Sant Gadge Baba Amravati University, Amravati

Part B

Syllabus Prescribed for 3 Year BCA UG Programme

Programme: Bachelor of Computer Application (BCA)

Semester VI

Code of the Course/Subject	Title of the Course/Subject	(Total Number of Periods)
6BCA1	**R-Programming**	**60 Periods**

Course Objectives (CO)

1. Learn Fundamentals of R, Develop an R script and execute it

2. Install, load and deploy the required packages, and build new packages for sharing and reusability

3. Covers how to use different functions in R, how to read data into R, accessing R packages, writing R functions, debugging, and organizing data using R functions.

4. Extract data from different sources using API and use it for data analysis

5. Visualize and summarize the data using statistical functions.

6. Design application with database connectivity for data analysis

Unit	Contents
Unit I	Evolution of R language, features of R programming, Introduction to R: What is R? – Why R? – Advantages of R over Other Programming Languages, R environment setup, R basic syntax. R data types: vectors, list, matrices, arrays, factors, data frames. R Studio: R command Prompt, R script file, comments – Handling Packages in R: Installing a R Package, Few commands to get started: installed. packages(), package. Description(), help(), find. package(), library() - Input and Output – Entering Data from keyboard – Printing fewer digits or more digits – Special Values functions : NA, Inf and –inf. **(12 Periods)**
Unit II	R - Variables: Variable assignment, Data types of Variable, Finding Variable ls(), Deleting Variables - R Operators: Arithmetic Operators, Relational Operators, Logical Operator, Assignment Operators, Miscellaneous Operators - R Decision Making: if statement, if – else statement, if – else if statement, switch statement – R Loops: repeat loop, while loop, for loop - Loop control statement: break statement, next statement. **(11 Periods)**
Unit III	R functions : function definition, function component, built in function, user defined function, calling a function. R-string: rules applied in string construction, string manipulation. R-vector: creation, accessing vector elements, vector manipulation, R-list: creating a list, naming, manipulating, accessing, merging list, converting list into vector. **(11 Periods)**
Unit IV	Data Frames –Create Data Frame, Data Frame Access, Understanding Data in Data Frames: dim(), nrow(), ncol(), str(), Summary(), names(), head(), tail(), edit() functions - Extract Data from Data Frame, Expand Data Frame: Add Column, Add Row - Joining columns and rows in a Data frame rbind() and cbind() – Merging Data frames merge() – Melting and Casting data melt(), cast(). Loading and handling Data in R: Getting and Setting the Working Directory – getwd(), setwd(), dir() - R-CSV Files - Input as a CSV file, Reading a CSV File, Analyzing the CSV File: summary(), min(), max(), range(), mean(), median(), apply() - Writing into a CSV File – R -Excel File – Reading the Excel file. **(11 Periods)**

Unit V	Descriptive Statistics: Data Range, Frequencies, Mode, Mean and Median: Mean Applying Trim Option, Applying NA Option, Median - Mode - Standard Deviation – Correlation - Spotting Problems in Data with Visualization: visually Checking Distributions for a single Variable - R –Pie Charts: Pie Chart title and Colors – Slice Percentages and Chart Legend, 3D Pie Chart – R Histograms – Density Plot - R – Bar Charts: Bar Chart Labels, Title and Colors. R-Packages , Types of Distribution (Normal , Binomial), Types of Ragression. R- Database: R-MySql database connectivity, table query. **(11 Periods)**
***SEM: A**ssignment, Class test, Seminar, Study tour, Industrial visit, Field work, Group discussion or any other innovative practice/activity	
COs: • Understand the basics of Fundamentals of R. • Understands the loading, retrieval techniques of data. • Understand how data is analysed and visualized using statistic functions.	
**Activities	R programming Basic R programming Array R programming Data frame R programming Matrix R programming Vector R programming List **(4 Periods)**

Course Material/Learning Resources

Text books:

1. Sandip Rakshit, R Programming for Beginners, McGraw Hill Education (India), 2017, ISBN : 978-93-5260-455-5.

2. Seema Acharya, Data Analytics using R, McGrawHill Education (India), 2018, ISBN: 978-93-5260-524-8.

3. Tutorials Point (I) simply easy learning, Online Tutorial Library (2018), R Programming, Retrieved from https://www.tutorialspoint.com/r/r_tutorial.pdf.

