storage Classes 6.8 Recursion	CO2, CO3, CO4, CO6	23% (7 Hrs)
Unit-7	**Arrays** 7.1 What is an array? 7.2 Types of array: One Dimensional, Two-Dimensional, Multi-Dimensional 7.3 Array declaration, initialization, accessing array elements 7.4 Passing array to function	CO2, CO3, CO4, CO5, CO6	13% (4 Hrs)

Resources:

1. Behrouz A. Forouzan and Richard F. Gilberg: Computer Science: A Structured Programming Approach using C Third Edition, Thomson Course Technology publication
2. Brian W. Kernighan and Dennis M. Ritchie: The C Programming Language, Second Edition, Prentice Hall Publication
3. Byron S Gottfried, Schaum's Outlines Programming with C, Second Edition, Tata McGraw Hill
4. Yashavant Kanetkar: Let Us C, Seventh Edition, PBP Publications
5. E Balagurusamy: Programming in ANSI C, Fourth Edition, TMH

Class: F. Y. B. Sc. Sem. I

Paper Code: CSC- 1011 **Paper Title:** Computer Science Practical -1 **Number of Credits**: 2

Sr. No.	Course Outcome	Bloom's Taxonomy level	Weightage in %
1	CO-1: Define algorithms and flowcharts for given problems in C programming.	Remember	10%
2	CO-2: Illustrate the use of simple data types, operators and	Understand	20%
3	CO-3: Implement various control structures and standard library functions.	Apply	20%
4	CO-4: Divide the programs into separate modules by writing user defined functions.	Analyze	20%
5	CO-5: Evaluate the programs to test and validate the output	Evaluate	10%
6	CO-6: Design and write programs to implement the concepts of functions, arrays in C programming.	Create	20%

Sr. No.	Title of Experiment / Practical
1.	Using basic Linux commands and vi Editor
2.	Defining algorithms and flowcharts for a given problem statements
3.	Use of data types, simple operators
4.	Decision making statements (if-else and switch case)
5.	Use of loops
6.	Use of Nested Loops
7.	Menu driven programs using Standard Library Functions
8.	Use of User Defined Functions
9.	Recursive functions
10.	Use of 1D Arrays
11.	Use of 2D Arrays
12.	Case Study

Class: F. Y. B. Sc. Sem. I

Paper Code: CSC- 1021 **Paper Title**: IT Literacy **Number of Credits**: 2

Sr. No.	Course Outcome	Bloom's Taxonomy level	Weightage in %
1	CO-1: State the characteristics of a computer and identify the components of the computer system.	Remember	30%
2	CO-2: Understand various office tools and strategies to execute efficient and structured office work.	Understand	20%
3	CO-3: Classify types of computer software, computer generations.	Apply	10%
4	CO4: Explain about internet and email management.	Analyze	10%
5	CO-5: Select and use the appropriate software application to complete a particular task such as a word Processing skills.	Evaluate	20%
6	CO-6: Develop the strong ability and execute the collaborative work using google drive.	Create	10%

	Title and contents	CO	Weightage in % & no. of Hours
Unit-1	**Computer Basics** 1.1 Introduction to computer 1.2 Characteristics of computer 1.3 Computer generations 1.4 Basic operation of computer 1.5 Block diagram of Computer 1.6 Computer software	CO1, CO2, CO3	15% (4 Hrs.)
Unit-2	**Office tools** 2.1 Introduction 2.2 Objective 2.3 Word Processing Basics 2.4 Opening Word Processing Package 2.5 Title Bar, Menu Bar, Toolbars & Sidebar 2.6 Creating a New Document 2.7 Opening and Closing Documents 2.8 Save and Save As, Print Document 2.9 Using The Help 2.10 Page Setup, Print Preview, Printing of Documents, PDF file and Saving a Document as PDF file 2.11 Document manipulation & Formatting, Text Selection, Cut, Copy and Paste, Font, Color, Style and Size selection, Alignment of Text, Undo & Redo, Spelling	CO1, CO2, CO3, CO4	25% (8 Hrs.)

	& Grammar, Shortcut Keys		
Unit-3	**Basics of Internet** 3.1 Introduction, Objectives 3.2 Internet & WWW 3.3 Website Address and URL 3.4 Applications of Internet 3.5 Modes of Connecting Internet (Hotspot, Wi-Fi, LAN Cable, Broadband, USB Tethering) 3.6 Popular Web Browsers (Internet Explorer/Edge, Chrome, Mozilla Firefox etc) 3.7 Exploring the Internet	CO3, CO4, CO5	20% (6 Hrs.)
Unit-4	**e-mail** 4.1 Introduction to Gmail Window 4.2 How to add contacts (E-Mail)/Edit contacts? 4.3 Details of Compose dialog box fields- To, CC, BCC, Subject etc., Compose an e-mail, add attachment and add signature, how to add more than one recipients at a time (from excel file) and Comma Separated list(notepad) 4.4 e-mail Formatting 4.5 How to send Reply/Forward the mail 4.6 e-mail Settings: download (set directory/drive other than C drive), signature etc. Inbox: all options 4.7 Managing E-mail	CO4, CO5	20% (6 Hrs.)
Unit-5	**Collaborative work using Drive** 5.1 Folder (Creating new Folder) 5.2 File Upload, Folder Upload, Creating, sharing and collaborative working with : Google Sheet and Google Doc, Google Form	CO5, CO6	20% (6 Hrs.)

