



Hindi Vidya Prachar Samiti's

**Ramniranjan Jhunjhunwala College**

**of Arts, Science & Commerce**

**(Autonomous College)**

Affiliated to

**UNIVERSITY OF MUMBAI**

**Syllabus for the F.Y.B.Sc.**

**Program: B.Sc. COMPUTER-SCIENCE**

**Program Code: RJSUCS**

**(CBCS 2021-2022)**

## **THE PREAMBLE**

### **Why Computer Science ?**

Computer Science(CS) has been evolving as an important branch of science and engineering throughout the world in last couple of decades and it has carved out a space for itself like any other disciplines of basic science and engineering. Computer science is a discipline that spans theory and practice and it requires thinking both in abstract terms and in concrete terms. Nowadays, practically everyone is a computer user, and many people are even computer programmers. Computer Science can be seen on a higher level, as a science of problem solving and problem solving requires precision, creativity, and careful reasoning. The ever-evolving discipline of computer science also has strong connections to other disciplines. Many problems in science, engineering, healthcare, business, and other areas can be solved effectively with computers, but finding a solution requires both computer science expertise and knowledge of the particular application domain. The B.Sc. Computer Science course structure therefore needed a fresh outlook and complete overhaul.

### **Why Computer Science at R J College?**

The Computer Science department was established in the year 1999 with strength of 60 Students and M.Sc CS with strength of 40 Seats was introduced in the year 2001. Today the strength has reached to 120 at UG level and 48 at PG level. The department offers both UG and PG programs in the subject of CS and is affiliated to, and recognized by the University of Mumbai. College facilitate departmental library with near about 1200+ books. There are 3 dedicated well-upgraded laborites for CS department. With the management extensive support, department believes in "**1 Student 1 PC policy**" which helps students to rigorous practice and focus. Projects, hands on training sessions, guest lectures, laboratory experimentation, lecture-based learning, industry visits etc. motivate students to explore more in terms of applications of the subject. Under autonomy, the department has made curriculum more robust by incorporating skill-based learning and value added course that

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imparts practical knowledge of the subject to the students. Department of CS (DBT), New Delhi has identified CS Department of R J College as DBT Star College Department which has further strengthened our hands in being able to provide hands on training to the students to satisfy their curiosity.

**Our Curriculum, Your Strength**

The syllabus of CS for the total six semesters is meticulously designed so as to make students understand the various programming languages and other many subjects of CS. FY level syllabus have great potential to serve the need of students for being strong basic foundation in computer science. Then gradually stepping ahead the students at higher complexities at every subsequent semesters, till semester 6. In all, 38 subjects are covered in 6 semesters, which gives adequate knowledge in the fields of computer science. Practical's of all semesters and project at TY level boost high level confidence of students to crack immense career opportunities.

**DISTRIBUTION OF TOPICS AND CREDITS****F.Y.B.Sc. COMPUTER-SCIENCE SEMESTER I**

Course	Nomenclature	Credits	Topics
RJSUCS101	Computer Organization and Design	02	1. Computer Abstractions and Technology 2. Instruction set architectures of 8086 3. Basic Processor Unit
RJSUCS102	Programming with Python-I	02	1. Introduction to python and data types use in python.. 2. conditional & loop statements, Functions 3. Dictionaries, Date & Time, OOPS concept.
RJSUCS103	Free and Open Source Software	02	1. Introduction to FOSS 2. Case Studies and Project 3. Understanding Open Source Ecosystem
RJSUCS104	Database Systems	02	1. Introduction to DBMS 2. Schema refinement and Normal forms 3. Database Protection
RJSUCS105	Discrete Mathematics	02	1. Recurrence Relations 2. Counting Principles , Languages 3. Graphs and Trees
RJSUCS106	Descriptive Statistics and Introduction to Probability	02	1. Data Presentation & Aggregation 2. Correlation and Regression 3. Probability
RJSUCS107	Soft Skills Development	02	1. Soft and Hard Skills

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			2. Academic Skills 3. Professional Skills
RJSUCSP101	Practical of RJSUCS101 + RJSUCS102	02	Computer Technology, Instruction set architectures of 8086, python programming basics, conditional & loop statements, Functions, Dictionaries, Date & Time
RJSUCSP102	Practical of RJSUCS103+RJSUCS10 4	02	FOSS, Case Studies and Project, Understanding Open Source Ecosystem, Introduction to DBMS,Schema refinement, Database Protection
RJSUCSP103	Practical of RJSUCS105+RJSUCS10 6	02	Recurrence Relations, Counting Principles , Languages, Graphs and Trees, Data Presentation & Aggregation,Correlation and Regression, Probability
RJSUCSP104	Practical of RJSUCS107	01	Academic & Professional Skills.

**F.Y.B.Sc Computer-Science Syllabus Semester I & II****F.Y.B.Sc. COMPUTER-SCIENCE SEMESTER II**

<b>Course</b>	<b>Nomenclature</b>	<b>Credits</b>	<b>Topics</b>
RJSUCS201	Programming with C	02	1. Introduction to C program 2. I/p, O/P functions and recursion 3. Pointers, structure & Union
RJSUCS202	Programming with Python– II	02	1. I/P, O/P files and Exception Handling. 2. GUI Programming in Python. 3. Database & Network connectivity.
RJSUCS203	Linux	02	1. Linux System 2. Understanding Linux file System 3. Script control & System Administration
RJSUCS204	Data Structures	02	1. Different Data Types & Sorting Techniques. 2. Data Structures 3. Advanced data structures & Sorting Techniques
RJSUCS205	Calculus	02	1. Derivatives and its applications 2. Integration and its applications 3. Partial derivatives and its applications
RJSUCS206	Statistical Methods and Testing of Hypothesis	02	1. Standard distributions 2. Hypothesis testing 3. Non-parametric tests
RJSUCS207	Green Technologies	02	1. Green IT Overview 2. Green IT Centers 3. Sustainable Information Systems and Green Metrics
RJSUCSP201	Practical of RJSUCS201 + RJSUCS202	02	Introduction to C program, I/p, O/P functions & recursion,

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			Pointers, structure & Union, I/P, O/P files and Exception Handling, GUI Programming in Python, Database & Network connectivity
RJSUCSP202	Practical of RJSUCS203+RJSUCS204	02	Linux System, Linux file System, Script control & System Administration, Sorting Techniques, Data Structures, Advanced data structures & Sorting Techniques
RJSUCSP203	Practical of RJSUCS205+RJSUCS206	02	Derivatives and its applications, Integration and its applications, Partial derivatives and its applications, Standard distributions, Hypothesis testing, Non-parametric tests
RJSUCSP204	Practical of RJSUCS207	01	Green IT Overview Green IT Centers Sustainable Information Systems and Green Metrics

<b>SEMESTER I (THEORY)</b>		<b>L</b>	<b>Cr</b>
<b>Paper-I: Computer Organization and Design</b>	<b>Paper Code: RJSUCS101</b>	45	2
<b><i>UNIT I</i></b>		15	
<b><i>COMPUTER ABSTRACTIONS AND TECHNOLOGY</i></b>			
1	Basic structure and operation of a computer, functional units and their interaction. Representation of numbers and characters.		
2	Combinational circuits and functions: Basic logic gates and functions, truth tables; logic circuits and functions. Minimization with Karnaugh maps. Synthesis of logic functions with and-or-not gates, nand gates, nor gates. Fan-in and fan-out. Half adder, full adder.		
3	Sequential and combinational circuits and functions.		
<b><i>UNIT II</i></b>		15	
<b><i>INSTRUCTION SET AND MEMORY ARCHITECTURES</i></b>			
1	FLIP-FLOP : SR , JK , RS, D flip flop. Shift registers Multiplexers and Demultiplexer.		
2	Instruction set architectures of 8086: Memory organization, addressing and operations; word size, big-endian & little-endian arrangements. Instruction sets for RISC and CISC.  Operand addressing modes. Machine language, assembly language, assembler.		



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3	Instructions: arithmetic, logic, shift, etc. Instruction sets.		
<b>UNIT III</b>		15	
<b>BASIC PROCESSOR &amp; I/O UNIT</b>			
1	<b>Basic Processor Unit:</b> Main components of a processor: registers and register files, ALU, control unit, instruction fetch unit, interfaces to instruction and data memories. Datapath. Instruction fetch and execute; executing arithmetic/logic, memory access and branch.		
2	<b>Basic I/O:</b> Accessing I/O devices, data transfers between processor and I/O devices. Interrupts and exceptions: interrupt requests and processing.		

F.Y.BSc	Semester I Theory
RJSUCS101  Paper I  Computer Organization and Design	Course Outcomes 1.1 :  To understand the structure and operation of modern processors and their instruction sets.  Learning Outcomes:  1) To learn about how computer systems work and underlying principles 2) To understand the basics of digital electronics needed for computers 3) To understand the basics of instruction set architecture for reduced and complex instruction sets 4) To understand the basics of processor structure and operation 5) To understand how data is transferred between the processor and I/O devices

<b>SEMESTER I (THEORY)</b>		<b>L</b>	<b>Cr</b>
<b>Paper-II: Programming with Python- I</b>	<b>Paper Code: RJSUCS102</b>	45	2
<b>UNIT I</b>		15	
<b>INTRODUCTION TO PYTHON PROGRAMMING</b>			
1	Reasons for Python as the learner's first programming language. Introduction to the IDLE interpreter (shell) and its documentation.  <b>Data:</b> variables, Basic data types int, float, Boolean. Built-in function type. Assigning Values to Variables.  <b>Python Basic syntax:</b> Introduction to Interactive Mode Programming, Script Mode Programming, python Identifiers, Reserved Words in python, The role of indentation in python, Comments in Python.		
2	<b>Types of operators:</b> Arithmetic, relational, logical, compound assignment, increment and decrement, conditional or ternary, bitwise and comma operators. Precedence and order of evaluation, statements and Expressions. Automatic and explicit type conversion.		
3	<b>I/O function:</b> Input/output with print and input functions. The del(delete) statement Introduction to python Data Types ,Python String ,List ,Tuple, Dictionary elements within these types. Enumerate the function & methods of string, tuple, list, dictionaries.		
<b>UNIT II</b>		15	
<b>THE CONDITIONAL, LOOP STATEMENTS &amp; FUNCTIONS</b>			
1	<b>The conditional statements:</b> if, if- else, if-elif-else.		
2	<b>Python Loops:</b> While loop, while-else, for-else, For Loop, Nested loop, The builtin function range().		