4. Andrie de Vries, Joris Meys, R for Dummies A Wiley Brand, 2nd Edition, John Wiley and Sons, Inc, 2015, ISBN: 978-1-119-05580-8

References Books:

1. Cotton, R., Learning R: a step by step function guide to data analysis. 1st edition. O'reilly Media Inc.

2. Gardener, M.(2017). Beginning R: The statistical programming language, WILEY.

3. Lawrence, M., & Verzani, J. (2016). Programming Graphical User Interfaces in R. CRC press. (ebook)

Web Resources

1. https://jrnold.github.io/r4ds-exercise-solutions/index.html
2. https://www.r-project.org/
3. https://cran.r-project.org/

Weblink to Equivalent MOOC on SWAYAM if relevant:

1. https://onlinecourses.swayam2.ac.in/aic20_sp35/unit?unit=2&lesson=5
2. https://onlinecourses.swayam2.ac.in/aic20_sp35/unit?unit=2&lesson=6

Any pertinent media (recorded lectures, YouTube, etc.) if relevant:

1. https://youtu.be/fDRa82lxzaU?si=OiwW1smoBpyFrA-8

Sant Gadge Baba Amravati University, Amravati

Part B

Syllabus Prescribed for 3 Year BCA UG Programme

Programme: Bachelor of Computer Application (BCA)

Semester VI

Code of the Course/Subject	Title of the Course/Subject	(Total Number of Hours)
6BCA2	**PHP Programming**	**60 Periods**

CO

1. To develop the basic skills of web programming.
2. To provide knowledge to create dynamic web page.
3. To improve the skills for fast development of web application.
4. To provide knowledge about database and communication between database & web application

Unit	Contents
Unit I	**Introduction to PHP:** Features of PHP, Server Introduction of PHP, Installation & Configuration of PHP, PHP Ethics, Fundamentals of PHP: Keywords in PHP, Variables (Predefined, User defined), Constants, data types in PHP , Operators in PHP: Arithmetic/math operators, Assignment Operators, Comparison Operators, Logical Operators, Bitwise Operators, String Operator. **(12 Periods)**
Unit II	**Control Structures in PHP:** if, if..else, if..else..if, Loops in PHP: while, do.. while, for, foreach, Functions in PHP: Introduction to Functions in PHP, function Declaration, Function calling, predefined functions in PHP (crypt(), move_uploaded_file(), isset(), empty(),include(), require()) **(11 Periods)**
Unit III	**Introduction to arrays in PHP:** What is array, Declaration of array,Types of array: Numeric array, Associative array, Multidimensional Array, Array Functions: print_r(), explode(), implode(), array_merge(), array_sum(), array_search(), array_push(), array_pop(), String Handling: Introduction to strings in PHP, Manipulation on string: Concatenation Operator for string, strlen(),strrev(),substr(),strops() **(11 Periods)**
Unit IV	**Receiving input from user:** Introduction to HTML forms, GET & POST methods with HTML forms, File Upload in PHP using file attributes (name, type, size, tmp_name), Sessions, Cookies in PHP,Error Handling, File Handling in PHP: Opening file, closing file, writing data into file, reading data from a file. **(12 Periods)**
Unit V	**PHP with MySQL** : Introduction to Mysql database, Database connection with PHP , functions of MySQL: mysql_connect() , mysql_select_db(), mysql_query(), mysql_result(), mysql_fetch_array(),mysql_error(), mysql_num_rows() **(10 Periods)**
***SEM: A**ssignment, Class test, Seminar, Study tour, Industrial visit, Field work, Group discussion or any other innovative practice/activity	

COs:	1. Understand the fundamental concepts scripting langauge. 2. Knowledge and ability to implement control structure for desired output. 3. Analyze the power of function arrays 4. Ability to create HTML form to post data using GET and POST method. 5. Acquire the basic knowledge of Web Programming with database connectivity.
**Activities	1. Simple programs to implement functions and arrays concept 2. Implementation control structure programs. 3. Implementation of cookies and session programs 4. Implementation of database programming **(4 Periods)**

Course Material/Learning Resources

Text books:

1. The Complete Reference PHP :
2. Learning PHP , My SQL & Java Script – Robin Nicson (Orelly)
3. PHP for Web – Visual Quickstart Guide- Larry Ullman
4. PHP & My SQL Web Development – A.Martin, S. Mathews

Reference Books:

1.Michael K. Glass, Yann Le Scouarnec, Elizabeth Naramore, Gary Mailer, Jeremy Stolz, Jason Gerner, Beginning PHP, Apache,MySQL Web development, Wrox Publication.

2.Jason Gerner, Elizabeth Naramore, Morgan L. owens, Matt warden, Professional LAMP: Linux, apache, MySqland PHP5 Web development, Wrox Publication.

3.Tim Converse, Joyce Park, PHP5 and Mysql Bible , Wiley publication

4.Lynn Beighley, Michael Morrison,Head first PHP and Mysql,Second Edition, Oreilly publication.