Resources:

1. P.K. Sinha, "Computer Fundamentals" , BPB publications, 8th Edition
2. MICROSOFT WORD & POWERPOINT FOR BEGINNERS & POWER USERS 2021: The Concise Microsoft Word & PowerPoint A-Z Mastery Guide for All Users Paperback – May 11, 2021by Tech Demystified (Author)

e- Resources:

1. https://support.microsoft.com/
2. http://nptel.ac.in
3. https://swayam.gov.in

Class: F. Y. B. Sc. Sem. I

Paper Code: MTS-1081 **Paper Title**: Foundation of Mathematics **Number of Credits:** 2

Sr NO.	Course Outcome	Bloom Taxonomy level	Weightage in %
1	CO1: Describe the fundamentals of logic and operands.	Remember	10%
2	CO2: Discuss concepts of relation and functions.	Understand	10%
3	CO3: Apply the counting principle on real life situations.	Apply	10%
4	CO4: Explain different methods of mathematical proofs by using logical reasoning	Analyze	20%
5	CO5: Determine the solutions of recurrence relations.	Evaluate	20%
6	CO6: Integrate basic concepts of logic, Recurrence and counting principles.	Create	30%

Unit No.	Title of Unit and Contents	CO	Weightage/ No. of Hour
Unit-1	**Statements and Logic** 1.1 Statements 1.2 Statements with quantifiers 1.3 Compound Statements 1.4 Implications 1.5 Proofs in Mathematics	CO1, CO2	15% (5 Hrs)
Unit-2	**Sets, Relations and Functions** 2.1 Sets, Operations on Sets, Power Set, Cartesian product of Sets, Graphical representation of sets 2.2 Relations, types of Relations. 2.3 Equivalence relations. 2.4 Partition of a set and equivalence classes. 2.5 Digraphs of relations, matrix representation and composition of Relations. 2.6 Transitive closure and Warshall's Algorithm. 2.7 Types of functions (One – One, Onto, Bijective).	CO2, CO3, CO5	35% (10 Hrs)
Unit-3	**Counting Principles** 3.1 Cardinality of a finite set. 3.2 The Sum Rule, the Product Rule, the Inclusion-Exclusion principle.	CO3, CO4	15% (5 Hrs)

	3.3 Statement of Pigeonhole Principle, Its Applications.		
Unit-4	**Recurrence Relation** 4.1 Introduction to Recurrence Relations, Formation. 4.2 Linear Recurrence Relations with constant coefficients. 4.3 Homogeneous Solutions. 4.4 Particular Solutions. 4.5 Total Solutions.	CO5, CO6	35% (10 Hrs)

Resources:

1. Kenneth Rosen, 'Discrete Mathematics and its applications', Seventh Edition by Tata McGraw Hill.
2. Kolman, Busby, Ross, Rehman, 'Discrete Mathematical Structures', Sixth edition, by Prentice Hall.
3. C. L. Liu, 'Elements of Discrete Mathematics', Fourth edition, by Tata McGraw Hill.

Class: F. Y. B. Sc. Sem. I

Paper Code: MTS- 1091 **Paper Title:** Mathematics Practical- 1 **Number of Credits:** 2

Sr No.	Course Outcome	Bloom Taxonomy level	Weightage in %
1	CO1: Identify basic commands of scilab	Remember	10%
2	CO2 : Illustrate plotting of 2D and 3D graphs using scilab	Understand	20%
3	CO3: Implement the fundamentals of logic and operands.	Apply	30%
4	CO4: Analyze Uniqueness and existence of solutions of linear equations using scilab.	Analyze	20%
5	CO5: Evaluate and validate different methods of Numerical techniques using scilab.	Evaluate	10%
6	CO6: Apply concepts of Discrete mathematics in various fields.	Create	10%

Unit No.	Title of Unit and Contents
1	Scilab- I(Data types, Special matrices, Operations on Matrices, Solving system of L.E.)
2	Scilab – II (Defining polynomials, plotting of 2-D and 3-D graphs))
3	Introduction to Scilab programming-I (if , while, for loop)
4	Basic Scilab programming-II
5	Regula Falsi method to find root of a function f(x) = 0 using Scilab.
6	Newton Raphson method to find the root of a function f(x) = 0 using Scilab.
7	Trapezoidal rule to find Integration (using Scilab)
8	Simpson's 1/3 rd rule to find Integration (using Scilab)
9	Simpson's 3/8 th rule to find Integration (using Scilab)
10	Statements and Logic
11	Sets, Relations and Functions
12	Counting Principles
13	Recurrence Relation
14	Student Activity - I
15	Student Activity - II

Class: F. Y. B. Sc. Sem. I

Paper Code: ELS -1081 **Paper Title:** Basic Digital Electronics **Number of Credits**: 2

Sr No.	Course Outcomes (COs)	Bloom's cognitive level	Weightage in %
1	CO1: Identify logic gates with symbols and truth tables.	Remember	20%
2	CO2 :State De Morgan's theorems and laws of Boolean Algebra	Remember	10%
3	CO3: Discuss circuit diagram and working of different logic circuits.	Understand	30%
4	CO4: Use the various rules and laws of Boolean Algebra for designing digital circuits.	Apply	20%
5	CO5: Modify (simplify) digital circuits using K-map.	Apply	10%
6	CO6: Differentiate basic digital circuits.	Understand	10%