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	<b>Loop Control Statements:</b> The continue statement loop, the break statement.		
3	<b>Function in python:</b> Advantages of functions, function parameters, formal parameters, actual parameters,global and local variables, Introduction to Anonymous functions.		
<b>UNIT III</b>		15	
<b>LIST COMPREHENSIONS</b>			
1	<b>Dictionaries:</b> concept of key-value pairs, techniques to create, update and delete dictionary items. Gentle introduction to object-oriented programming with examples.		
2	<b>Python Date-Time:</b> Introduction to Time module functions.		

F.Y.BSc	Semester I Theory
RJSUCS102 Paper II Programming with Python- I	<p>Course Outcomes1.2 :</p> <p>The objective of this paper is to introduce various concepts of programming to the students using Python.</p> <p><b>Learning outcomes</b></p> <ol style="list-style-type: none"> <li>1.Students should be able to understand the concepts of programming before actually starting to write programs.</li> <li>2.Students should be able to develop logic for Problem Solving.</li> <li>3.Students should be made familiar with the basic constructs of programming such as data, operations, conditions, loops, functions etc.</li> <li>4.Students should be able to apply the problem solving skills using syntactically simple language i.e. <b>Python (version: 3.X or higher).</b></li> </ol>

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<b>SEMESTER I (THEORY)</b>		<b>L</b>	<b>Cr</b>
<b>Paper-III: Free and Open-source Software</b>	<b>Paper Code: RJSUCS103</b>	45	2
<b>UNIT I</b>		15	
<b>INTRODUCTION</b>			
1	Introduction: Open Source, Free Software, Free Software vs. Open Source software, Public Domain Software, FOSS does not mean no cost.		
2	<b>Methodologies</b> Open Source History, Initiatives, Principle and methodologies. Philosophy : Software Freedom, Open Source Development Model Licenses and Patents: What Is A License, Important FOSS Licenses (Apache,BSD,GPL, LGPL), copyrights and copy lefts, Patents Economics of FOSS : Zero Marginal Cost, Income-generation opportunities, Problems with traditional commercial software, Internationalization.		
3	<b>Social Impact</b> Open source vs. closed source, , Open source ethics. Social and Financial impacts of open source technology, Shared software, Shared source, Open Source in Government.		
<b>UNIT II</b>		15	
<b>CASE STUDIES &amp; PROJECTS</b>			
1	<b>Case Studies:</b> Example Projects: Apache web server, GNU/Linux, Android, Mozilla (Firefox), Wikipedia, Drupal, wordpress, GCC, GDB, github, Open Office. Study: Understanding the developmental models, licensings,		

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	mode of funding, commercial/non-commercial use. Open Source Hardware. Open source media. Collaboration, Community and Communication		
2	Introduction to github, interacting with the community on github, Communication and etiquette, testing open source code, reporting issues, contributing code. Introduction to wikipedia, contributing to Wikipedia Or contributing to any prominent open source project of student's choice.		
<b>UNIT III</b>		15	
<b>UNDERSTANDING OPEN SOURCE ECOSYSTEM</b>			
1	Open Source Operating Systems: GNU/Linux, Android, Open Solaris. Open Source Hardware, Virtualization Technologies, Containerization Technologies: Docker, Development tools, IDEs, debuggers, Programming languages, LAMP, Open Source database technologies.		

F.Y.BSc	Semester I Theory
RJSUCS103 Paper III Free and Open Source Software	<p>Course Outcomes1.3 :</p> <p>Open Source has acquired a prominent place in software industry. Having knowledge of Open Source and its related technologies is an essential for Computer Science student. This course introduces Open Source methodologies and ecosystem to students.</p> <p>Learning Outcome:</p> <p>Upon completion of this course, students should have a good working knowledge of Open Source ecosystem, its use, impact and importance. This course shall help student to learn Open Source methodologies, case studies with real life examples.</p>

<b>SEMESTER I (THEORY)</b>		<b>L</b>	<b>Cr</b>
<b>Paper-IV: Database Systems</b>	<b>Paper Code: RJSUCS104</b>	45	2
<b>UNIT I</b>		15	
<b>INTRODUCTION</b>			
1	<b>Introduction to DBMS</b> - Database, DBMS - Definition, Overview of DBMS, Advantages of DBMS, Levels of abstraction, Data independence, DBMS Architecture.		
2	<b>Entity Relationship Model</b> - Entities, attributes, entity sets, relations, relationship sets, Additional constraints ( key constraints, participation constraints, weak entities, aggregation / generalization, Conceptual Design using ER ( entities VS attributes, Entity Vs relationship, binary Vs ternary, constraints beyond ER).		
3	<b>Relational data model</b> - Domains, attributes, Tuples and Relations, Relational Model Notation, Characteristics of Relations, Relational Constraints - primary key, referential integrity, unique constraint, Null constraint, Check constraint. <b>ER to Table</b> - Entity to Table, Relationship to tables with and without key constraints.		
<b>UNIT II</b>		15	
<b>NORMAL FORMS, STATEMENTS AND FUNCTIONS</b>			
1	<b>Schema refinement and Normal forms:</b> Functional dependencies, first, second, third, and BCNF normal forms based on primary keys, lossless join decomposition. <b>Relational Algebra:</b>		

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	operations (selection, projection, set operations union, intersection, difference, cross product, Joins -conditional, equi join and natural joins, division).		
2	<b>DDL Statements</b> :Creating Databases, Using Databases, data types, Creating Tables (with integrity constraints - primary key, default, check, not null), Altering Tables, Renaming Tables, Dropping Tables, Truncating Tables, Backing Up and Restoring databases. <b>DML Statements</b> :Viewing the structure of a table insert, update, delete, Select all columns, specific columns, unique records, conditional select, in clause, between clause, limit, aggregate functions, group by clause, having Clause.		
3	<b>Functions</b> - String Functions , Math Functions , Date <b>Joining Tables</b> - inner join, outer join (left outer, right outer, full outer). <b>Subqueries</b> - subqueries with IN, EXISTS, subqueries restrictions, Nested subqueries, ANY/ALL clause, correlated subqueries.		
<b>UNIT III</b>		15	
<b>DATABASE PROTECTION</b>			
1	<b>Database Protection:</b> Security Issues, Threats to Databases, Security Mechanisms, Role of DBA, Discretionary Access Control. <b>Views</b> (creating, altering, dropping, renaming and manipulating views).		
2	<b>DCL Statements</b> (creating/dropping users, privileges introduction, granting/revoking privileges, viewing privileges). <b>TCL Statements</b> Commit, Rollback and SavePoint.		

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F.Y.BSc	Semester I Theory
RJSUCS104 Paper IV Database System	<p>Course Outcomes1.4 :</p> <p>The objective of this course is to introduce the concept of the DBMS with respect to the relational model, to specify the functional and data requirements for a typical database application and to understand creation, manipulation and querying of data in databases</p> <p>Learning Outcomes:</p> <ol style="list-style-type: none"><li>1) Students should be able to evaluate business information problems and find the requirements of a problem in terms of data.</li><li>2) Students should be able to design the database schema with the use of appropriate data types for storage of data in the database.</li><li>3) Students should be able to create, manipulate, query and back up the databases.</li></ol>



<b>SEMESTER I (THEORY)</b>		<b>L</b>	<b>Cr</b>
<b>Paper-V: Discrete Mathematics</b>	<b>Paper Code: RJSUCS105</b>	45	2
<b>UNIT I</b>		15	
<b>RECURRENCE RELATIONS</b>			
1	<b>Functions:</b> Definition of function. Domain, co domain and the range of a function. Direct and inverse images. Injective, surjective and bijective functions. Composite and inverse functions.		
2	<b>Relations:</b> Definition and examples. Properties of relations , Partial Ordering sets, Linear Ordering Hasse Daigrams , Maximum and Minimum elements, Lattices		
3	<b>Recurrence Relations:</b> Definition of recurrence relations, Formulating recurrence relations, solving recurrence relations- Back tracking method, Linear homogeneous recurrence relations with constant coefficients. Solving linear homogeneous recurrence relations with constant coefficients of degree two when characteristic equation has distinct roots and only one root, Particular solutions of non linear homogeneous recurrence relation, Solution of recurrence relation by the method of generation functions, Applications – Formulate and solve recurrence relation for Fibonacci numbers, Tower of Hanoi		
<b>UNIT II</b>		15	
<b>COUNTING PRINCIPLES, LANGUAGES</b>			
1	<b>Permutations and Combinations:</b> Partition and Distribution of objects, Permutation with distinct and indistinct objects, Binomial numbers, Combination with identities: Pascal Identity,		

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	Vandermonde's Identity, Pascal triangle, Binomial theorem, Combination with indistinct objects.		
2	<b>Counting Principles:</b> Sum and Product Rules, Two-way counting, Tree diagram for solving counting problems, Pigeonhole Principle (without proof); Simple examples, Inclusion Exclusion Principle (Sieve formula) (Without proof).		
3	<b>Set Theory :</b> Set definition, set builder notations, types of sets, Venn Diagrams, Set Operations, Power Set.		
<b>UNIT III</b>		15	
<b>GRAPHS AND TREES</b>			
1	<b>Graphs :</b> Definition and elementary results, Adjacency matrix, path matrix, Representing relations using diagraphs, Warshall's algorithm-shortest path , Linked representation of a graph, Operations on graph with algorithms - searching in a graph; Insertion in a graph, Deleting from a graph, Traversing a graph- Breadth-First search and Depth-First search.		
2	<b>Trees:</b> Definition and elementary results. Ordered rooted tree, Binary trees, Complete and extended binary trees, representing binary trees in memory, traversing binary trees, binary search tree, Algorithms for searching and inserting in binary search trees, Algorithms for deleting in a binary search tree		

F.Y.BSc	Semester I Theory
RJSUCS105 Paper V Discrete Mathematics	Course Outcomes1.5 :  The purpose of the course is to familiarize the prospective learners with mathematical structures that are fundamentally discrete. This course introduces sets and functions, forming and solving recurrence relations and different counting principles. These concepts are useful to study or describe objects or problems in computer algorithms and programming languages.