5.Luke Weling, Laura Thomas, PHP and MYSQL Web Development,Pearson Education.

Weblink to Equivalent MOOC on SWAYAM if relevant:

1. https://onlinecourses.swayam2.ac.in/aic20_sp32/preview
2. https://ciet.nic.in/swayam-moocs.php

Weblink to Equivalent Virtual Lab if relevant:

1. http://vlabs.iitb.ac.in/vlabs-dev/labs/phplab_17062019/labs/exp1/theory.php
2. http://vlabs.iitb.ac.in/vlabs-dev/labs/phplab_17062019/labs/exp1/simulation.php

Any pertinent media (recorded lectures, YouTube, etc.) if relevant:

1. https://www.youtube.com/watch?v=OK_JCtrrv-c
2. https://www.youtube.com/watch?v=yXzWfZ4N4xU
3. https://www.youtube.com/watch?v=2eebptXfEvw
4. https://www.youtube.com/watch?v=qVU3V0A05k8
5. https://www.youtube.com/watch?v=6EukZDFE_Zg

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Part B

Syllabus Prescribed for 3 Year UG Programme

Programme: Bachelor of Computer Application (BCA)

Semester VI

Code of the Course/Subject	Title of the Course/Subject	(Total Number of Hours)
6BCA3	**Fundamentals of Cloud Computing**	**60**

CO:

1. Identify the technical foundations of cloud systems architectures.
2. Analyze the problems and solutions to cloud application problems.
3. Apply principles of best practice in cloud application design and management.
4. Identify and define technical challenges for cloud applications and assess their importance.

Unit	Content
Unit I	Cloud Computing Overview: Origins of Cloud computing – Cloud components - Essential characteristics – On-demand self-service, Broad network access, Location independent resource pooling, Rapid elasticity, Measured service, Comparing cloud providers with traditional IT service providers, Roots of cloud computing. **(12 Periods)**
Unit II	Cloud Insights: Architectural influences – High-performance computing, Utility and Enterprise grid computing, Cloud scenarios – Benefits: scalability, simplicity, vendors, security, Limitations – Sensitive information - Application development- security level of third party - security benefits, Regularity issues: Government policies. **(11 Periods)**
Unit III	Cloud Architecture Layers and Models: Layers in cloud architecture, Software as a Service (SaaS), features of SaaS and benefits, Platform as a Service (PaaS), features of PaaS and benefits, Infrastructure as a Service (IaaS), features of IaaS and benefits, Service providers, challenges and risks in cloud adoption. Cloud deployment model: Public clouds – Private clouds – Community clouds - Hybrid clouds - Advantages of Cloud computing. **(11 Periods)**
Unit IV	Introduction to Simulator, understanding CloudSim simulator, CloudSim Architecture (User code, CloudSim, GridSim, SimJava) Understanding Working platform for CloudSim, Introduction to GreenCloud. **(11 Periods)**
Unit V	Introduction to VMWare Simulator Basics of VMWare, advantages of VMware virtualization, using Vmware workstation, creating virtual machines-understanding virtual machines, create a new virtual machine on local host, cloning virtual machines, virtualize a physical machine, starting and stopping a virtual machine. **(11 Periods)**
***SEM** Assignment, Class test, Attendance, Seminar, Study tour, Industrial visit, Field work, Group discussion or any other innovative practice/activity	
COs 1. Understand the fundamental principles of distributed computing. 2. Analyze the distributed computing environments known as Grids can be built from lower level services. 3. Enabled the development of Cloud Computing. 4. Analyze the performance of Cloud Computing. 5. Understand the concept of Cloud Security. 6. Learn the Concept of Cloud Infrastructure Model.	
**Activities	1. Draw Cloud Computing Architecture. 2. Write Advantages and Disadvantages of Cloud Computing. 3. Study different tools and techniques of Cloud Computing. **(4 Periods)**

Course Material/Learning Resources

Text books:

1. Cloud computing a practical approach - Anthony T.Velte , Toby J. Velte Robert Elsenpeter, TATA McGraw- Hill , New Delhi – 2010
2. Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online - Michael Miller - Que 2008

Reference Books:

1. Cloud computing for dummies- Judith Hurwitz , Robin Bloor , Marcia Kaufman ,Fern Halper, Wiley Publishing, Inc, 2010
2. Cloud Computing (Principles and Paradigms), Edited by Rajkumar Buyya, James Broberg, Andrzej Goscinski, John Wiley & Sons, Inc. 2011

Weblink to Equivalent MOOC on SWAYAM if relevant:

