JAI HIND COLLEGE
BASANTSING INSTITUTE OF SCIENCE
&
J.T.LALVANI COLLEGE OF COMMERCE
(AUTONOMOUS)
"A" Road, Churchgate, Mumbai - 400 020, India.

Affiliated to
University of Mumbai

Program : B.Sc.

Proposed Subject : Mathematics (Applied Component)
Python and R Programming – II

Semester VI

Credit Based Semester and Grading System (CBGS) with effect from the academic year 2020-21

T.Y.B.Sc. (Applied Component-Mathematics)
Python and R Programming – II Syllabus

Academic year 2020-2021

Semester VI			
Course Code	**Course Title**	**Credits**	**Lectures /Week**
SMAT605AC	Python and R Programming - II	2.5	4
SMAT605ACPR	Practical of Python and R Programming - II	2.5	4

Semester VI – Theory

Course: SMAT 605AC	**Python and R Programming- II (Credits : 2.5 , Lectures/Week: 4)**

Objectives: Students will try to learn:

- Write Python functions to facilitate code reuse
- Use Python to read and write files
- Make their code robust by handling errors and exceptions properly
- Work with the Python standard library
- Explore Python's object-oriented features
- Search text using regular expressions

Outcomes: Students will be able to:

- Understand the concepts of object-oriented programming as used in Python: classes, subclasses, in- heritance, and overriding.
- Develop function based program.
- To understand and apply problem-solving skills using syntactically simple language.

Unit I	**Functions And Modules in Python**	**15 L**
	(a) Functions: Definition**,** Advantages of functions, function parameters, formal parameters, actual parameters, global and local variables. **(b) Modules:** Creating and importing own module **(c) Python File Input-Output:** Opening and closing files, various types of file modes, reading and writing to files, manipulating directories. Iterables, iterators and their problem solving applications.	
Unit II	**Object-oriented programming and Regular Expressions in Python**	**15 L**
	(a) Object-oriented programming concepts: encapsulation, inheritance, abstraction, polymorphism, Classes and Objects in python **(b) Exception handling:** Keywords to handle exceptions such try, catch, except, else, finally, raise. **(c) Regular Expressions:** Concept of regular expression, various types of regular expressions, using match function.	
Unit III	**Plots and Descriptive Statistics using R Programming**	**15 L**
	(a) Bar Plot, Histogram, Pie Chart, Box Plot, Plot Function, 3D Plot. **(b)** Descriptive Statistics: Measures of central tendency, Measures of variability, Correlation.	

Unit IV	**Regression using R Programming**	15 L
	(a) Linear Regression and application (b) Multiple regression (c) Logistic Regression	

References:

- Practical Programming: An Introduction to Computer Science Using Python, Paul Gries, et al., Pragmatic Bookshelf, 2nd Edition 2014.
- Beginning Python: From Novice to Professional, Magnus Lie Hetland, Apress,2nd edition 2008.
- Wickham, H. & Grolemund, G. (2018). for Data Science. O'Reilly: New York.Available for free at http://r4ds.had.co.nz
- Paul Tetor: R Cook Book, O'Reilly, http://www.bagualu.net/wordpress/wpcontent/uploads/2015/10/R_Cookbook.pdf

Additional References:

- Introduction to Computer Science using Python, Charles Dierbach, Wiley, 2013.
- The Quick Python Book, Naomi Ceder, Manning Publications; Third Edition, 2018
- R for Dummies; 2 edition http://sgpwe.izt.uam.mx/files/users/uami/gma/R_for_dummies.pdf (2015)

Semester VI – Practical

Course: SMAT 605 ACPR	Practical of Python and R Programming (Credits 2.5 : Practical/Week: 4)

1. Program based on Function and anonymous function.
2. Program based on Modules.
3. Programs based on File processing.
4. Programs based on Exception handling
5. Programs based on regular expressions
6. Programs based on Plotting a data
7. Programs based on Descriptive Statistics
8. Linear Regression and application
9. Multiple regression
10. Logistic Regression

Evaluation Scheme

Evaluation scheme for Theory courses

I. Continuous Assessment (C.A.) - 40 % - 40 Marks

Sr. No.	Evaluation type	Marks
1.	**C.A.-I :** It will be conducted either using any open source learning management system or by taking a test	20
2.	**C.A.-II :** Assignments / Project (maximum 5 students in a group)	20

II. Semester End Examination (SEE)- 60 % - 60 Mark , Duration 2 Hrs

Theory Question Paper Pattern:-

All Questions are Compulsory			
Question	Options	Based on	Marks
1.	Any 3 out of 5	**Unit I**	15
2.	Any 3 out of 5	**Unit II**	15
3.	Any 3 out of 5	**Unit III**	15
4.	Any 3 out of 5	**Unit IV**	15

Evaluation scheme for Practical courses- 100 Marks

Each student will maintain an e-journal. After every practical, student will upload his practical in the form of documents along with the screen shots of output on any LMS.

[1] CA of Practical Course - 40 % - 40 Marks:

Individual student or group of students (maximum 5 students) shows implementation of a given problem not from Practical List and its performance.

[2] SEE of Practical Course - 60 % - 60 Marks:

Sr. No.	Heading	Marks
1.	Journal	10
2.	Implementation of Python Code	25
3	Implementation of R Code	25
Total		**60**

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