Unit No.	Unit title and Contents	CO	Weightage % (No. of Hours)
Unit-1	**Logic gates** Introduction to analog signals and digital signals, Positive and Negative logic, Logic gates: definition, symbols, truth tables, Boolean expressions, pulsed operation of NOT, OR, AND, NAND, NOR, EX-OR, EX-NOR gates	CO1	10% (3 Hrs.)
Unit-2	**Number system and codes** Decimal, binary, octal, hexadecimal number systems, Conversion of numbers from one number system to another including decimal / binary points, Binary addition, subtraction, multiplication, division, 1's and 2's complement method of subtraction BCD code numbers and their limitations, gray code, ASCII code	CO2	27% (8 Hrs.)
Unit-3	**Boolean Algebra** Rules and laws of Boolean algebra, logic expression, De Morgan's theorems, their proof, Sum of products form (min. terms), Product of sum form (max. terms), Simplification of Boolean expressions using Boolean algebra and Karnaugh map upto 4 variables.	CO2, CO4, CO5	27% (8 Hrs.)

Unit-4	**Arithmetic and logical circuits** Half adder, Full adder circuit and its operation, Parallel binary adder, Half Subtractor, and full Subtractor	CO3	13% (4 Hrs.)
Unit-5	**Combinational Circuits** Multiplexer(2:1 and 4:1), De-multiplexer (1:2 and 1:4), Encoder, Priority encoder, Decoder, BCD to seven segment decoder	CO3, CO6	23% (7 Hrs.)

Resources:

1. Digital Principles and Applications: Malvino Leach, Tata McGraw-Hill.
2. Modern Digital Electronics: Jain R.P., Tata McGraw Hill
3. Digital System Design, Morris Mano, Pearson Education (2014)
4. Digital Computer Electronics, Malvino
5. Digital Principals, Schaum's outline series, Tata McGraw Hill (2006)
6. Fundamentals of Logic Design, Charles H. Roth, Jr. and Larry L. Kinney
7. Digital Fundamentals: Floyd T.M., Jain R.P., Pearson Education

Class: F. Y. B. Sc. Sem. I

Paper Code: ELS-1091 **Paper Title**: Electronics Practical-1 **Number of Credits:** 2

Sr. No	Course Outcomes (COs)	Bloom's cognitive level	Weightage in %
1	CO1: Recall the circuit diagrams using different symbols of logic gates	Remember	30%
2	CO2: Discuss the working of circuits used in experiments.	Understand	30%
3	CO3: Carry out the experiment to achieve the given objectives.	Apply	20%
4	CO4: Analyze observations of each experiment.	Analyze	10%
5	CO5: Validate observed outputs with expected theoretical outputs.	Evaluate	10%

Any 10 Experiments

Sr. No.	Title of Experiment / Practical
1	Study of logic gates
2	Binary to gray code and gray to binary code conversion
3	Verification of De-Morgan's Theorems
4	Interconversion of logic gates using NAND gate
5	Interconversion of logic gates using NOR gate
6	Study of Half adder and full adder
7	Study of Half Subtractor and full Subtractor
8	Study of multiplexer and demultiplexer
9	Simplification of Boolean expressions using Boolean algebra and Karnaugh map and its implementation using logic gates
10	4-bit Parallel Adder
11	BCD to seven segment decoder
12	Study of priority encoder IC 74148
13	Construction of 1- bit comparator
14	Implementation of Boolean Functions using Multiplexer
15	Octal to binary Encoder

Or Any Other Equivalent Experiment

Class: F. Y. B. Sc. Sem. I

Paper Code: STS -1081 **Paper Title:** Fundamental of Statistics **Number of Credits:** 2

Sr. No	Course Outcomes (COs)	Bloom's cognitive level	Weightage in %
1	CO1: Describe basic features of the data.	Remember	10%
2	CO2: Help make informed judgments based on a pattern of data observed previously.	Understand	10%
3	CO3: Find chance of an event based on prior knowledge of conditions that might be related to the event.	Apply	10%
4	CO4: Provide brief summary about the sample using different graphs.	Analyze	20%
5	CO5: Enhance the computational techniques related to probability.	Evaluate	30%
6	CO6: Develop analytical thinking by using the ability to see a problem or solution from different points of view.	Create	20%

	Title and Contents	CO	Weightage % (No. of Hours)
Unit-1	**Data condensation and Graphical methods:** 1.1 Raw data, attributes and variables, discrete and continuous variables. 1.2 Presentation of data using frequency distribution and cumulative frequency distribution. (Construction of frequency distribution is not expected) 1.3 Graphical Presentation of frequency distribution –histogram, stem and leaf chart, less than and more than type ogive curves. 1.4 Numerical problems related to real life situations.	CO1, CO2, CO5	20% (6 Hrs)
Unit-2	**Measures of central tendency and dispersion:** 2.1 Measures of Central tendency: Mean, Mode, Median. Examples where each one of these is most appropriate. 2.2 Partition values: Quartiles, Box-Plot. 2.3 Variance, Standard Deviation, Coefficient of Variation. (Section 2.1 to 2.3 should be covered for raw data, ungrouped frequency distribution and exclusive type grouped frequency	CO2, CO3, CO6	34% (10 Hrs.)

	distribution)		
Unit-3	**Counting Principles, Sample spaces and Events:** 3.1 Counting Principles 3.2 Permutation 3.3 Combination. 3.4 Deterministic and non-deterministic models. 3.5 Random Experiment, Sample Spaces (finite and countably infinite) 3.6 Events: types of events, Operations on events.	CO1, CO2	13% (4Hrs)
Unit-4	**Basic Theory of Probability:** 4.1 Probability - classical definition, probability models, axioms of probability, probability of an event. 4.2 Theorems of probability (with proof) i) $0 \leq P(A) \leq 1$ ii) $P(A) + P(A') = 1$ iii) $P(A) \leq P(B)$ when $A \subset B$ iv) $P(A \cup B) = P(A) + P(B) - P(A \cap B)$ 4.3 Numerical problems related to real life situations.	CO4, CO5, CO6	33% (10 Hrs)