1. https://onlinecourses.nptel.ac.in/noc20_cs20/preview
2. https://www.classcentral.com/course/swayam-cloud-computing-10027
3. https://www.classcentral.com/course/swayam-google-cloud-computing-foundation-course-19886

Weblink to Equivalent Virtual Lab if relevant:

1. https://www.cloudshare.com/

Any pertinent media (recorded lectures, YouTube, etc.) if relevant:

1. https://www.youtube.com/watch?v=8C_kHJ5YEiA
2. https://www.youtube.com/watch?v=8LEHFsmZwJg
3. https://www.youtube.com/watch?v=Dv0sjAYnVCY

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Syllabus Prescribed for 3 Years BCA UG Programme

Programme: Bachelor of Computer Application (BCA)

Semester VI

Code of the Course/Subject	Title of the Course/Subject	(Total Number of Hours)
6BCA4	**Network Security**	**60 Periods**

CO:

1. Understanding security architectures, protocols and services in both wired and wireless networks.
2. Discover, analyse and identify security issues in the networks.

Unit No.	Content
Unit I	**Introduction:** Security Trends, Security Services Security attacks, Security mechanisms, A Module for Network security, Authorization, Keys, Viruses, Worms, Trojan Horses, Multilevel Model of Security, Legal Issues. **(11 Periods)**
Unit II	**Classical Encryption Techniques:** Symmetric cipher model, substitution techniques and Transposition techniques. Block ciphers and Data Encryption standard - Block cipher principles. **(11 Periods)**
Unit III	**Public key cryptography & RSA:** Principles of Public key crypto Systems, RSA algorithm Message authentication, Authentication, Functions, Message authentication codes, Hash function Digital Signatures. **(11 Periods)**
Unit IV	**Authentication:** Overview of Authentication System, Password-based Authentication, Address-based Authentication, Cryptographic Authentication Protocols, Keys, Trusted Intermediaries, Authentication of People. **(11 Periods)**
Unit V	**Security & Firewalls:** E-mail Security- Pretty good privacy, S/MIME, IP Security & Web Security- IP security over view, IP Security architecture, Viruses & related Threats. Firewalls: Packet Filters, Application-Level Gateways, Encrypted Tunnels,

	Comparisons. Web Issues: URLs/URIs, HTTP, Cookies. Web Security Problems. (**12 Periods)**
***SEM:** Assignment, Class test, Attendance, Seminar, Study tour, Industrial visit, Field work, Group discussion or any other innovative practice/activity.	
COs: 1. Students able to know various security protocol & issues. 2. Students get deep Knowledge about networking.	
**Activities	1.Quiz 2.Group Discussion 3. Assignment (**4 Periods)**

Course Material/Learning Resources

Text books:

1. Applied network security monitoring: collection, detection, and analysis chris sanders
2. Network Security Essentials: Applications and Standards William Stallings

Reference Books:

1. Network Security: Private Communication in a Public World, Second Edition: Charlie Kaufman; Radia Perlman; Mike Speciner (Prentice Hall)

2. Cryptography and Networking Security Principles & Practice (fourth edition) Willam Stallings

3. The fundamentals of New Security - John F. Chavwan, Artch. House

4. The Internet Security Guide Book - Juaniata.

Weblink to Equivalent MOOC on SWAYAM if relevant:

1. https://youtu.be/Q-HugPvA7GQ
2. https://youtu.be/Q-HugPvA7GQ?list=PL71FE85723FD414D7
3. https://youtu.be/GqLKpi7k_BQ?list=PL71FE85723FD414D7

Any pertinent media (recorded lectures, YouTube, etc.) if relevant:

1. https://youtu.be/oUUmAQLea-A
2. https://youtu.be/VJelZrYc49c

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Semester VI

Code of the Course/Subject	**Title of the Course/Subject** (Laboratory/Practical/practicum/ hands-on/Activity)	**(No. of Periods/Week)**
6BCALAB1	**R Programming**	**4 Periods**

CO:

1. Understand the basics of Fundamentals of R.
2. Understands the loading, retrieval techniques of data.
3. Understand how data is analyzed and visualized using statistic functions.