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	<p>Learning Outcomes:</p> <ol style="list-style-type: none"><li>1) To provide overview of theory of discrete objects, starting with relations and partially ordered sets.</li><li>2) Study about recurrence relations, generating function and operations on them.</li><li>3) Give an understanding of graphs and trees, which are widely used in software.</li></ol> <p>Provide basic knowledge about models of automata theory and the corresponding formal languages.</p>
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<b>SEMESTER I (THEORY)</b>		<b>L</b>	<b>Cr</b>
<b>Paper- VI Descriptive Statistics and Introduction to Probability</b>	<b>Paper Code: RJSUCS106</b>	45	2
<b>UNIT I</b>		15	
<b>DATA PRESENTATION &amp; AGGREGATION</b>			
1	<b>Data Presentation</b> Data types : attribute, variable, discrete and continuous variable Data presentation : frequency distribution, histogram o give, curves, stem and leaf display		
2	<b>Data Aggregation</b> Measures of Central tendency: Mean, Median, mode for raw data, discrete, grouped frequency distribution. Measures dispersion: Variance, standard deviation, coefficient of variation for raw data, discrete and grouped frequency distribution, quartiles, quantiles Real life examples.		
<b>UNIT II</b>		15	
<b>REGRESSION</b>			
1	<b>Moments:</b> m raw moments, central moments, relation between raw and central moments <b>Measures of Skewness and Kurtosis:</b> based on moments, quartiles, relation between mean, median, mode for symmetric, asymmetric frequency curve.		
2	<b>Correlation and Regression:</b> bivariate data, scatter plot, correlation, nonsense correlation, Karl pearson's coefficients of correlation, independence		

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3	<b>Linear regression:</b> fitting of linear regression using least square regression, coefficient of determination, properties of regression coefficients (only statement)		
<b>UNIT III</b>		15	
<b>PROBABILITY</b>			
1	<b>Probability :</b> Random experiment, sample space, events types and operations of events <b>Probability definition :</b> classical, axiomatic, Elementary Theorems of probability (without proof) – $0 \leq P(A) \leq 1$ , – $P(A \cup B) = P(A) + P(B) - P(A \cap B)$ – $P(A') = 1 - P(A)$ – $P(A) \leq P(B)$ if $A \subset B$		
2	Conditional probability, 'Bayes' theorem, independence, Examples on Probability.		

F.Y.BSc	Semester I Theory
RJSUCS106 Paper VI Descriptive Statistics and Introduction to Probability	Course Outcomes 1.6 : The purpose of this course is to familiarize students with basics of Statistics. This will be essential for prospective researchers and professionals to know these basics  Learning Outcomes: 1) Enable learners to know descriptive statistical concepts 2) Enable study of probability concept required for Computer learners

<b>SEMESTER I (THEORY)</b>		<b>L</b>	<b>Cr</b>
<b>Paper- VII Soft Skills Development</b>	<b>Paper Code: RJSUCS107</b>	45	2
<b>UNIT I</b>		15	
<b>INTRODUCTION TO SOFT SKILLS AND HARD SKILLS</b>			
1	<b>Personality Development:</b> Knowing Yourself, Positive Thinking, Johari's Window, Communication Skills, Non-verbal Communication, Physical Fitness		
2	<b>Emotional Intelligence:</b> Meaning and Definition, Need for Emotional Intelligence, Intelligence Quotient versus Emotional Intelligence Quotient, Components of Emotional Intelligence, Competencies of Emotional Intelligence, Skills to Develop Emotional Intelligence <b>Etiquette and Mannerism:</b> Introduction, Professional Etiquette, Technology Etiquette		
3	<b>Communication Today:</b> Significance of Communication, GSC's 3M Model of Communication, Vitality of the Communication Process, Virtues of Listening, Fundamentals of Good Listening, Nature of Non-Verbal Communication, Need for Intercultural Communication, Communicating Digital World		
<b>UNIT II</b>		15	
<b>ACADEMIC SKILLS</b>			
1	<b>Employment Communication:</b> Introduction, Resume, Curriculum Vitae, Scannable Resume, Developing an Impressive Resume, Formats of Resume, Job Application or Cover Letter		

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	<b>Professional Presentation:</b> Nature of Oral Presentation, Planning a Presentation, Preparing the Presentation, Delivering the Presentation		
2	<b>Job Interviews:</b> Introduction, Importance of Resume, Definition of Interview, Background Information, Types of Interviews, Preparatory Steps for Job Interviews, Interview Skill Tips, Changes in the Interview Process, FAQ During Interviews		
3	<b>Group Discussion:</b> Introduction, Ambience/Seating Arrangement for Group Discussion, Importance of Group Discussions, Difference between Group Discussion, Panel Discussion and Debate, Traits, Types of Group Discussions, topic based and Case based Group Discussion, Individual Traits		
<b>UNIT III</b>		15	
<b>PROFESSIONAL SKILLS</b>			
1	<b>Creativity at Workplace:</b> Introduction, Current Workplaces, Creativity, Motivation, Nurturing Hobbies at Work, The Six Thinking Hat Method <b>Ethical Values:</b> Ethics and Society, Theories of Ethics, Correlation between Values and Behavior, Nurturing Ethics, Importance of Work Ethics, Problems in the Absence of Work Ethics		
2	<b>Capacity Building: Learn, Unlearn and Relearn:</b> Capacity Building, Elements of Capacity Building, Zones of Learning, Ideas for Learning, Strategies for Capacity Building <b>Leadership and Team Building:</b> Leader and Leadership, Leadership Traits, Culture and Leadership, Leadership Styles and Trends, Team Building, Types of Teams,		

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3	<b>Decision Making and Negotiation:</b> Introduction to Decision Making, Steps for Decision Making, Decision Making Techniques, Negotiation Fundamentals, Negotiation Styles, Major Negotiation Concepts <b>Stress and Time Management:</b> Stress, Sources of Stress, Ways to Cope with Stress		
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F.Y.BSc	Semester I Theory
RJSUCS107 Paper VII Soft Skills Development	<p>Course Outcomes1.7 :</p> <ol style="list-style-type: none"> <li>1) To help learners develop their soft skills and develop their personality together with their technical skills.</li> <li>2) Developing professional, social and academic skills to harness hidden strengths, capabilities and knowledge.</li> <li>3) equip them to excel in real work environment and corporate life.</li> <li>4) Understand various issues in personal and profession communication and learn to overcome them.</li> </ol> <p>Learning Outcomes:</p> <ol style="list-style-type: none"> <li>1) To know about various aspects of soft skills and learn ways to develop personality.</li> <li>2) Understand the importance and types of communication in personal and professional environment.</li> <li>3)To provide insight into much needed technical and non-technical qualities in career planning.</li> <li>4) Learn about Leadership, team building, decision making and stress management.</li> </ol>



<b>SEMESTER II (THEORY)</b>		<b>L</b>	<b>Cr</b>
<b>Paper-I: PROGRAMMING WITH C</b>	<b>Paper Code: RJSUCS201</b>	45	2
<b>UNIT I</b>		15	
<b>INTRODUCTION TO C PROGRAMMING</b>			
1	<b>Structure of C program:</b> Header and body, Use of comments. Interpreters vs compilers, Python vs C. Compilation of a program. Formatted I/O: printf(), scanf(). <b>Data:</b> Variables, Constants, data types like: int, float char, double and void, short and long size qualifiers, signed and unsigned qualifiers. Compare with data types in Python. Compare static typing in C vs dynamic typing in Python		
2	<b>Variables:</b> Declaring variables, scope of the variables according to block, hierarchy of data types. Compare explicit declarations in C with implicit declarations in Python.		
3	<b>Types of operators:</b> Arithmetic, relational, logical, compound assignment, increment and decrement, conditional or ternary, bitwise and comma operators. Precedence and order		
<b>UNIT II</b>		15	
<b>ARRAYS, I/O FUNCTIONS AND RECURSION FUNCTIONS</b>			
1	<b>Arrays:</b> (One and two dimensional), declaring array variables, initialization of arrays, accessing array elements. Compare array types of C with list and tuple types of Python.		
2	<b>Data Input and Output functions:</b> Character I/O format: getch(), getche(), getchar(), getc(), gets(), putchar(), putc(),		

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	puts(). <b>Manipulating Strings:</b> Declaring and initializing String variables, Character and string handling functions. Compare with Python strings		
3	<b>.Functions:</b> Function declaration, function definition, Global and local variables, return statement, Calling a function by passing values. <b>Recursion:</b> Definition, Recursive functions.		
<b>UNIT III</b>		15	
<b>POINTERS, STRUCTURES AND FILE HANDLING</b>			
1	<b>Pointer:</b> Fundamentals, Pointer variables, Referencing and de-referencing, Pointer Arithmetic, Using Pointers with Arrays, Using Pointers with Strings, Array of Pointers, Pointers as function arguments, Functions returning pointers. <b>Dynamic Memory Allocation:</b> malloc(), callocQ, reallocQ, free() and sizeof operator. Compare with automatic garbage collection in Python.		
2	<b>Structure:</b> Declaration of structure, reading and assignment of structure variables, Array of structures, arrays within structures, structures within structures. Compare C structures with Python tuples. <b>Unions:</b> Defining and working with unions		
	<b>.File handling:</b> Different types of files like text and binary, Different types of functions: fopen(), fclose(), fgetc(), fputc(), fgets(), fputs(), fscanf(), fprintf(), getw(), putw(), fread(), fwrite(), fseek().		