Resources:

1. Statistical Methods, G.W. Snedecor, W.G. Cochran, John Wiley & sons, 1989.
2. Fundamentals of Applied Statistics (4th Edition), Gupta and Kapoor, S. Chand and Sons, New Delhi, 2014.
3. Modern Elementary Statistics, Freund J.E., Pearson Publication, 2005.
4. A First course in Probability 6th Edition, Ross, Pearson Publication, 2006.

Class: F. Y. B. Sc. Sem. I

Paper Code: STS -1091 **Paper Title:** Statistics Practical - 1 **Number of Credits**: 2

Sr. No	Course Outcomes (COs)	Bloom's cognitive level	Weightage in %
1	CO1: Articulate the data, its types and summarize information in the data using different measures.	Remember	10%
2	CO2: Create different frequency distributions for real life data	Understand	20%
3	CO3: Articulate sample space for a certain random experiment and identify events and their types.	Apply	10%
4	CO4: Illustrate different real life situations to find probability of different types of events, the theorems of probability.	Analyze	10%
5	CO5: Understand the R environment for downloading, installing, and using packages, debug, organize, and comment R code	Evaluate	20%
6	CO6: Identify the methods and procedures of summarizing information by using summary statistics such as measures of central tendency, dispersion, skewness kurtosis using R	Create	30%

Sr. No.	Title of Experiment/ Practical
1	Diagrammatic Representation
2	Methods of Classification (Inclusive and Exclusive) and construction of frequency distributions
3	Introduction to R
4	Graphical methods using R
5	Measures of Central Tendency
6	Measures of Dispersion
7	Measure of Central Tendency and Dispersion using R
8	Counting Principles
9	Permutation and Combination
10	Sample spaces and events
11	Basic probability theory I
12	Basic probability theory II
13,14&15	Applications of statistical techniques to real life data.

Fergusson College (Autonomous), Pune

Learning Outcomes-Based Curriculum

for 3/4 years B. Sc. /B. Sc. (Honours) Programme

as per guidelines of

NEP 2.0

for

F.Y B. Sc. (Computer Science)
SEMESTER II

With effect from Academic Year

2024-2025

Class: F. Y. B. Sc. Sem. II

Paper Code: CSC-1002 **Paper Title**: Advance Programming using C **Number of Credits**: 2

Sr. No.	Course Outcome	Bloom's Taxonomy level	Weightage in % (For Example)
1	CO-1: Define the basic concepts of C Programming to design more complex programs for solving problems.	Remember	20%
2	CO-2: Illustrate efficient memory handling techniques in programs with the concepts of pointers and dynamic memory management.	Understand	20%
3	CO-3: Implement various string and file handling functions.	Apply	20%
4	CO-4: Identify and organize data in structures and files to develop small applications.	Analyze	20%
5	CO-5 Test and validate the data stored in the structures and files and perform various operations on it.	Evaluate	10%
6	CO-6: Design simple data processing applications for real-world problems. Develop the concepts for advanced programming like data structures and Object Oriented Programming.	Create	10%

	Title and contents	CO	Weightage
Unit-1	**Pointers** 1.1 Pointer declaration, initialization, Dereferencing pointers, Pointer arithmetic 1.2 Pointer to pointer, Arrays and pointers, Array of Pointers 1.3 Functions and pointers – passing pointers to functions, function returning pointers 1.4 Dynamic memory allocation	CO1, CO2,	27% (8 Hrs.)
Unit-2	**Strings** 2.1 Declaration and initialization 2.2 String input/output, format specifiers 2.3 Standard library functions 2.4 Strings and pointers, Array of strings 2.5 Command Line Arguments	CO2,CO3, CO4, CO5	23% (7 Hrs.)
Unit-3	**C Preprocessor** 3.1 Introduction of Preprocessor directive	CO1,	7% (2 Hrs.)

	3.2 File Inclusion directive 3.3 Macro substitution, nested macro, macro with arguments 3.4 Difference between functions and macros	CO2, CO3	
Unit-4	**Structures and Unions** 4.1 Creating structures, Structure declaration and initialization, 4.2 Accessing structure members (dot Operator) 4.3 Array of structures 4.4 Passing structures to functions 4.5 Nested structures 4.6 Pointers and structures 4.7 Self-referential structure 4.8 Unions: Declaration, Initialization and accessing 4.9 Difference between structures and unions 4.10 typedef	CO3, CO4, CO5, CO6	30% (9 Hrs.)
Unit-5	**File Handling** 5.1 Introduction – streams, types of files 5.2 Modes of file opening 5.3 Operations on files 5.4 Random access to files	CO3, CO4, CO5, CO6	13% (4 Hrs.)

