

**COMPUTER SCIENCE COMPLEMENTARY PAPERS
FOR B.SC. MATHEMATICS, STATISTICS
(2022 admission onwards)**

SCHEME

Sem.	Course	Credits	Hrs/Week		Lab
			T	P	
1	CS1131.3 Fundamentals of Information Technology	2	2	2	
2	CS1231.3 Web Programming	2	2	2	
3	CS1331.3 Introduction to Data Science	3	3	2	
4	CS1431.3 Python Programming	3	3	-	
4	CS1432.3 Python Programming Lab	4	-	2	

Division of Marks (Lab Examination)

1. First program should be sufficiently simple (From Part A) – **25 Marks**
(Logic – 10 marks, Successful compilation – 10 marks, Result – 5 marks)
2. Second Program should be based on advanced concepts (From Part B) – **30 Marks**
(Logic – 15 marks, Successful compilation – 10 marks, result – 5 marks)
3. Viva Voce – **15 Marks**
4. Lab Record – **10 Marks**

Total Marks – 80 Marks

CS1131.3 FUNDAMENTALS OF INFORMATION TECHNOLOGY

1. COURSE OUTCOME

At the end of the course, the student will be able to:

C01	Remember basic concepts and terminologies
C02	Understand how multimedia and networking is used in our daily lives
C03	Apply security measurements while using computers
C04	Analyze the impact of IT in different application areas

2. COURSE CONTENT

Module I: Information Technology Basics: Information – Need for information - Information Technology – Role of Information Technology – Information Technology and the Internet. **Multimedia Essentials:** Building Blocks of Multimedia – Multimedia System – Multimedia Applications – Virtual Reality.

Module II: Computer Software: Introduction – Categories of Software – Installing and Uninstalling Software – Software Piracy – Software Terminologies. **Data Communication and Computer Networks:** Data Communication – Transmission Media. **Computer Network:** Types of Computer Networks –Network Devices.

Module III: Internet: Introduction - Evolution of Internet and basic terminologies – Getting connected to the Internet – Internet Applications – Data over the Internet. **Internet Tools:** Web Browser – Electronic mail – E-mail Client – Search Engines – Instant Messaging. **Computer Security:** Security Threats – Malicious Programs - Digital Signature – Firewall – User Identification and Authentication – Data Backup and Recovery – Security Awareness and Policies.

Module IV: Current and Future Trends in IT: Electronic Commerce – Electronic Data Interchange – Wireless Application Protocol – Smart Card – Internet Protocol Television – Blogging – Radio Frequency Identification – Brain Computer Interface –Imminent Technologies. **Artificial Intelligence** (definition and applications only): Introduction – Natural Language processing – Expert Systems – Neural Networks. **Societal Impacts of IT** – Role of Technology in Disaster Management - e-Governance.

CORE TEXT

- ITL Education Solutions, Introduction to Information Technology, Pearson Education, 2020

ADDITIONAL REFENCES

- Jagbir Singh, Disaster Management- Future Challenges and Opportunities, Dreamtech Press, 2020
- Reema Thareja, Fundamentals of Computers, 2nd edition, Oxford Publishers
- V. Rajaraman, Introduction to Information Technology, 3rd edition, PHI, 2018

WEB REFERENCES

- <https://www.india.gov.in/e-governance-portal>
- <https://nceg.gov.in/>
- <https://darpg.gov.in/e-governance>
- <http://egyankosh.ac.in/bitstream/123456789/25880/1/Unit-1.pdf>
- www.ijergs.org
- E-Governance-An Application of Information and Communication Technology
- E-Governance and Digital India Empowering Indian Citizens through Technology

CS1231.3: WEB PROGRAMMING

1. COURSE OUTCOMES

At the end of the Course, the Student will be able to

CO1	Remember basic concept of web technology.
CO2	Understand the different Web Programming languages.
CO3	Apply the styles to the web pages at various levels using CSS.
CO4	Analyze the looping structure and functions of JavaScript

2. COURSE CONTENT

Module I: General Introduction to Internet and WWW; **HTML:** Structured language, Document types, Rules of html, Html tags, Head tags, Body tags, Headings, Divisions and Centering, Quotations, Preformatted text, Lists, Horizontal Rules, Block level elements, Text level elements, Character entities, Comments, Fonts, Tables: Table tags, Colors, Color names, Color values, Marquee tag.

Module II: Advanced HTML - Linking in html: Anchor tags, Layer tags, Link relationships, URL: Relative, Absolute, Image, Image maps, Frames: Layouts, Targeting, no frame tag, Floating frames, Audio, Embed tag, **Forms:** form tag and its attributes, Get, Post, Form field elements, Form accessibility enhancements: Access key, Tooltips, Browser-specific form accessibility improvements.

Module III: JavaScript - Introduction to JavaScript, Variables and data types, Declaring Variables, Operators, Control Structures, Conditional Statements, Loop Statements, Functions, Objects, Dialog Boxes, Alert Boxes, Confirm Boxes, Prompt Boxes, JavaScript with HTML, Events, Arrays, Predefined objects, DHTML, Page Redirect, Void Keyword, Page Printing, String Methods, Error Handling, Validations, Publishing your Site, Cookies.