F.Y.BSc	Semester II Theory
RJSUCS201 Paper I PROGRAMMING WITH C	<p>Course Outcomes 2.1: The objective of this course is to provide a comprehensive study of the C programming language, stressing upon the strengths of C, which provide the students with the means of writing modular, efficient, maintainable, and portable code.</p> <p>Learning Outcomes:</p> <ol style="list-style-type: none"><li>1) Students should be able to write, compile and debug programs in C language.</li><li>2) Students should be able to use different data types in a computer program.</li><li>3) Students should be able to design programs involving decision structures, loops and functions.</li><li>4) Students should be able to explain the difference between call by value and call by reference.</li><li>5) Students should be able to understand the dynamics of memory by the use of pointers.</li><li>6) Students should be able to use different data structures and create/update basic data files.</li></ol>

<b>SEMESTER II (THEORY)</b>		<b>L</b>	<b>Cr</b>
<b>Paper-II: Programming with Python – II</b>	<b>Paper Code: RJSUCS202</b>	45	2
<b>UNIT I</b>		15	
<b>FILE AND EXCEPTION HANDLING</b>			
1	<b>Python File Input-Output:</b> Opening and closing files, various types of file modes, reading and writing to files, manipulating directories. Iterables, iterators and their problem solving applications.		
2	<b>Exception handling:</b> What is an exception, various keywords to handle exceptions such try, catch, except, else, finally, raise.		
3	<b>Regular Expressions:</b> various types of regular expressions & functions.		
<b>UNIT II</b>		15	
<b>GUI PROGRAMMING IN PYTHON (USING TKINTER/WXPYTHON/QT)</b>			
1	<b>GUI Designing:</b> What is GUI, Advantages of GUI, Introduction to GUI library.		
2	<b>Layout management:</b> events and bindings, fonts, colours, drawing on canvas (line, oval, rectangle, etc.).		
3	<b>Introduction to Widgets :</b> frame, label, button, checkbutton, entry, listbox, message, radiobutton, text, spinbox etc.		
<b>UNIT III</b>		15	

<b><i>DATABASE AND NETWORK CONNECTIVITY</i></b>			
1	<b>Database connectivity in Python:</b> Installing mysql connector, accessing connector module module, using connect, cursor, execute & close functions, reading single & multiple results of query execution, executing different types of statements, executing transactions, understanding exceptions in database connectivity.		
2	<b>Network connectivity:</b> Socket module, creating server-client programs, sending email, reading from URL		

F.Y.BSc	Semester II Theory
<p>RJSUCS202</p> <p>Paper II</p> <p>Programming with Python – II</p>	<p>COURSE OUTCOMES 2.2:</p> <p>The objective of this paper is to explore the style of structured programming to give the idea to the students how programming can be used for designing real-life applications by reading/writing to files, GUI programming, interfacing database/networks and various other features.</p> <p>Learning Outcomes:</p> <ol style="list-style-type: none"> <li>1.Students should be able to understand how to read/write to files using python.</li> <li>2.Students should be able to catch their own errors that happen during execution of programs.</li> <li>3.Students should get an introduction to the concept of pattern matching.</li> <li>4.Students should be made familiar with the concepts of GUI controls and designing GUI applications.</li> <li>5.Students should be able to connect to the database to move the data to/from the application.</li> <li>6.Students should know how to connect to computers, read from URLs and send email.</li> </ol>

<b>SEMESTER II (THEORY)</b>		<b>L</b>	<b>Cr</b>
<b>Paper-III: LINUX</b>	<b>Paper Code: RJSUCS203</b>	45	2
<b>UNIT I</b>		15	
<b>LINUX SYSTEM</b>			
1	<b>Linux System:</b> History, Design Principles, Kernel Modules, Process Management, Scheduling, Memory Management, File system, I/O. <b>Linux Basics:</b> Looking into the Linux Kernel, GNU Utilities, Desktop environments, The Linux console The Unix/Linux architecture, Features of Unix/Linux.		
2	<b>Basic bash shell commands:</b> Starting the shell, Shell prompt, File system Navigation, File and directory listing, File handling, Directory handling, Viewing file contents <b>More bash shell commands:</b> Monitoring programs, Monitoring disk space, Working with data files: Sorting, Searching, Compressing, Archiving		
3	<b>The Linux environment variable:</b> Environment variables, setting environment variables, Removing environment variables, Default shell environment variables, setting the PATH environment variables, Using command aliases.		
<b>UNIT II</b>		15	
<b>PERMISSIONS AND STRUCTURED, UNSTRUCTURED COMMANDS</b>			
1	<b>Understanding Linux file permission:</b> Linux security, Using Linux groups, Decoding file permissions, Changing security settings <b>vi editor Basic script building:</b> Using multiple commands, Creating a script file, Displaying messages, Using variables, Redirecting Input and Output, Pipes, Performing math, Exiting the script.		
2	<b>Using structured commands:</b> Working with the if-then, if-then-else and nesting if statements, test command, Compound condition testing,		

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	advanced if then features, the case command.		
3	<b>More structured commands:</b> for command, C-style for command, while command, until command, nesting loops, Looping on file data, controlling the loop, processing the o/p of a loop.		
<b>UNIT III</b>		15	
<b>SCRIPT, EDITORS AND NETWORKING</b>			
1	<b>Script control:</b> Handling signals, Running scripts in background mode, Job control, Job Scheduling Commands: nice, renice, at, batch, cron table.		
2	<b>Editors:</b> Sed and awk <b>Essential System Administration:</b> root: The system administrator's login, run levels, The administrator's privileges, Startup & Shutdown.		
3	<b>TCP/IP networking:</b> TCP/IP Basics, TCP/IP Model, Resolving IP addresses, Applications, telnet, ftp, Berkeley commands.		

F.Y.BSc	Semester II Theory
RJSUCS203 Paper III Linux	<p><b>COURSE OUTCOMES 2.3:</b> This course introduces various tools and techniques commonly used by Linux programmers, system administrators and end users to achieve their day to day work in Linux environment. It is designed for computer students who have limited or no previous exposure to Linux.</p> <p><b>Learning Outcomes:</b></p> <ol style="list-style-type: none"> <li>1) Upon completion of this course, students should have a good working knowledge of Linux, from both a graphical and command line perspective, allowing them to easily use any Linux distribution.</li> <li>2) This course shall help student to learn advanced subjects in computer science practically.</li> <li>3) Student shall be able to progress as a Developer or Linux System Administrator using the acquired skill set.</li> </ol>

<b>SEMESTER II (THEORY)</b>		<b>L</b>	<b>Cr</b>
<b>Paper-IV: Data Structures</b>	<b>Paper Code: RJSUCS204</b>	45	2
<b>UNIT I</b>		15	
<b>DATA TYPES AND SORTING</b>			
1	<b>Abstract Data Types:</b> Introduction, The Date Abstract Data Type, Bags, Iterators. Application. <b>Arrays:</b> Array Structure, Python List, Two Dimensional Arrays, Multidimensional Arrays.		
2	<b>Sets and Maps:</b> Sets-Set ADT, Selecting Data Structure, List based Implementation, Maps-Map ADT, List Based Implementation .		
3	<b>Searching and Sorting:</b> Searching-Linear Search, Binary Search, Sorting-Bubble, Selection Working with Sorted Lists-Maintaining Sorted List, Maintaining sorted Lists.		
<b>UNIT II</b>		15	
<b>DIFFERENT DATA STRUCTURES</b>			
1	<b>Linked Structures:</b> Introduction, Singly Linked List-Traversing, Searching, Prepending and Removing Nodes, Linked List Implementation.		
2	<b>Stacks:</b> Stack ADT, Implementing Stacks-Using Python List, Using Linked List, Stack Applications-Evaluating Postfix Expressions.		
3	<b>Queues:</b> Queue ADT, Implementing Queue-Using Python List, Circular Array, Using List, Priority Queues- Priority Queue ADT, Bounded and unbounded Priority Queues .		



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<b>UNIT III</b>		15	
<b>ADVANCE DATA STRUCTURES AND SORTING TECHNIQUES</b>			
1	<b>Advanced Linked List:</b> Doubly Linked Lists-Organization and Operation, Circular Linked List-Organization and Operation.		
2	<b>Recursion:</b> Recursive Functions, Properties of Recursion, Its working, Recursive Applications. <b>Advanced Sorting:</b> Merge Sort, Quick Sort, Radix Sort, Sorting Linked List.		
3	<b>Hash Table:</b> Introduction, Hashing-Linear Probing, Clustering, Rehashing, Separate Chaining, Hash Functions. <b>Binary Trees:</b> Tree Structure, Binary Tree-Properties, Implementation and Traversals, Expression Trees, Heaps and Heapsort, Search Trees.		