Resources:

1. Behrouz A. Forouzan and Richard F. Gilberg: Computer Science: A Structured Programming Approach using C Third Edition, Thomson Course Technology publication
2. Brian W. Kernighan and Dennis M. Ritchie: The C Programming Language, Second Edition, Prentice Hall Publication
3. Byron S Gottfried, Schaum's Outlines Programming With C, Second Edition, Tata McGraw Hill
4. Yashavant Kanetkar: Let Us C, Seventh Edition, PBP Publications
5. E Balagurusamy: Programming in ANSI C, Fourth Edition, TMH

Class: F. Y. B. Sc. Sem. II

Paper Code: CSC -1012 **Paper Title:** Computer Science Practical -2 **Number of Credits**: 2

Sr. No.	Course Outcome	Bloom's Taxonomy level	Weightage in %
1	CO-1: Identify the concepts of programming in C language using pointers, strings	Remember	10%
2	CO-2: Illustrate the use of advanced concepts of C programming using Structure, Command Line Arguments	Understand	20%
3	CO-3: Execute the dynamic memory management techniques using the concept of pointers, string handling functions and structures in C Programming	Apply	20%
4	CO-4: Analyze and use pointers, structures, file handling in C programming	Analyze	20%
5	CO-5: Test and validate the outputs of the C programs	Evaluate	10%
6	CO-6: Develop programs to design applications using advanced concepts of C programming	Create	20%

Sr. No.	Title of Experiment / Practical
1.	Use of pointers
2.	Use of pointers in functions
3.	Standard Library Functions in Strings
4.	Concept of strings, array of strings and String operations using pointers
5.	Use of Command line arguments
6.	Use of preprocessor directives
7.	Structures using array, pointer and functions
8.	Nested Structures and Union using array, pointer and functions
9.	File handling
10.	Debugging Tool: GDB
11.	Case Study-I
12.	Case Study-II

Class: F. Y. B. Sc. Sem. II

Paper Code: CSC -1022 **Paper Title:** Handling Data with Excel **Number of Credits**: 2

Sr. No.	Course Outcome	Bloom's Taxonomy level	Weightage in %
1	CO1:Understand and remember basic principles of data	Remember	10%
2	CO2 :Build various graphs in Excel	Understand	20%
3	CO3 :Apply analysis techniques to datasheets in Excel	Apply	20%
4	CO4 :Analyze Excel functions and techniques for data analysis	Analyze	20%
5	CO5 :Test filters and learn how to use Charts to streamline workflow in Excel	Evaluate	20%
6	CO6 :Integrate different features of excel to create effective design principles and present data	Create	10%

	Title and contents	CO	Weightage
I	**Introduction to Excel**: 1.1 About Microsoft Excel 1.2 Uses of Excel, Excel software 1.3 Spreadsheet window pane, Title Bar, Menu Bar, Standard Toolbar, Formatting Toolbar 1.4 The Ribbon, File Tab and Backstage View, Formula Bar, Workbook Window, Status Bar, Task Pane, Workbook & sheet	CO1, CO2	5% (2 Hrs.)
II	**Basic Spreadsheet Handling:** 2.1 Selecting Columns & Rows 2.2 Changing Column Width & Row Height 2.3 Autofitting Columns & Rows, Hiding/Unhiding Columns & Rows 2.4 Inserting & Deleting Columns & Rows, Cell, Address of a cell, Components of a cell – Format, value, formula 2.5 Use of paste and paste special	CO1, CO2, CO3	5% (2 Hrs.)
III	**Functions in Excel:** 3.1 Text Functions 3.2 Date time Functions 3.3 Logical Functions 3.4 Advanced paste special techniques 3.5 Using Ranges, Selecting Ranges, Entering Information Into a Range 3.6 Using AutoFill	CO1, CO2, CO3, CO4	10% (3 Hrs.)
IV	**Creating Basic and Advanced Formulas:** 4.1 Using Formulas 4.2 Formula Functions – Sum, Average, if, Count, max, min,	CO4, CO5	10% (5 Hrs.)

	Proper, Upper, Lower 4.3 Using AutoSum, Concatenate 4.4 Vlookup, Hlookup 4.5 Match, Countif, Text, Trim		
V	**Spreadsheet Charts:** 5.1 Creating Charts 5.2 Different types of chart 5.3 Formatting Chart Objects 5.4 Changing the Chart Type 5.5 Showing and Hiding the Legend 5.6 Showing and Hiding the Data Table	CO4, CO5, CO6	15% (5 Hrs.)
VI	**Data Analysis:** 6.1 Sorting 6.2 Filter 6.3 Text to Column 6.4 Data Validation	CO5, CO6	15% (3 Hrs.)
VII	**PivotTables:** 7.1 Creating PivotTables 7.2 Manipulating a PivotTable 7.3 Using the PivotTable Toolbar 7.4 Changing Data Field 7.5 Properties 7.6 Displaying a PivotChart 7.7 Setting PivotTable Options 7.8 Adding Subtotals to PivotTables	CO5, CO6	25% (5 Hrs.)
VII I	**Spreadsheet Tools:** 8.1 Moving between Spreadsheets 8.2 Selecting Multiple Spreadsheets 8.3 Inserting and Deleting Spreadsheets Renaming Spreadsheets 8.4 Splitting the Screen, Freezing Panes 8.5 Copying and Pasting Data between Spreadsheets 8.6 Hiding, Protecting worksheets	CO5,CO6	10% (3 Hrs.)
IX	**Making Macros:** 9.1 Recording Macros 9.2 Running Macros 9.3 Deleting Macros	CO6	5% (2 Hrs.)