Module IV: CSS: Style Sheet Basics, Adding Style to a Document, CSS (Cascading Style Sheet) and HTML Elements, Selectors, Document Structure.

CORE TEXT

- V.K. Jain, Advanced Programming in Web Design, Cyber Tech Publications

ADDITIONAL REFERENCES

- Joel Sklar, Web Design Principles, Vikas, 5thEdition
- The Complete Reference HTML & XHTML, Thomas A Powell, 4thEdition
- H M Deitel, P J Deitel & A B Goldberg, Internet & World Wide Web How to Program, 3/e, Pearson Education

CS1331.3 INTRODUCTION TO DATA SCIENCE

1. COURSE OUTCOMES

At the end of the Course, the Student will be able to

CO1	Understand the data analytics life cycle.
CO2	Understand the concepts of Data pre-processing.
CO3	Apply probability theory for data analysis.
CO4	Analyze data using worksheet.
CO5	Evaluate formulas with tables.
CO6	Create charts for analysis.

2. COURSE CONTENT

Module I: Fundamentals of Data Science: Introduction, Why data science? Data Analytics life cycle, Types of Data analysis, Types of jobs in data analytics, Data Science tools, Areas of study in data science, Role of SQL in data science, Pros and Cons of data science. Data Pre -processing: Introduction, data types and forms, possible data error types, Various data pre -processing operations.

Module II: Data plotting and Visualization: Introduction, Visual encoding, Data Visualization software and libraries, Basic, specialized and advanced data visualization tools, Visualization of geospatial data, Data visualization types. Statistical data analysis: Role and kind of statistics, Descriptive statistics, Probability theory

Module III: Data Analysis with worksheet-Ranges and Tables-Data Cleaning with Text Functions, Containing Date Values and Containing Time Values; Conditional Formatting; Sorting and Filtering; Subtotals with Ranges; PivotTable.

Module IV: Quick Analysis; Lookup Functions; Data Visualization-Band Chart, Thermometer Chart, Gantt chart, Waterfall Chart, Sparkline and Pivot Charts.

CORE TEXT

- Gypsy Nandi and Rupam Kumar Sharma, Data Science fundamentals and practical approaches, BPB Publication, First Edition, 2020

ADDITIONAL REFERENCE

- Bernd Held, Excel Functions and Formulas, BPB Publications.

1431.3: PYTHON PROGRAMMING

1. **COURSE OUTCOMES:** At the end of the course, the student will be able to

CO1	Remember the concepts of python programming
CO2	Understand data types and differences
CO3	Apply CGI programming
CO4	Analyze the concepts of database programming in python
CO5	Evaluate the usage of Python package installer PIP
CO6	Create programs using libraries such as Flask, SQLAlchemy, Pandas, numpy etc..

2. COURSE CONTENT

Module I: Introduction to Python - Features of Python, Identifiers, Reserved Keywords, Variables, Comments in Python, Input, Output and Import Functions, Operators; **Data Types and Operations** - int, float, complex, Strings, List, Tuple, Set, Dictionary, Mutable and Immutable Objects, Data Type Conversion; **Flow control** - Decision Making, Loops-for, range() while, break, continue, pass;

Module II: Functions- Definition, calling, arguments, anonymous function, recursion, return; **Modules & Packages** - Built-in Modules, Creating Modules, import statement, Locating, modules, Namespaces and Scope, dir (), reload (), Packages in Python; **File Handling**- open, close, write, read, methods, rename, delete, directories;

Module III: Object oriented programming- class, object, method, attribute, destructor, encapsulation, data hiding; **Exception handling**- built in exceptions, Handling, Exception with

arguments, Raising and User defined exceptions, Assertions in Python; **Regular expressions** – match, search, replace, patterns.

Module IV: Database Programming- Connection, Create, insert, update, delete, commit, rollback, disconnection, exceptions; **Iterators-** Data type supports iterators; **CGI Programming-** HTTP Header, Env variables, Forms, Radio button, Dropdown box, check box, text area, cookies, uploading file.

CORE TEXT

- Jeeva Jose, “Taming PYTHON By Programming”, Khanna Publications, 2017

ADDITIONAL REFERENCES

- Allen B. Downey,” Think Python- How to think like a computer scientist”, Second Edition, O’Reilly, 2016.
- Paul Gries, Jennifer Campbell and Jason Montojo, “Practical Programming: An Introduction to Computer Science using Python 3”, Second edition, Pragmatic Programmers, LLC, 2013.

CS1432.3: PYTHON PROGRAMMING LAB

The laboratory work will consist of 10-15 Experiments

Part A

- To write, test, and debug simple Python programs.
- To implement Python programs with conditionals and loops. (square root, gcd, exponentiation, sum of an array of numbers, linear search, binary search, bubble sort, insertion sort, selection sort etc.)
- Use functions for structuring Python programs.
- Represent compound data using Python lists, tuples, dictionaries.

Part B

- Read and write data from/to files in Python.
- Programs to demonstrate creating and handling of modules and packages
- Programs involving a variety of Exception Handling situations
- Programs involving Database manipulation
- CGI programming