*** List of Practical/Laboratory Experiments/Activities etc.**

Sr.No.	Name of Programs/ Experiments
1	Write an R script to do the following: • simulate a sample of 100 random data points from a normal distribution with mean 100 and standard deviation 5 and store the result in a vector. • visualize the vector created above using different plots. • test the hypothesis that the mean equals 100. • use wilcox test to test the hypothesis that mean equals 90.
2	Using the Algae data set from package DMwR to complete the following tasks. • create a graph that you find adequate to show the distribution of the values of algae a6. • show the distribution of the values of size 3. • check visually if oPO4 follows a normal distribution. • produce a graph that allows you to understand how the values of NO3 are distributed across the sizes of river. • using a graph check if the distribution of algae a1 varies with the speed of the river. • visualize the relationship between the frequencies of algae a1 and a6. Give the appropriate graph title, x-axis and y-axis title.
3	Read the file Coweeta.CSV and write an R script to do the following: • count the number of observations per species. • take a subset of the data including only those species with at least 10 observations. • make a scatter plot of biomass versus height, with the symbol colour varying by species, and use filled squares for the symbols. Also add a title to the plot, in italics. • log-transform biomass, and redraw the plot.
4	The built-in data set mammals contain data on body weight versus brain weight. Write R commands to: • Find the Pearson and Spearman correlation coefficients. Are they similar? • Plot the data using the plot command. • Plot the logarithm (log) of each variable and see if that makes a difference.
5	In the library MASS is a dataset UScereal which contains information about popular breakfast cereals. Attach the data set and use different kinds of plots to investigate the following relationships: • relationship between manufacturer and shelf • relationship between fat and vitamins • relationship between fat and shelf • relationship between carbohydrates and sugars • relationship between fiber and manufacturer • relationship between sodium and sugars.

6	Write R script to: • Do two simulations of a binomial number with n = 100 and p = .5. Do you get the same results each time? What is different? What is similar? • Do a simulation of the normal two times. Once with n = 10, μ = 10 and σ = 10, the other with n = 10, μ = 100 and σ = 100. How are they different? How are they similar? Are both approximately normal?
7	Create a database medicine that contains the details about medicines such as {manufacturer, composition, price}. Create an interactive application using which the user can find an alternative to a given medicine with the same composition.
8	Create a database song that contains the fields {song_name, mood, online_link_play_song}. Create an application where the mood of the user is given as input and the list of songs corresponding to that mood appears as the output. The user can listen to any song form the list via the online link given.
9	Create a package in R to perform certain basic statistics functions. Mini project using data set of your choice from Open Data Portal (https://data.gov.in/) for the following exercise

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Code of the Course/Subject	**Title of the Course/Subject** (Laboratory/Practical/practicum/ hands-on/Activity)	**(No. of Periods/Week)**
6BCALAB2	**PHP Programming**	**4 Periods**

COs

1. Implement Server-side programming.
2. Develop dynamic software components.
3. Develop database application.

*** List of Practical/Laboratory Experiments/Activities etc.**

Sr.No.	Name of Program/ Experiment
1	Implements of various operators used in PHP.
2	Implementation of if-else used in PHP
3	Implementation of if-else-if in PHP
4	Implementation of for loops in PHP
5	Implementation of while loops in PHP
6	Implementation of do while loops in PHP
7	Implementation of foreach loops in PHP
8	Implementation of function in PHP
9	Implementation of Numeric array in PHP
10	Implementation of Associative array in PHP
11	Implementation of Multidimensional Array in PHP
12	Implementation of string handling in PHP
13	Implementation of GET method with HTML Forms in PHP
14	Implementation of POST method with HTML Forms in PHP
15	Implementation of Sessions in PHP
16	Implementation of Cookies in PHP
17	Implementation of Error Handling in PHP
18	Implementation of File Handling in PHP
19	Implementation of database connection in PHP
20	Implementation of mysql_query() in PHP

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Code of the Course/Subject	**Title of the Course/Subject** (Laboratory/Practical/practicum/ hands-on/Activity)	**(No. of Periods/Week)**
6BCALAB3	**Cloud Computing**	**4 Periods**

CO:

- To provide the fundamentals mid essentials and foundation of Cloud Computing (VMW).
- Enable to explore some important Cloud Computing driven commercial systems and applications.
- To provide essentials of Cloud Computing architecture, Virtualization, storage and Network concepts.
- Describe the fundamental concept, architecture and applications of Cloud Computing.
- To Discuss the problems related to cloud deployment model and examine the concept of virtualization.
- To Inspect the security issues in cloud service models

*** List of Practical/Laboratory Experiments/Activities etc.**

Sr. No.	**Name of Programs/ Experiment**
1	Study of NIST Services.
2	Study of NIST Development.
3	Study of simulation with Cloud Sim.
4	Study of Server Deployment.
5	Study of Grid Sim.
6	Study of Sim Java.
7	Installation of Virtual Machine Server
8	Create Virtual Machine Server
9	Installation of Guest Operating System on Virtual Machine

10	External Storage controller Agent at virtual layer in Virtual Machine ware
11	Create Python program using Guest Virtual Machine
12	Install Guest Operating System