ST. ALOYSIUS' COLLEGE
JABALPUR (MADHYA PRADESH)

Autonomous, Reaccredited 'A++' Grade by NAAC (CGPA 3.58/4.00)
College with Potential for Excellence (CPE) by UGC

DST-FIST Supported & Star College Scheme by DBT

Affiliated to Rani Durgavati Vishwavidyalaya, Jabalpur (M.P.)

SYLLABUS

Department of Computer Science

BCA

Academic Curriculum & Syllabus

Programme Level	UG
Academic Session	
Department	CS

PROGRAM OUTCOMES

PO1. Apply knowledge of computer applications, programming, mathematics, and information technology to solve real-world problems using appropriate computational approaches.

PO2. Analyze complex problems, develop logical and innovative solutions, and apply computational thinking to address societal and professional challenges.

PO3. Design, develop, test, and maintain software applications using modern technologies, tools, databases, and sustainable development practices.

PO4. Demonstrate effective communication, collaboration, ethical responsibility, leadership, professional values, and sensitivity towards societal and environmental needs.

PO5. Develop an attitude of lifelong learning, creativity, innovation, entrepreneurship, and adaptability to emerging technologies for continuous personal and professional development.

Syllabus Book

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SYLLABUS

Department	Department of Computer Science	Program	BCA
Level	UG	Semester	V
Course Code		Course Type	Core Course
Paper	I	Course Title	Programming With Python
Credit	4	Session	

Course Outcomes

CO1. Understand Python's fundamentals and development environments, including installation, data types, variables, operators, and input/output operations. (U, R)

CO2. Master Python's control structures, data collections, and functions, including conditional and loop statements, strings, lists, tuples, sets, dictionaries, and higher-order functions. (U, R, Ap)

CO3. Understand the importance of modular programming, creating and using predefined and user-defined modules and packages, and file and directory handling in Python. (U, Ap, C)

CO4. Comprehend procedural vs. object-oriented programming, OOP principles (encapsulation, abstraction, polymorphism, inheritance), inner classes, and exception handling. (An, Ap, C)

CO5. Learn multithreading and multiprocessing in Python, thread lifecycle methods, synchronization, and Numpy, Pandas, and Matplotlib for data handling and plotting. (U, Ap, C)

UNIT 1	Content	Duration
1	What is Python? WHY PYTHON? History, Features - Dynamic, Interpreted, Object-oriented, Embeddable, Extensible, Large standard libraries, Free and Open source.Data Types and Variables, Numbers, Operators Comments in Python. Input-output operation in Python, str.format(). Control Statements: Conditional control statements - if, If-else, If-elseif-else, Loop control statements- for, while.	12
2	Data Structure : - String, List, Tuple, Set, Dictionary, Comparison of List, Tuple, and Set, Function in Python, types of function in Python, map, reduce, filter function. Lambda Function. Importance of modular programming. What is a module? Types of Modules: Pre-defined, User-defined. A user defines module creation, Date-time, math modules.	12
3	organizing Python projects into packages. Types of packages – predefined, user-defined. Package. Procedural v/s Object-oriented programming, Principles of OOP - Encapsulation, Abstraction (Data Hiding), Polymorphism, Inheritance. Exception handling and types of errors, try, except, finally, raise, and Need to Custom exceptions.	12
4	Introduction of Numpy: Creating Arrays, Array indexing, Array slicing, Array Shape, Array Reshape, Array iterating, Array Join, Array Split, Array Search, Array Sort, Array Filter. Introduction Pandas: Series, DataFrames. Data Visualization using Matplotlib: Pyplot, Plotting, Markers, Line, Labels, Grid, Scatter, Bars, Pie.	12
5	Python File Handling: Python File Handling, Python Read CSV File, Python Write CSV File, Read Excel File, Write Excel File GUI programming in Python, using Tkinter library, root, Tk() function, mainloop(), pack(), widgets in tkinter: label, entry, command buttons, check-button, radio-button, scale, scroll-bar, geometry(), design a GUI window form.	12

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Assessment Scheme

Component	Credit	Internal	External	Total
Theory	3	40	60	100
Practical	1	40	60	100
Total	**4**			**200**

Practical List

P1. Write a program to demonstrate different number data types in Python.