Learning Resources:

1. https://www.simplilearn.com/tutorials/excel-tutorial/data-analysis-excel
2. https://www.futurelearn.com/courses/a-beginners-guide-to-data-handling-and-management-in-excel
3. https://support.microsoft.com/en-us/office/analyze-data-in-excel
4. https://www.analyticsvidhya.com/blog/2021/11/a-comprehensive-guide-on-microsoft-excel-for-data-analysis/

Class: F. Y. B. Sc. Sem. II

Paper Code: CSC -1032 **Paper Title:** Basics of Web Technologies **Number of Credits**: 2

Students will acquire the following skills on completion of the course:

1.	Implement website related terminologies and web page related terms.
2.	Develop Front-end coding using HTML and CSS.
3.	Create the web page with layout, colors, font, and styles to make more attractive websites.
4.	Implement web designer skills.
5.	Apply the skills of User Interface designs.
6.	Apply the process of planning and building web-based platforms.
7.	Designing the website as a web developer.
8.	Develop the creativity while designing web pages.
9.	Implement the knowledge of how to link different web pages more efficiently.
10.	Implement web-page navigation.

Sr. No.	Course Outcome	Bloom's Taxonomy level	Weightage in %
1	CO1:Understand and remember web technology and different keywords used in web development	Remember	30%
2	CO2 :Build various web pages using HTML	Understand	40%
3	CO3 :Apply CSS for web page development	Apply	30%

	Title and contents	CO	Weightage
I	**Overview:** 1.1 Introduction to web technology. What is Web Development? 1.2 Introduction to Web server, Web browser, Web Protocols (HTTP, TCP/IP, UDP, FTP, SMTP, SOAP) 1.3 Web development: Frontend, backend 1.4 Front End Frameworks and Libraries: HTML, CSS, JavaScript 1.5 Back End Frameworks and Technology: PHP, Node JS,	CO1, CO2, CO3	30% (3 Hrs.)

	Python, Ruby, Java, DBMS		
II	**Introduction to HTML:** 2.1 HTML features 2.2 HTML Structure 2.3 HTML Tags 2.4 Commenting Codes 2.5 Formatting and Fonts 2.6 Anchors, Hyperlinks 2.7 Backgrounds 2.8 HTML Lists, Tables, Frames 2.9 HTML Forms 2.10 HTML Graphics 2.11 HTML SVG-Basics 2.12 HTML Canvas Basics	CO1, CO2, CO3	40% (15 Hrs.)
III	**Introduction to CSS:** 3.1 Need for CSS 3.2 Introduction to CSS 3.3 Basic Syntax and structure 3.4 Inline styles 3.5 Embedding Style sheets 3.6 Linking External Style 3.7 Background Styles 3.8 Manipulating Text 3.9 Margins and Padding 3.10 Positioning using CSS	CO1, CO2, CO3	30% (12 Hrs.)

Learning Resources:

1. DT Editorial Services, "HTML 5 Black Book", Dreamtech Press, 2010.
2. Kogent Learning Solutions Inc.,"Web Technologies, Black Book", Dreamtech Press,2009
3. P.J. Deitel & H.M. Deitel, "Internet & World Wide Web How to Program (4th Edition)", Pearson –Prentice Hall, 2000

Proposed Evaluation Methods:

1. Case study (Study of websites /web applications from the design point of view)
2. Simple web site designs (Subject to availability of labs and machines)
3. Presentation
4. Seminar

Class: F. Y. B. Sc. Sem. II

Paper Code: MTS- 1082 **Paper Title:** Graph Theory **Number of Credits:** 2

Sr No.	Course Outcome	Bloom's Taxonomy Level	Weightage in %
1	Define and explain the basic concepts of graphs, including vertices, edges, degree, paths, and cycles.	Remember	10%
2	Identify the different graphs based on their properties.	Understand	10%
3	Demonstrate proficiency in representing graphs using various methods, including adjacency matrix, adjacency list, and incidence matrix.	Apply	10%
4	Understand and apply algorithms related to tree traversal, such as in-order, pre-order, and post-order traversal.	Analyze	20%
5	Evaluate properties of graphs, including Eulerian and Hamiltonian paths/cycles, using different algorithms.	Evaluate	30%
6	Apply graph theory concepts to solve real-world problems such as network design, transportation planning, and social network analysis.	Create	30%

Unit No.	Title of Unit and Contents	CO	Weightage in % (No. of Hours)
I	**Introduction to Graphs and Operations on Graphs** 1.1 Definition and examples of graph, degree of a vertex, Hand shaking lemma and its corollaries. 1.2 Types of graphs: Simple graph, Complete graph, bipartite graph, Regular graph, Null graph. 1.3 Isomorphism of graphs. 1.4 Adjacency and Incidence Matrix of a Graph. 1.5 Vertex induced subgraph, Edge induced subgraph, Vertex deleted subgraph, Edge deleted subgraph. 1.6 Union of two graphs, Intersection of two graphs, Product of two graphs, Ring Sum of two graphs. 1.7 Fusion of vertices, Complement of a graph.	CO1, CO2	20% 4 Hrs
II	**Connected Graphs** 2.1 Walk, Trail, Path, Cycle: Definitions and elementary properties. 2.2 Connected Graphs: definition and properties. 2.3 Distance between two vertices, eccentricity, centre, radius and diameter of a graph. 2.4 Isthmus, Cut vertex : Definition and properties. 2.5 Cutset, edge connectivity, vertex connectivity. 2.6 Weighted Graph and Dijkstra's Algorithm.	CO2, CO3	30% 8 Hrs