F.Y.BSc	Semester II Theory
RJSUCS204 Paper IV Data Structures	<p><b>COURSE OUTCOMES 2.4:</b></p> <p>To explore and understand the concepts of Data Structures and its significance in programming. Provide a holistic approach to design, use and implement abstract data types. Understand the commonly used data structures and various forms of its implementation for different applications using Python.</p> <p><b>Learning Outcomes:</b></p> <ol style="list-style-type: none"> <li>1) Learn about Data structures, its types and significance in computing.</li> <li>2) Explore Abstract Data types and its implementation.</li> <li>3) Ability to program various applications using different data structures in Python.</li> </ol>

<b>SEMESTER II (THEORY)</b>		<b>L</b>	<b>Cr</b>
<b>Paper-V: Calculus</b>	<b>Paper Code: RJSUCS205</b>	45	2
<b>UNIT I</b>		15	
<b>DERIVATIVES AND ITS APPLICATIONS</b>			
1	Review of Functions, limit of a function, continuity of a function, derivative function. Derivative In Graphing And Applications.		
2	Analysis of Functions: Increase, Decrease, Concavity, Relative Extrema; Graphing Polynomials, Rational Functions, Cusps and Vertical Tangents.		
3	Absolute Maxima and Minima, Applied Maximum and Minimum Problems, Newton's Method..		
<b>UNIT II</b>		15	
<b>INTEGRATION AND ITS APPLICATIONS</b>			
1	An Overview of the Area Problem, Indefinite Integral, Definition of Area as a Limit; Sigma Notation, Definite Integral, Evaluating Definite Integrals by Substitution, Area Between Two Curves, Length of a Plane Curve. Numerical Integration: Simpson's Rule.		
2	Modeling with Differential Equations, Separation of Variables, Slope Fields, Euler's Method, First- Order Differential Equations and Applications.		
<b>UNIT III</b>		15	

<b><i>PARTIAL DERIVATIVES AND ITS APPLICATIONS</i></b>		
1	Functions of Two or More Variables Limits and Continuity Partial Derivatives, Differentiability, Differentials, and Local Linearity, Chain Rule, Directional Derivatives and Gradients, Tangent Planes and Normal, Vectors, Maxima and Minima of Functions of Two Variables.	

F.Y.BSc	Semester II Theory
RJSUCS205 Paper V Calculus	<p><b>COURSE OUTCOMES 2.5:</b></p> <p>The course is designed to have a grasp of important concepts of Calculus in a scientific way. It covers topics from as basic as definition of functions to partial derivatives of functions in a gradual and logical way. The learner is expected to solve as many examples as possible to get complete clarity and understanding of the topics covered.</p> <p><b>Learning Outcomes:</b></p> <ol style="list-style-type: none"> <li>1) Understanding of Mathematical concepts like limit, continuity, derivative, integration of functions.</li> <li>2) Ability to appreciate real world applications which uses these concepts.</li> <li>3) Skill to formulate a problem through Mathematical modeling and simulation.</li> </ol>

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<b>SEMESTER II (THEORY)</b>		<b>L</b>	<b>Cr</b>
<b>Paper-VI: Statistical Methods and Testing of Hypothesis</b>	<b>Paper Code: RJSUCS206</b>	45	2
<b>UNIT I</b>		15	
<b>STANDARD DISTRIBUTIONS</b>			
1	Random variable; discrete, continuous, expectation and variance of a random variable, pmf, pdf, cdf, reliability.		
2	Introduction and properties without proof for following distributions; binomial, normal, chi-square, t, F. Examples.		
<b>UNIT II</b>		15	
<b>HYPOTHESIS TESTING</b>			
1	One sided, two sided hypothesis, critical region, p-value, tests based on t, Normal and F, confidence intervals.		
<b>UNIT III</b>		15	
<b>NON-PARAMETRIC TESTS</b>			
1	Need of non-parametric tests, sign test, Wilcoxon's signed rank test, run test, Kruskal-Wallis tests.		
2	Post-hoc analysis of one-way analysis of variance : Duncan's test Chi-square test of Association.		

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F.Y.BSc	Semester II Theory
RJSUCS206 Paper VI Statistical Methods and Testing of Hypothesis	<p><b>COURSE OUTCOMES 2.6:</b></p> <p>The purpose of this course is to familiarize students with basics of Statistics. This will be essential for prospective researchers and professionals to know these basics.</p> <p><b>Learning Outcomes:</b></p> <ol style="list-style-type: none"><li>1) Enable learners to know descriptive statistical concepts</li><li>2) Enable study of probability concept required for Computer learners.</li></ol>

<b>SEMESTER II (THEORY)</b>		<b>L</b>	<b>Cr</b>
<b>Paper-VII: Green Technologies</b>	<b>Paper Code: RJSUCS207</b>	45	2
<b>UNIT I</b>		15	
<b>GREEN TECHNOLOGIES OVERVIEW</b>			
1	<b>Green IT Overview:</b> Introduction , Environmental Concerns and Sustainable Development, Environmental Impacts of IT, Green I , Holistic Approach to Greening IT, Greening IT, Applying IT for Enhancing Environmental Sustainability, Green IT Standards and Eco-Labeling of IT , Enterprise Green IT Strategy, Green Washing, Green IT: Burden or Opportunity?		
2	<b>Green Devices and Hardware:</b> Introduction , Life Cycle of a Device or Hardware, Reuse, Recycle and Dispose <b>Green Software:</b> Introduction , Processor Power States , Energy-Saving Software Techniques, Evaluating and Measuring Software Impact to Platform Power.		
3	<b>Sustainable Software Development:</b> Introduction, Current Practices, Sustainable Software, Software Sustainability Attributes, Software Sustainability Metrics, Sustainable Software Methodology, Defining Actions <b>TroubleShooting:</b> What is trouble shooting and basic trouble shooting techniques.		
<b>UNIT II</b>		15	
<b>GREEN DATA CENTRES AND STORAGE</b>			

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1	Data Centres and Associated Energy Challenges, Data Centre IT Infrastructure, Data Centre Facility Infrastructure: Implications for Energy Efficiency, IT Infrastructure Management, Green Data Centre Metrics		
2	<b>Green Data Storage:</b> Introduction , Storage Media Power Characteristics, Energy Management Techniques for Hard Disks, System-Level Energy Management. <b>Green Networks and Communications:</b> Introduction, Objectives of Green Network Protocols, Green Network Protocols and Standards.		
3	<b>Enterprise Green IT Strategy:</b> Introduction, Approaching Green IT Strategies, Business Drivers of Green IT Strategy, Business Dimensions for Green IT Transformation, Organizational Considerations in a Green IT Strategy, Steps in Developing a Green IT Strategy, Metrics and Measurements in Green Strategies.		
<b>UNIT III</b>		15	
<b>SUSTAINABLE INFORMATION SYSTEMS AND GREEN METRICS</b>			
1	Introduction, Multilevel Sustainable Information, Sustainability Hierarchy Models, Product Level Information, Individual Level Information, Functional Level Information, Organizational Level Information, Measuring the Maturity of Sustainable ICT		
2	<b>Enterprise Green IT Readiness:</b> Introduction, Readiness and Capability, Development of the G-Readiness Framework, Measuring an Organization's G-Readiness.		
3	<b>Sustainable IT Services: Creating a Framework for Service Innovation:</b> Introduction, Factors Driving the Development of		

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	Sustainable IT, Sustainable IT Services (SITS), SITS Strategic Framework Enterprise Greening, Information Systems in Greening Enterprises, Enterprise. IT Usage and Hardware, Inter-organizational Enterprise Activities and Green Issues		
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F.Y.BSc	Semester II Theory
RJSUCS207 Paper VII Green Technologies	<p><b>COURSE OUTCOMES 2.7:</b></p> <p>To familiarize with the concept of Green Computing and Green IT infrastructure for making computing and information system environment sustainable. Encouraging optimized software and hardware designs for development of Green IT Storage, Communication and Services. To highlight useful approaches to embrace.</p> <p><b>Learning Outcomes:</b></p> <ol style="list-style-type: none"> <li>1) Learn about green IT can be achieved in and by hardware, software, network communication and data center operations.</li> <li>2) Understand the strategies, frameworks, processes and management of green IT</li> </ol>



**F.Y.B.Sc Computer-Science Syllabus Semester I & II**

<b>Semester I (PRACTICALS)</b>		<b>L</b>	<b>Cr</b>
<b>Practical-I: Computer Organization and Design + Programming with Python-1</b>	<b>Paper Code: RJSUCSP101 (RJSUCS101 + RJSUCS102)</b>		2
<b>Computer Organization and Design</b>			
1	Study and verify the truth table of various logic gates (NOT, AND, OR, NAND, NOR, EX-OR, and EX-NOR).		
2	Simplify given Boolean expression and realize it.		
3	Design and verify a half adder.		
4	Design and verify a half subtractor .		
5	Design and verify a full adder.		
6	Design and verify full subtractor.		
7	Design a 4 bit magnitude comparator using combinational circuits.		
8	Design and verify the operation of flip-flops using logic gates.		
9	Verify the operation of a counter.		
10	Verify the operation of a 4 bit shift register.		