P2. Write a program to perform different arithmetic Operations on numbers in Python.

P3. Write a program to create, concatenate print a string and access a sub-string from a given string.

P4. Write a Python script to print the current date in the following format a. "Fri Oct 11

P5. Write a program to create, append, and remove lists in Python.

P6. Write a program demonstrating working with tuples in Python.

P7. Write a program demonstrating working with dictionaries in Python.

P8. Write a Python program to find the largest of three numbers.

P9. Write a Python program to construct the following pattern, using a nested for loop

P10. *

P11. *

P12. * *

P13. * * *

P14. **

P15. *

P16. *

P17. Write a Python script that prints primenumberslessthan20.

P18. Write a Python program to define a module to find Fibonacci Numbers and import the module to another program.

P19. Write a Python program to define a module and import a specific function in that module to another program.

P20. Write a program that inputs a text file. The program should print all of the unique words in the file in alphabetical order.

P21. Write a Python class to convert an integer to a Roman numeral.

P22. Write a Python class to reverse a string word by word.

Reference Books

- Python Crash Course: A Hands-On, Project-Based Introduction to Programming Edition Eric Matthes.
- The Python Language Reference Manual (version 3.2), Guido van Rossum, Drake, Jr. (Editor), ISBN: 1906966141, Network Theory Ltd, 120 pages

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Department	Department of Computer Science	**Program**	BCA
Level	UG	**Semester**	V
Course Code		**Course Type**	Elective
Paper	II	**Course Title**	Cloud Computing
Credit	6	**Session**	

Course Outcomes

CO1. Analyze the trade-offs between deploying applications in the cloud and over the local infrastructure. (U, R)

CO2. Compare the advantages and disadvantages of various cloud computing plateforms. (U, R, Ap)

CO3. Program data-intensive parallel applications in the cloud. (U, Ap, C)

CO4. Analyze the underlying cloud technologies and software's performance, scalability and availability. (An, Ap, C)

CO5. Solve a real-world problem using cloud computing through group collaboration. (U, Ap, C)

UNIT 1	Content	Duration
1	Cloud Computing Fundamental: Cloud Computing definition, Private, Public and Hybrid cloud types, IaaS, PaaS, SaaS, Benefits and challenges of cloud computing, public vs private clouds.	10
2	Basics of Service Management in Cloud Computing, Data Management in Cloud Computing. Cloud Computing Architecture: Cloud Reference Model, Layer and Types of clouds, Architectural design of compute and storage clouds.	10
3	Overview of cloud Management and Virtualization: Fundamental concept of compute, storage, networking, desktop and application virtualization, role of virtualization in enabling the cloud virtualization benefits, server virtualization, block and file level storage virtualization.	10
4	Cloud Security: Cloud Information security fundamentals, Cloud security services, Design principles, Secure Cloud Software requirements, Policy Implementation, Cloud Computing Security Challenges, Virtualization security management, Cloud Computing security architecture.	15
5	Market based management of Clouds, Federated Cloud/ Inter cloud: Characteristics and Definition, Cloud Federation Stack, Third Party cloud services.	15

Assessment Scheme

Component	Credit	Internal	External	Total
Theory	4	40	60	100
Practical	2	40	60	100
Total	**6**			**200**

Practical List

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P1. Download and Install Virtual Machine (Virtual Box, VMware, and KVM)

P2. Installing Virtual Machine

P3. Controlling Virtual Machine (Start, restart, power off)