III	**Eulerian and Hamiltonian Graphs** 3.1 Seven Bridge Problem, Eulerian Graph: Definition and Examples. Necessary and Sufficient condition. 3.2 Fleury's Algorithm. 3.3 Hamiltonian Graph: Definition and Examples, Necessary Condition. 3.4 Introduction to Chinese Postman Problem and Travelling Salesman Problem.	CO3, CO5	10% 3 Hrs
IV	**Trees** 4.1 Definition, Properties of trees. 4.2 Centre of a tree. 4.3 Binary Tree: Definition and properties. 4.4 Tree Traversal. 4.5 Spanning Tree: Definition, Properties, Shortest Spanning Tree, Kruskal's Algorithm.	CO5, CO6	30 % 8 Hrs
V	**Directed Graphs** 5.1 Definition, Examples, Elementary Terminologies and properties. 5.2 Special Types of Digraphs. 5.3 Connectedness of digraphs. 5.4 Network and Flows: definition and examples.	CO4, CO5, CO6	10% 7 Hrs

Learning Resources:

1) 'Graph Theory with applications to Engineering and Computer Science', D Narsingh, Prentice Hall publication.

2) 'A first look at Graph Theory', John Clark, Derek Allen Holton, Allied Publishers Ltd.

Class: F. Y. B. Sc. Sem. II

Paper Code: **MTS- 1092** **Paper Title:** Mathematics Practical -2 **Number of Credits: 2**

Sr. No.	Course Outcome	Bloom's Taxonomy Level	Weightage in %
1	CO1: Describe the basic concepts of graph theory.	Remember	10%
2	CO2: State formulae of different numerical interpolation techniques.	Understand	20%
3	Co3: Understand the concepts of different types of graphs.	Apply	30%
4	CO4: Discuss different methods to solve Ordinary differential equations.	Analyze	20%
5	CO5: Solve interpolation problems by different numerical techniques.	Evaluate	10%
6	CO6: Apply graph theory concepts to solve real-world problems such as network design, transportation planning, and social network analysis.	Create	10%

Unit No.	Title of Unit and Contents
1	Introduction to Graph
2	Connected Graphs.
3	Eulerian and Hamiltonian Graphs
4	Trees.
5	Directed Graphs.
6	Solution to ODE by Euler's Method (By Scilab).
7	Solution to ODE by Runge-kutta of 2^{nd} order (By Scilab).
8	Solution to ODE by Runge-kutta of 4^{th} order (By Scilab).
9	Newton's Forward Interpolation (Using Scilab)
10	Newton's Backward Interpolation (Using Scilab)
11	Newton's Divided Interpolation (Using Scilab)
12	Lagrange's Interpolation (Using Scilab)
13	Student Activity -I
14	Students Activity - II
15	Students Activity – III

Class: F. Y. B. Sc. Sem. II

Paper Code: ELS-1082 **Paper Title:** Sequential Logic Circuits **Number of Credits:** 2

Sr.No	Course Outcomes (COs)	Bloom's Taxonomy level	Weightage in %
1	CO1: Describe the fundamental concepts of sequential logic circuits.	Remember	20%
2	CO2: Discuss the design of sequential circuits.	Remember	20%
3	CO3: Differentiate synchronous and asynchronous logic circuits.	Understand	20%
4	CO4: Explain multi bit shift register, counter and their ICs.	Understand	20%
5	CO5: Classify digital memories used in computer system.	Apply	10%
6	CO6: Demonstrate memory organization.	Apply	10%

	Title and Contents	CO	Weightage % (No. of Hours)
Unit-1	**Flip flops** Difference between combinational and sequential circuits, the Concept of clock and types, synchronous and asynchronous circuits, Latch,S-R-latch, D-latch, Difference between latch and flip-flop, S-R, J-K, and D flip-flop their operation and truth tables, race around condition, Master-slave JK flip flop, T flip flop, and their operation using timing diagram and truth tables	CO1, CO3	40%
Unit-2	**Sequential Circuits** The basic building block of the counter, Ripple counter, up counter, down counter, Up- Down counter, Concept of modulus counters, Decade counter, Shift registers: SISO, SIPO, PISO, PIPO, Ring counter, Universal 4-bit shift register	CO2, CO4	30%
Unit-3	**Memory organization** Memory Architecture, Types of memory, Memory parameters (Access time, speed, capacity, cost), Concept of Address Bus, Data Bus, Control Bus, Memory Hierarchy, Memory address map Vertical & horizontal Memory expansion (increasing the capacity, increasing word size)	CO5, CO6	30%

Resources:

1. Modern Digital Electronics: Jain R.P., Tata McGraw Hill
2. Digital Principles and Applications: Malvino Leach, Tata McGraw-Hill.
3. Digital Fundamentals: Floyd T.M., Jain R.P., Pearson Education
4. Computer Architecture: Morris Mano

Class: F. Y. B. Sc. Sem. II

Paper Code: ELS -1092 **Paper Title:** Electronics Practical -II **Number of Credits:** 2

	Course Outcomes (COs)	Bloom's Taxonomy level	Weightage in %
1	CO1: Recall the circuit diagrams required to complete experiments.	Remember	30 %
2	CO2: Illustrate circuits of individual experiments.	Understand	30 %
3	CO3: Carry out the experiment to achieve the given objectives.	Apply	20 %
4	CO4: Analyse observations of each experiment.	Analyze	10 %
5	CO5: Validate observed outputs with expected theoretical outputs.	Evaluate	10 %