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11	Assembly program for addition and subtraction.		
12	Assembly program for multiplication and division		
<b>Programming with Python-1</b>			
1	Installing and setting up the Python IDLE interpreter. Executing simple statements like expression statement (numeric and Boolean types), assert, assignment, delete statements; the print function for output.		
2	Script and interactive modes; defining a function in the two modes; executing a script; interactively executing a statement list (semicolon-separated sequence of simple statements); the input function.		
3	Programs based on lists, conditional constructs, the for statement and the range function; interactively using the built-in functions len, sum, max, min.		
4	Programs related to string manipulation.		
5	Programs based on the while statement; importing and executing built-in functions from the time, math and random modules.		
6	Programs using break and continue statements.		
7	Programs related to user defined function.		
8	Programs using the built-in methods of the string, list and dictionary classes.		
<b>Practical-II: FOSS + Database System</b>		<b>Paper Code: RJSUCSP102 (RJSUCS103 + RJSUCS104 )</b>	<b>2</b>

FOSS				
1	Identify any Open Source software and create detailed report about it. Sample Guidelines.			
	a.	Idea		
	b.	What problem does it solves?		
	c.	Licensing model		
	d.	Intent behind making it open source		
	e.	Monetization models		
	f.	Popularity		
	g.	Impact		
	2	2. Learn at least three different open source licenses and create abrief report about them.		
a.		History of license		
b.		Idea		
c.		What problems does it solve?		
d.		Detailed licensing model		
e.		Which popular software are released under this license?		
f.		Any popular news associated with this license?		
g.		Popularity		
h.		Impact		
3				

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	<table><tr><td colspan="2">Hands on with Open Source Software</td></tr><tr><td>a.</td><td>Identify any open source software of your interest</td></tr><tr><td>b.</td><td>Learn it from practical view-point</td></tr><tr><td>c.</td><td>Give a brief presentation about it to the class</td></tr><tr><td>d.</td><td>Sample projects: gcc, gdb, drupal, wordpress, apache web server, mysql database</td></tr></table>	Hands on with Open Source Software		a.	Identify any open source software of your interest	b.	Learn it from practical view-point	c.	Give a brief presentation about it to the class	d.	Sample projects: gcc, gdb, drupal, wordpress, apache web server, mysql database		
Hands on with Open Source Software													
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4	<table><tr><td colspan="2">Contributing to Wikipedia:</td></tr><tr><td>a.</td><td>Introduction to wikipedia: operating model, license, how to contribute?</td></tr><tr><td>b.</td><td>Create your user account on wikipedia</td></tr><tr><td>c.</td><td>Identify any topic of your choice and contribute the missing Information</td></tr></table>	Contributing to Wikipedia:		a.	Introduction to wikipedia: operating model, license, how to contribute?	b.	Create your user account on wikipedia	c.	Identify any topic of your choice and contribute the missing Information				
Contributing to Wikipedia:													
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5	<table><tr><td>Github</td><td></td></tr><tr><td>a.</td><td>Create and publish your own open source project: Write any simple program using your choice of programming language.</td></tr><tr><td colspan="2">Create a repository on github and save versions of your project. You'll learn about the staging area, committing your code, branching, and merging, Using GitHub to Collaborate: Get practice using GitHub or other remote repositories to share your changes with others and collaborate on multi-developer projects. You'll learn how to make and review a pull request on GitHub.</td></tr></table>	Github		a.	Create and publish your own open source project: Write any simple program using your choice of programming language.	Create a repository on github and save versions of your project. You'll learn about the staging area, committing your code, branching, and merging, Using GitHub to Collaborate: Get practice using GitHub or other remote repositories to share your changes with others and collaborate on multi-developer projects. You'll learn how to make and review a pull request on GitHub.							
Github													
a.	Create and publish your own open source project: Write any simple program using your choice of programming language.												
Create a repository on github and save versions of your project. You'll learn about the staging area, committing your code, branching, and merging, Using GitHub to Collaborate: Get practice using GitHub or other remote repositories to share your changes with others and collaborate on multi-developer projects. You'll learn how to make and review a pull request on GitHub.													
6	<p>Open Source Operating Systems</p> <p>Learn any open source operating system of your choice : Linux, Android, FreeBSD, Open Solaris etc.</p> <p>Learn the installation.</p> <p>Identify the unique features of the OS of your choice.</p>												

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7	.Virtualization: Open Source virtualization technologies: Install and configure any one: VirtualBox. Create and use virtual machines		
8	Containerization: Containerization technology: docker		
9	Linux Kernel: Learn Linux kernel with respect to: How development works? Download kernel source code. Compile the Kernel		
<b>Database System</b>			
1	For given scenario Draw an E-R diagram and convert entities and relationships to table.		
2	Write relational algebra queries on the tables created in Practical1		
3	Perform the following: 1. Viewing all databases 2. Creating a Database 3. Viewing all Tables in a Database 4. Creating Tables (With and Without Constraints) 5. Inserting/Updating/Deleting Records in a Table		
4	Perform the following: 1. Altering a Table 2. Dropping/Truncating/Renaming Tables 3. Backing up / Restoring a Database		
5	Perform the following: 1. Simple Queries 2. Simple Queries with Aggregate functions 3. Queries with Aggregate functions (group by and having clause		

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6	Queries involving <ol style="list-style-type: none"> <li>1. Date Functions</li> <li>2. String Functions</li> <li>3. Math Functions</li> </ol>		
7	Join Queries <ol style="list-style-type: none"> <li>1. Inner Join</li> <li>2. Outer Join</li> <li>3. Selecting from a view</li> <li>4. Saving (Commit) and Undoing (rollback), SavePoint</li> </ol>		
8	Subqueries <ol style="list-style-type: none"> <li>1. With IN clause</li> <li>2. With EXISTS clause</li> </ol>		
9	Views <ol style="list-style-type: none"> <li>1. Creating Views (with and without check option)</li> <li>2. Dropping views</li> </ol>		
10	TCL statements		
11	DCL statements Granting and revoking permissions		
<b>Practical-III: Discrete Mathematics + Descriptive Statistics and Introduction to Probability</b>		<b>Paper Code: RJSUCSP103 (RJSUCS105 + RJSUCS106)</b>	2
<b>Discrete Mathematics</b>			
1	Graphs of standard functions such as absolute value function, inverse function, logarithmic and exponential functions, flooring ceiling functions, trigonometric functions over suitable intervals.		
2	Partial ordering sets, Hasse diagram and Lattices.		

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3	Recurrence relation		
4	Different counting principles.		
5	Finite state Automata and Finite state machines		
6	Warshall's Algorithm.		
7	Shortest Path algorithms.		
8	Operations on graph.		
9	Breadth and Depth First search algorithms.		
10	Concept of searching, inserting and deleting from binary search trees.		
<b>Descriptive Statistics and Introduction to Probability</b> ( <i>To be implemented using R</i> )			
1	Frequency distribution and data presentation Frequency distribution using cut(), table()		
2	Measures of central tendency		
3	Data entry using, functions, c(), scan (), Creating vectors, Mathematical Operations: $^{**}$ $^{+/-}$ $^{*/}$ $^{/}$ $^A$ , exp, log, log10, etc, creating vector of text type, useful functions: data, frame, matrix operations, seq(), split() etc.		
4	Data presentation		
5	Finite Summary Statistics (measures of central tendency, dispersion)		
6	Measures of skewness and kurtosis		

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7	Correlation and regression		
8	Probability		
9	Conditional probability.		
<b>Practical-IV: Soft Skills</b>		<b>Paper Code: RJSUCSP104 (RJSUCS107 )</b>	1
<b>Soft Skills</b>			
1	<b>Personality Development:</b> Communication skill, body language, how they deal with their strength and weakness .		
2	<b>Professional Presentation:</b> Nature of Oral Presentation, Planning a Presentation, Preparing the Presentation, Delivering the Presentation		
3	<b>Resume Writing</b>		
4	<b>Group Discussion</b>		
5	<b>Project Report:</b> A Project report should be prepared based on this four practicals. The report should have a font size of 12, Times new roman and 1.5 line spacing. The headings should have font size 14.		



F.Y.B.Sc	Semester I (Practical)
RJSUCSP101 (RJSUCS101+ RJSUCS102)	<p><b>Computer Organization and Design</b></p> <p>Course Outcomes:</p> <ol style="list-style-type: none"><li>1) To understand how a simulator is used to test circuits.</li><li>2) To test &amp; study various logic gates.</li><li>3) To test &amp; study adders and subtractors.</li><li>4) To design and study various circuits like flip-flops, counter and shift registers</li><li>5) To understand the basics of assembly programming.</li></ol> <p>Learning outcomes:</p> <ol style="list-style-type: none"><li>1. Understanding of Logisim simulator.</li><li>2. Understanding of various circuit designs.</li><li>3. Understanding basics of assembly programming.</li></ol> <p><b>Python Programming I</b></p> <p>Course Outcomes:</p> <ol style="list-style-type: none"><li>1.To learn and understand Python programming basics and paradigm.</li><li>2.To learn and understand python looping, control statements and string manipulations.</li><li>3.Students should be made familiar with the concepts of modules in python.</li><li>4.To learn and know the concepts of user defined functions in programming.</li><li>5.To learn and know the concepts of object oriented programming.</li></ol> <p>Learning outcomes:</p>

	<p>1. Understand syntax of python programming</p> <p>2. Understand how to use basic and advanced data type of python programming.</p> <p>3. Design and implement control statement and looping programs.</p> <p>4. Understand how to use modules of python programming.</p> <p>5. Understand how to defined function in python.</p>
<p>RJSUCSP102</p> <p>(RJSUCS103+</p> <p>RJSUCS104)</p>	<p><b>Free and Open Source Software</b></p> <p>Course Outcomes:</p> <p>1. This course provides an overview of the historical and modern context and operation of free and open source software (FOSS) communities and associated software projects.</p> <p>2. Students will learn some important FOSS tools and techniques for contributing to projects.</p> <p>Learning Outcomes:</p> <p>1. Ability to install and run open-source operating systems.</p> <p>2. Ability to gather information about Free and Open Source Software projects from software releases and from sites on the internet.</p> <p>3. Ability to install and run open-source operating systems.</p> <p>4. Ability to gather information about Free and Open Source Software projects from software releases and from sites on the internet.</p> <p><b>Database System:</b></p> <p><b>Course Outcomes:</b></p> <p>This course helps you in learning MySQL, which is one of the most widely used databases in the industry. This course covers the fundamental concepts of a relational database management system along with the steps to create database and database tables. Then it introduces queries to insert data, update,</p>