P4. Editing Virtual Machine Hardware

P5. Creating and Using Image Snapshots

P6. Importing and Exporting Virtual Machine Images

P7. Accessing Linux Command Line

P8. Managing Files from the Command Line

P9. Creating, Viewing, and Editing Text Files

P10. Installing and Updating Software Packages

Reference Books

- A. Srinivasan, J. Suresh, Cloud Computing
- Gautam Shroff, Enterprise Cloud Computing Technology Architecture Application
- Kumar Saurabh- Cloud Computing
- Dimitris N. Chorafas – Cloud Computing Strategies
- Buyya, Selvi – Mastering Cloud Computing
- Krutz, Vnes – Cloud Security

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SYLLABUS

Department	Department of Computer Science	**Program**	BCA
Level	UG	**Semester**	V
Course Code		**Course Type**	Discipline Specific Elective (DSE)
Paper	I	**Course Title**	Statistics and R Programming
Credit	4	**Session**	

Course Outcomes

CO1. Develop a comprehensive understanding of descriptive statistics, including data classification, tabulation, and graphic representation.

CO2. Gain proficiency in correlation and regression analysis techniques and their applications in statistical modelling.

CO3. Acquire a solid foundation in probability theory and probability distributions, and apply these concepts to real-world scenarios.

CO4. Enhance skills in data visualization and statistical analysis using R, including hypothesis testing and linear regression.

UNIT 1	Content	Duration
1	Descriptive Statistics Sampling Techniques – Data Classification – Tabulation – Frequency and graphic Representation – Averages (Objectives, Requisites), Types of Averages (Simple Arithmetic Mean, Median, Mode), Moments - Skewness and Kurtosis.	10
2	Correlation and Regression Scatter Diagram – Karl Pearson's Correlation Coefficient – (Actual mean – Assumed mean – Step deviation – Direct method) – Rank Correlation Coefficient – (Two variables – more than two variables – ranks are same) – Regression Coefficients – (Deviations taken from arithmetic mean – Deviations taken from assumed mean).	10
3	Statistical Inference Hypothesis Testing, Estimation, Test of Significance for large samples (Standard Error of Mean), Test of Significance for small samples (t and Z test), Chi-square test (Goodness of Fit), Variance Ratio test (F-test), Kruskal-Wallis test (H-test)	10
4	Data Visualization and Statistical Analysis in R Basic Plotting: Creating histograms, bar plots, box plots, pie charts, dot charts, density plot, strip charts, stem-and-leaf plots and scatter plots using base R. Statistical Analysis in R: Implementing descriptive statistics, hypothesis testing (ANOVA – ONE way – TWO way) and linear regression analysis using R.	15
5	Eigenvalues and Eigenvectors: Calculating eigenvalues and eigenvectors (2X2 matrix), their significance in data analysis and machine learning, application of eigenvalue decomposition in R.	15

Assessment Scheme

Component	Credit	Internal	External	Total

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Theory	3	40	60	100
Practical	1	40	60	100
Total	**4**			**200**

Practical List

P1. Write an R program to import a CSV file named students.csv that contains student names, ages, and marks. Display the contents of the file, and show the structure and summary of the dataset.

P2. WAP in R to perform t-test

P3. WAP in R to perform Chi-square test.

P4. WAP in R to perform One Way ANOVA.

P5. WAP in R to perform Two Way ANOVA.

P6. WAP in R to create basic plots (histogram, bar plot, box plot, scatter plot).

P7. WAP in R to perform correlation analysis.

P8. WAP in R to perform linear regression analysis.

P9. WAP in R to manipulate and clean a dataset (sub-setting, filtering, merging).

P10. WAP in R to calculate eigenvalues and eigenvectors of a matrix.

Reference Books

- Statistical Methods by S.P. Gupta
- Statistical Methods" by N.G. Das
- Statistical Analysis Handbook" by Dr. Michael J. De Smith
- R for Data Science" by Hadley Wickham and Garrett Grolemun

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