Any 10 Experiments

Expt. No.	Title of the Experiment
1	Study of R-S and D Latch
2	Study of R-S and D flip-flops
3	Testing of flip-flops using ICs
4	Shift register IC 7495: SISO, SIPO
5	Shift register IC 7495: PIPO, PISO
6	Modulo (2, 5, 10) counter using IC 7490
7	Modulo (3, 4, 7) counter using IC 7490
8	Study of Up counter IC 74192/93
9	Study of Down counter IC 74192/93
10	Three-bit synchronous counter
11	Rolling display
12	Diode Matrix ROM
13	Study of RAM
14	Study of IC7493 as Asynchronous Counter
15	Study of 16 X 4 ROM

Or Any Other Equivalent Experiment

Class: F. Y. B. Sc. Sem. II

Paper Code: STS-1082 **Paper Title:** Introduction to Probability and Statistics **No. of Credits:** 2

Sr. No	Course Outcomes (COs)	Bloom's Taxonomy level	Weightage in %
1	CO1: Describe basic features of the data.	Remember	10%
2	CO2: Discuss shape and size of the data.	Understand	10%
3	CO3: Compute chance of an event based on prior knowledge of conditions that might be related to the event.	Apply	20%
4	CO4: Compare different data sets and conclude the best fit.	Analyze	30%
5	CO5: Evaluate the computational techniques related to advanced probability.	Evaluate	20%
6	CO6: Build predictive models for the data.	Create	10%

	Title and Contents	CO	Weightage % (No. of Hours)
Unit-1	**Moments** 1.1Raw and Central moments: definition, computations for ungrouped and grouped data (only up to first four moments) 1.2 Relation between raw and central moments up to fourth order (without proof) 1.3 Numerical problems related to real life situations	CO1, CO2	10% (3 Hrs.)
Unit-2	**Measures of Skewness and Kurtosis** 2.1 Concept of symmetric frequency distribution, skewness, positive and negative skewness 2.2 Measures of Skewness-Pearson's measure, Bowley's measure ($\beta 1$, $\gamma 1$) 2.3 Kurtosis of a frequency distribution, measure of kurtosis ($\beta 2$, $\gamma 2$) based upon moments, type of kurtosis: leptokurtic, platykurtic and mesokurtic 2.4 Numerical problems related to real life situations.	CO1, CO2, CO3	17% (5 Hrs.)
Unit-3	**Correlation and Linear Regression** 3.1 Bivariate data, Scatter diagram. 3.2 Correlation, Positive Correlation, Negative correlation, Zero Correlation 3.3 Karl Pearson's coefficient of correlation (r), limits of r ($-1 \leq r \leq 1$), interpretation of r, Coefficient of determination (r^2) 3.4 Meaning of regression, difference between correlation and regression. 3.5 Concept and equation of regression line of Y on X. 3.6 Concept of residual plot and mean residual sum of squares.	CO2, CO4, CO6	20% (6 Hrs.)

	3.7 Numerical Problems.		
Unit-4	**Non-Linear Regression** 4.1Second degree curve 4.2 Growth curve models of the type i) $Y = ae^{bX}$ ii) $Y = ab^{X}$ iii) $Y = aX^{b}$ 4.3 Logistic model $Y = k / (1+e^{a+bx})$ 4.4 Numerical problems related to real life situations.	CO3, CO4,CO6	13% (4 Hrs.)
Unit-5	**Advanced Theory of Probability** 5.1Concepts and definitions of conditional probability, multiplication theorem $P(A \cap B)=P(A).P(B\|A)$ 5.2 Bayes' theorem (without proof) 5.3 Concept of Posterior probability, problems on posterior probability. 5.4 Definition of sensitivity of a procedure, specificity of a procedure. Application of Bayes' theorem to design a procedure for false positive and false negative. 5.5 Concept and definition of independence of two events. 5.6 Numerical problems related to real life situations.	CO2, CO3, CO5	40% (12 Hrs.)

Resources:

1. Statistical Methods, G.W. Snedecor, W.G. Cochran, John Wiley & sons, 1989.
2. Fundamentals of Applied Statistics (4th Edition), Gupta and Kapoor, S. Chand and Sons, New Delhi, 2014.
3. Modern Elementary Statistics, Freund J.E., Pearson Publication, 2005.
4. A First course in Probability 6th Edition, Ross, Pearson Publication, 2006.

Class: F. Y. B. Sc. Sem. II

Paper Code: STS -1092 **Paper Title:** Statistics Practical – 2 **Number of Credits:** 2

Sr. No	Course Outcomes (COs)	Bloom's Taxonomy level	Weightage in %
1	CO1: Illustrate different real-life situations to find probability of different types of events using advanced theory of probability.	Remember	15%
2	CO2: Discuss various applications of statistical measures using R software.	Understand	10%
3	CO3: Execute the computational techniques using R software.	Apply	20%
4	CO4: Analyse different concepts of statistics using R software.	Analyze	20%
5	CO5: Validate the fundamental knowledge and represent using R software.	Evaluate	20%
6	CO6: Write a program using R to build different regression models for the given data and estimate the error.	Create	15%

Expt. No.	Title of the Experiment
1.	Computation of moments
2.	Computation of moments using R
3.	Measures of skewness and kurtosis -I
4.	Measures of skewness and kurtosis -II
5.	Measures of skewness and kurtosis using R
6.	Correlation and Regression
7.	Correlation and Regression using R
8.	Fitting of Second degree and Exponential curves, verification using R
9.	Conditional probability
10.	Independence of events
11.	Applications of Multiplication and Bayes' theorem
12.	Sensitivity and Specificity
13, 14 and 15.	Applications of statistical techniques to real life data.