	<p>delete and fetch the data from the tables. Merging of tables, using aggregate functions, clauses to filter and sort the data, has been covered in detail. The course mainly focuses on the practical approach and expects you to try hands-on with the exercises to get completely proficient in working with.</p> <p><b>Learning outcomes:</b></p> <ul style="list-style-type: none"> <li>• Understand basic concepts of how a database stores information via tables.</li> <li>• Understand SQL syntax used with MySQL.</li> <li>• Learn how to retrieve and manipulate data from one or more tables.</li> <li>• Learn how to filter data based upon multiple conditions.</li> <li>• Learn how to work with joins and subqueries.</li> <li>• Update and insert data into the existing tables.</li> <li>• Understand how the relationships between tables will affect the SQL.</li> </ul>
<p>RJSUCSP103 (RJSUCS105+ RJSUCS106)</p>	<p><b>Discrete Mathematics</b></p> <p>Course Outcomes:</p> <p>The purpose of the course is to familiarize the prospective learners with mathematical structures that are fundamentally discrete. This course introduces sets and functions, forming and solving recurrence relations and different counting principles. These concepts are useful to study or describe objects or problems in computer algorithms and programming languages.</p> <p>Learning Outcomes:</p> <p>1) To provide practical knowledge of discrete objects, starting with relations and partially ordered sets.</p>

	<p><b>Descriptive Statistics and Introduction to Probability</b></p> <p>Course Outcomes:</p> <p>The Objective of this Practical is to deals with numerical and graphical ways to describe and display data. Students will learn to calculate and interpret these measures and graphs,</p> <p>Learning outcomes:</p> <ol style="list-style-type: none"><li>1.Display data graphically and interpret graphs: histograms, Frequency Polygon and Ogive</li><li>2.Recognize, describe, and calculate the measures of location of data: quartiles and percentiles.</li><li>3.Recognize, describe, and calculate the measures of the center of data: mean, median, and mode.</li><li>4,Recognize, describe, and calculate the measures of the spread of data: variance, standard deviation, and range.</li></ol>
RJSUCSP104 (RJSUCS107)	<p>Soft Skill:</p> <p>Course Outcomes:</p> <p>The Objective of this Practical Developing professional, social and academic skills to harness hidden strengths, capabilities and knowledge equip them to excel in real work environment and corporate life.</p> <p>Learning outcomes:</p> <ol style="list-style-type: none"><li>1) To know about how to present your idea in front of people.</li><li>2) Understand the importance and type of communication in personal and professional environment.</li><li>3) How to create resume in professional manner.</li><li>4) how to discuss your idea in a group.</li></ol>

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<b>Semester II (PRACTICALS)</b>		<b>L</b>	<b>Cr</b>
<b>Practical-I: Programming with C + Programming with Python-II</b>	<b>Paper Code: RJSUCSP201 (RJSUCS201 + RJSUCS202)</b>		2
<b>Programming with C</b>			
1	Programs to understand the basic data types and I/O.		
2	Programs on Operators and Expressions		
3	Programs on decision statements.		
4	Programs on looping.		
5	Programs on arrays.		
6	Programs on functions.		
7	Programs on structures and unions.		
8	Programs on pointers,DMA.		
9	Programs on string manipulations.		
10	Programs on basic file operations.		

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11	Programs on Command Line Arguments.		
<b>Programming with Python-II</b>			
1	Programs to read and write files.		
2	Programs with iterables and iterators.		
3	Program to demonstrate exception handling.		
4	Program to demonstrate the use of regular expressions.		
5	Program to show draw shapes & event handling.		
6	Program to demonstrate GUI controls.		
7	Program to demonstrate database connectivity.		
8	Program to create server-client and exchange basic information		
<b>Practical-II: LINUX + Data Structure</b>		<b>Paper Code: RJSUCSP202 (RJSUCS203 + RJSUCS204 )</b>	2
<b>LINUX</b>			
1	Linux installation		
2	Basic Linux commands such as file and directory manipulation, redirection and piping		

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3	Basic filter commands such as head, tail, more, cat, sort, cut, grep		
4	Advanced filters such as egrep, fgrep, tr, sed, awk		
5	File operation commands such as – split, tar, find, zip, ln, chmod		
6	Basic shell scripting such as – defining variables, reading user input,		
7	conditions, loops, string operations, arithmetic operations		
8	Advanced shell scripting such as - environment variables, shell features,		
9	command line arguments, file tests, using backticks,		
<b>Data Structure</b>			
1	Implement Linear Search to find an item in a list.		
2	Implement binary search to find an item in an ordered list.		
3	Implement Sorting Algorithms a. Bubble sort b. Selection sort		
4	Implement use of Sets and various operations on Sets.		
5	Implement working of Stacks. (pop method to take the last item added off the stack and a push method to add an item to the stack)		
6	Implement Program for Postfix Evaluation.		
7	Implement a queue as a list which you add and delete items from.		

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8	Implement Linked list and demonstrate the functionality to add and delete items in the linked list.		
<b>Practical-III: Calculus + Statistical Methods and Testing of Hypothesis</b>		<b>Paper Code: RJSUCSP203 (RJSUCS205 + RJSUCS206 )</b>	2
<b>Calculus</b>			
1	Continuity of functions; Derivative of functions		
2	Increasing, decreasing, concave up and concave down functions		
3	Relative maxima, relative minima, absolute maxima, absolute minima		
4	Newton's method to find approximate solution of an equation		
5	Area as a limit and length of a plane curve		
6	Numerical integration using Simpson's rule		
7	Solution of a first order first degree differential equation, Euler's method		
8	Calculation of Partial derivatives of functions		
9	Local linear approximation and directional derivatives		
10	Maxima and minima of functions of two variables		
<b>Statistical Methods and Testing of Hypothesis</b>			
1	Problems based on binomial distribution		



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2	Problems based on normal distribution		
3	Property plotting of binomial distribution		
4	Property plotting of normal distribution		
5	Plotting pdf, cdf, pmf, for discrete and continuous distribution		
6	t test, normal test, F test		
7	Analysis of Variance		
8	Non parametric tests- I		
9	Non- Parametric tests – II		
10	Post-hoc analysis of one-way analysis		
<b>Practical-IV: Green Technologies</b>		<b>Paper Code: RJSUCSP104 (RJSUCS107 )</b>	1
<b>Green Technologies</b>			
1	<b>Project based on outreach activity:</b> Student have to do one project based on outreach activity.		
2	<b>Project Report:</b> A Project report should be prepared based on outreach activity done by students. The report should have a font size of 12, Times new roman and 1.5 line spacing. The headings should have font size 14.		

F.Y.B.Sc	Semester II (Practical)
RJSUCSP201 (RJSUCS201+ RJSUCS202)	<p><b>Programming with C:</b></p> <p>Course Outcomes:</p> <p>The objective of this course is to provide a comprehensive study of the C programming language, stressing upon the strengths of C, which provide the students with the means of writing modular, efficient, maintainable, and portable code.</p> <p>Learning Outcomes:</p> <ol style="list-style-type: none"><li>1) Students should be able to write, compile and debug programs in C language.</li><li>2) Students should be able to use different data types in a computer program.</li><li>3) Students should be able to design programs involving decision structures, loops and functions.</li><li>4) Students should be able to explain the difference between call by value and call by reference</li><li>5) Students should be able to understand the dynamics of memory by the use of pointers.</li><li>6) Students should be able to use different data structures and create/update basic data files.</li></ol> <p><b>Programming with Python-II</b></p> <p>Course Outcomes:</p> <ol style="list-style-type: none"><li>1. To learn and understand Python programming basics and paradigm.</li><li>2. To learn and understand python looping, control statements and string manipulations.</li><li>3. Students should be made familiar with the concepts of GUI controls and designing GUI applications.</li></ol>

	<p>4.To learn and know the concepts of file handling, exception handling and database connectivity</p> <p>Learning outcomes:</p> <p>1.Design and implement file handling, exception handling and database connectivity</p> <p>2.Design and implement a program to solve a real world problem</p> <p>3.Design and implement GUI applications and how to handle events.</p> <p>4.Make database connectivity in python programming language.</p>
<p>RJSUCSP202</p> <p>(RJSUCS203+</p> <p>RJSUCS204)</p>	<p><b>Linux</b></p> <p>Course Outcomes:</p> <p>The course objective of Linux practicals is to analyze fundamentals of the Linux operating system, including installation, configuration, administration, file management, and security.</p> <p><b>Learning outcomes:</b></p> <ul style="list-style-type: none"><li>• Explain some of the different distribution of Linux and the reason for open source</li><li>• Use Linux commands to manage files and file systems</li><li>• Create and execute BASH scripts</li><li>• Explain the structure of the Linux operating system</li><li>• Establish user accounts and permissions</li><li>• Configure basic Linux network services</li></ul> <p><b>Data Structure:</b></p> <p>Course Outcomes:</p> <p>Understanding basic data structures and algorithms.</p> <p>Learning outcomes:</p>

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	<ol style="list-style-type: none"> <li>1. To provide the knowledge of basic data structures and their implementations.</li> <li>2. To understand the importance of data structures in the context of writing efficient programs.</li> <li>3. To develop skills to apply appropriate data structures in problem solving.</li> <li>4. Ability to analyze algorithms and algorithm correctness.</li> <li>5. Ability to summarize searching and sorting techniques.</li> <li>6. Ability to describe stack, queue and linked list operation.</li> </ol>
RJSUCSP203 (RJSUCS205+ RJSUCS206)	<p><b>Calculus</b></p> <p>Course Outcomes:</p> <p>To understand the basic concepts of differential and integral calculus .</p> <p>Learning outcomes:</p> <ol style="list-style-type: none"> <li>1. Compute indefinite and definite integrals using by the method of substitution.</li> <li>2. Use integration by parts to evaluate integrals.</li> <li>3. evaluate integrals using by the inverse substitution.</li> </ol> <p><b>Statistical Methods and Testing of Hypothesis</b></p> <p>Course Outcomes: To understand Hypothesis testing, Analysis of Variance, Correlation and Regression analysis, Multiple Regression</p> <p>Learning outcomes:</p> <ol style="list-style-type: none"> <li>1. Perform Test of Hypothesis as well as calculate confidence interval for a population parameter for single sample and two sample cases</li> <li>2. Learn non-parametric test such as the Chi-Square test,</li> <li>3. Compute and interpret the results of Bivariate and Multivariate Regression and Correlation Analysis</li> </ol>

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RJSUCSP204 (RJSUCS207)	<p><b>Green Technologies:</b></p> <p>Course Outcomes:</p> <p>To familiarize with the concept of Green Computing and Green IT infrastructure for making computing and information system environment sustainable.</p> <p>Learning outcomes:</p> <ol style="list-style-type: none"><li>1. Understand the usage of Green IT in Practical way.</li><li>2. Doing some activity for understanding how we can use Green IT in daily life in practical way.</li></ol>
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**Scheme of Examinations**

1. Two Internals of 20 marks each. Duration 30min for each.
2. One External (Semester End Examination) of 60 marks. Duration 2 hours.
3. One Practical at the end of Semester consisting of Groups and each group have 2 practicals each of 50 marks but passing combined out of 100.
4. Minimum marks for passing Semester End Theory and Practical Exam is 40 %.
5. Student must appear for at least one of the two Internal Tests to be eligible for the Semester End Examination.
6. For any KT examinations, there shall be ODD-ODD/EVEN-EVEN pattern followed.
7. Two short field excursions for habitat studies are compulsory.
8. Field work of not less than eight hours duration is equivalent to one period per week for a batch of 15 students.
9. A candidate will be allowed to appear for the practical examinations if he/she submits a certified journal of F.Y.B.Sc. Computer-Science or a certificate from the Head of the department / Institute to the effect that the candidate has completed the practical course of F.Y.B.Sc. Computer-Science as per the minimum requirements.
10. In case of loss of journal, a candidate must produce a certificate from the Head of the department /Institute that the practicals for the academic year were completed by the student. However, such a candidate will be allowed to appear for the practical examination, but the marks allotted for the journal will not be granted.
11. HOD's decision, in consultation with the Principal, shall remain final and abiding to all.

**Evaluation and Assessment****Evaluation (Theory): Total marks per course - 100.****CIA- 40 marks****CIA 1: Written test -20 marks****CIA 2: Written Test / Assignment / Field Trip/mini project/ & Report -20 marks****Semester End Examination – 60 marks****Question paper covering all units****Evaluation of Practicals 100 marks /group & 50 marks Skill Development subject (RJSUCSP101, RJSUCSP102, RJSUCSP103& RJSUCSP104(Skill), RJSUCSP201, RJSUCSP202, RJSUCSP203 & RJSUCSP204(Skill) )****Course SemesterEnd Examination in Semester1 and II Paper I To VII  
( RJSUCS101 To RJSUCS107, RJSUCS201 To RJSUCS207)**

<b>Question</b>	<b>KNOWLEDGE</b>	<b>UNDERSTANDING</b>	<b>APPLICATION and ANALYSES</b>	<b>TOTAL MARKS-Per unit</b>
<b>Unit 1</b>	08	03	04	15
<b>Unit 2</b>	08	03	04	15
<b>Unit 3</b>	08	03	04	15
<b>Short notes from topics covering all the units</b>	08	03	04	15
<b>-TOTAL-Per objective</b>	32	12	16	<b>60</b>
<b>% WEIGHTAGE</b>	53	20	27	<b>100 %</b>

**Evaluation of Practicals 100 marks /group & 50 marks Skill Development subject (RJSUCSP101, RJSUCSP102, RJSUCSP103& RJSUCSP104(Skill), RJSUCSP201, RJSUCSP202, RJSUCSP203 & RJSUCSP204(Skill) )**

Continuous Evaluation of components which require adequate duration for completion of the task, observation and interpretation: 25%

Course end Practical Evaluation of skills of students in terms of skill, analysis, interpretation and conclusion.

**Mapping of the course to employability/ Entrepreneurship/skill development**

Class	Course Name	Course Code	Unit No. And topics focusing on Employability / Entrepreneurship / Skill development	Employability / Entrepreneurship / Skill development
<b>FYBSC SEM I</b>				
FYBSC	Computer Organization and Design	RJSUGCS101	<b>Employability</b> <b>UNIT 1:</b> Computer Abstractions and Technology , Logic circuits and functions <b>UNIT 2:</b> Flip-Flop , Instruction set architectures of 8086 <b>UNIT 3:</b> Basic Processor Unit , Basic IO	Employability in the field of circuit design

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FYBSC	Programmin g with Python-I	RJSUGCS102	<b>Employability</b> <b>UNIT 1:</b> Introduction to python programming, Data, Python Basic syntax, Types of operators, I/O functions <b>UNIT 2:</b> conditional statements , Loop Control Statements, Function in python <b>UNIT 3:</b> Dictionaries, Python Date-Time	Employability in the field of programming, development
FYBSC	Free and Open Source Software	RJSUGCS103	<b>Employability</b> <b>UNIT 1:</b> Introduction, Methodologies, Social Impact <b>UNIT 2:</b> Case Studies, Contributing to Open Source Projects <b>UNIT 3:</b> Understanding Open Source Ecosystem	Employability in the field of development
FYBSC	Database Systems	RJSUGCS104	<b>Employability</b> <b>UNIT 1:</b> Introduction to DBMS, Entity Relationship Model, Relational data model, ER-Table <b>UNIT 2:</b> Relational Algebra, DDL Statements, DML Statements, Functions, Joining Tables, Subqueries	Employability in the field of data management or back end developer

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			<b>UNIT 3:</b> Database Protection, Views, DCL statements, TCL Statements	
FYBSC	Discrete Mathematics	RJSUGCS105	<b>Employability</b>  <b>UNIT 1:</b> Recurrence Relations (Functions, Relations, Recurrence Relations,  <b>UNIT 2:</b> Permutations and Combinations, Counting Principles, Set Theory  <b>UNIT 3:</b> Graphs, Trees	Employability in the field of teaching
FYBSC	Descriptive Statistics and Introduction to Probability	RJSUGCS106	<b>Employability</b>  <b>UNIT 1:</b> Data Presentation, Data Aggregation  <b>UNIT 2:</b> Moents, Measures of Skewness and Kurtosis , Correlation and Regression, Linear regression  <b>UNIT 3:</b> Probability definition	Employability in the field of teaching or also it is important in data analysis

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FYBSC	Soft Skills Development	RJSUGCS107	<b>Skill Development</b>  <b>UNIT 1:</b> Personality Development, Emotional Intelligence, Etiquette and Mannerism, Communication Today  <b>UNIT 2:</b> Communication Today, Professional Presentation, Job Interviews, Group Discussion  <b>UNIT 3:</b> Creativity at Workplace, Ethical Values, Capacity Building, Leadership and Team Building, Decision Making and Negotiation, Stress and Time Management	
<b>FYBSC SEM II</b>				
FYBSC	Programmin g with C	RJSUGCS201	<b>Employability</b>  <b>UNIT 1:</b> Structure of C program, Data, Variables, Types of operators, Iterations  <b>UNIT 2:</b> Arrays, Data I/O functions, Strings, Recursion  <b>UNIT 3:</b> Pointer, Dynamic Memory Allocation, Structure, Unions, File handling	Employability in the field of development

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FYBSC	Programmin g with Python– II	RJSUGCS202	<b>Employability</b>  <b>UNIT 1:</b> Python File Input-Output, Exception handling, Regular Expressions  <b>UNIT 2:</b> GUI Programming in Python (using Tkinter/wxPython/Qt)  <b>UNIT 3:</b> Database connectivity in Python, Network connectivity	Employability in the field of development
FYBSC	Linux	RJSUGCS203	<b>Employability</b>  <b>UNIT 1:</b> Linux System, Linux Basics, Basic bash shell commands, More bash shell commands, The Linux environment variable  <b>UNIT 2:</b> Linux file permission, vi editor, structured commands  <b>UNIT 3:</b> Script control, Editors, Essential System Administration, TCP/IP networking,	Employability in the field of server administration

**F.Y.B.Sc Computer-Science Syllabus Semester I & II**

FYBSC	Data Structures	RJSUGCS204	<b>Employability</b> <b>UNIT 1:</b> Abstract Data Types, Arrays, Sets and Maps, Searching and Sorting  <b>UNIT 2:</b> Linked Structures, Stacks, Queues,  <b>UNIT 3:</b> Advanced Linked List, Recursion, Advanced Sorting, Hash Table, Binary Trees	Employability in the field of development
FYBSC	Calculus	RJSUGCS205	<b>Employability</b> <b>UNIT 1:</b> DERIVATIVES AND ITS APPLICATIONS  <b>UNIT 2:</b> INTEGRATION AND ITS APPLICATIONS:  <b>UNIT 3:</b> PARTIAL DERIVATIVES AND ITS APPLICATIONS	Employability in the field of teaching
FYBSC	Statistical Methods and Testing of Hypothesis	RJSUGCS206	<b>Employability</b> <b>UNIT 1:</b> Standard distributions  <b>UNIT 2:</b> Hypothesis testing  <b>UNIT 3:</b> Non-parametric tests	Employability in the field of teaching or also it is important in data analysis



**F.Y.B.Sc Computer-Science Syllabus Semester I & II**

FYBSC	Green Technologies	RJSUGCS207	<b>Skill Development</b>  <b>UNIT 1:</b> Green IT Overview, Green Devices and Hardware, Green Software, Sustainable Software Development  <b>UNIT 2:</b> Green Data Centers, Green Data Storage, Green Networks and Communications, Enterprise Green IT Strategy,  <b>UNIT 3:</b> Sustainable Information Systems and Green Metrics, Enterprise Green IT Readiness, Sustainable IT Services: Creating a Framework for Service  Innovation	
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