Enclosure – II

Shree Manibhai Virani and Smt. Navalben Virani Science College, Rajkot
(AUTONOMOUS)
Affiliated to Saurashtra University, Rajkot

Department of Computer Science & Information Technology
M.Sc. INFORMATION TECHNOLOGY & COMPUTER APPLICATION

SEMESTER - III

16PITCC11	Core 6: Web Application Development Using DJANGO	05 hrs/wk	5 Credits

Objectives:

To enable the students to

1. Understand how to learn a web development framework.
2. Understand how to use Python and Django to develop modern web applications.
3. Gain functional knowledge of Python, Databases and the Django framework.
4. Understand current web development best practices.
5. Build and deploy a Python Django web application that incorporates a database.

Unit -1 Introduction to Python and Python Syntax, Language Components/Collections & Functions (10 hrs)

- A Brief History of Python, Strengths and Weaknesses, Python Versions. Installing Python, Environment Variables, and Executing Python from the Command Line, IDLE, Editing Python Files, Getting Help, Dynamic Types, Python Reserved Words, Naming Conventions, Basic Syntax, Comments, String Values, String Operations, The format Method, String Slices, String Operators, Numeric Data Types, Conversions, Simple Input and Output, The print Function.
- Control Flow and Syntax, Indenting, if Statement, Relational Operators, Logical Operators, True or False, Bit Wise Operators.
- The while Loop, break and continue, The for Loop, Lists, Tuples, Sets, Dictionaries, Sorting Dictionaries, Copying Collections, Summary, Defining Your Own Functions, Parameters, Function Documentation, Keyword and Optional Parameters, Passing Collections to a Function.

Unit -2 Introduction to Web framework and DJango DJango Template System (10 hrs)

- HTTP Client-Server Request – Response, concept of web framework and web application.
- Introduction to Django, MVC Design Pattern, Django installation, setting up database, starting project.
- Django project architecture, Understanding manage.py, Understanding settings.py, Understanding __init__.py and wsgi.py, Understanding urls.py and Python regular expression, Understanding admin.py, Understanding models.py, Understanding views.py , Running Django development server.

- Template system basics, Using template system, basic template tags and filters, using templates in views, template loading.

Unit – 3 Interaction with Database (10 hrs)

- Configuring database, defining model, basic data access, inserting and updating data, selecting objects, deleting objects.

Unit – 4 Django Admin Site & Forms, Views and URLConfs (10 hrs)

- Activating the Admin interface, Creating super user for Admin site, Using the Admin site, Using Admin site, django.contrib package.
- Form basics, GET and POST methods , Form validation, Rendering forms , ModelForm, Understanding the view layer, Requesting a web page via URL, Rendering web page via view function, Render HTTPResponse to templates, Understanding context data and Python dictionary type.

Unit – 5 Session and Cookies & Testing and Deploying web application (10 hrs)

- Cookies: Getting and Setting Cookies.
- Session: Django's session framework: enabling sessions, using session in views, session outside views.
- Testing Django, Python's unittest2 library, Deploying Django application on GitHub / Amazon Web Service.

Reference Books

1. John V Guttag. "Introduction to Computation and Programming Using Python", Prentice Hall of India
2. Learning Website Development using DJano – Ayman Hourieh – PACKT Publishing
3. Pro DJango – Marty Alchin - APress
4. The Definitive Guide to Djano: Web Development done Right – Adrian Holovaty, Jacob K. Moss.

16PITCC12	Core 7: Programming With R for Data Science	05 hrs/wk	5 Credits

Objectives:

To enable the students to

1. The main objective of this syllabus is to ensure the working aspects of R-Programming.
2. Here, Students will be able to learn R programming with various level of strategic inputs such as Vectors, Arrays, Matrices, Strings and Factors etc.
3. The course also covers the understanding the aspects of Packages and at last Visualize the data in the form of graph in various ways.

Unit -1 Introduction to Data Analysis and Fundamentals of R (10 hrs)

- Overview of Data Analytics, Need of Data Analytics
- Classification of Data: Structured, Semi-Structured, Unstructured,
- Characteristics of Data, Applications of Data Analytics.
- Setup with R Studio
- R Commands, Variables, Data Types.
- **Vectors**
  - Sequences, Lengths, Names, Indexing vectors, Vector Recycling and Repetition
- **Matrices and Arrays**
  - Creating Arrays and Matrices,
  - Row, Columns and Dimensions
  - Row, Column and Dimension names, Array Arithmetic
- **Lists**
  - Creating Lists, Atomic and Recursive Variables, List Dimensions and Arithmetic
  - Indexing Lists, Converting Between Vectors and Lists
  - Combining Lists, NULL. Pair lists
- **Data Input**
  - Data Input from Keyboard, Input from files(CSV), input from files using scan, Reading data from a file using readLines, Masking Input and output formats, Checking Files from cmd.
- **Data Frames**
  - Creating Data Frames, Indexing Data Frames, Basic Data Frames
- **Manipulation**

Unit -2 Environment, Functions, String, Factors, Flow Control and Loops (10 hrs)

- Environments
- Functions – Creating and calling Functions, Passing functions to and from other functions, Variable scope, Commands to Functions, Functions and Functional Programming, Function Objects and Function Calls, Debugging, Interactive Tracing and Editing, Conditions: Errors and Warnings, Testing R Software.
- **Strings**
  - Constructing and Printing Strings, Formatting Numbers, Special Characters, Changing Case, Extracting Substrings Splitting Strings, File Paths
- **Factors**
  - Creating Factors, Changing Factor Levels, Dropping Factor Levels, Ordered Factors, Converting Continuous Variables to Categorical, Converting

Categorical Variables to continuous, Generating Factor Levels, Combining Factor Levels

- **Flow Control and Loops**
  - Flow Control – if and else, Vectorized if, Multiple selections
  - Loops – repeat, while, for, lapply, sapply,
- **Advance Loops – Replication, Looping over Lists, Looping Over Arrays, Multiple Inputs, Split-Apply-Combine, the plyr package.**

Unit -3 Creating Packages and working with date & time (10 hrs)

- **Packages**
  - Loading Packages – The search path, Libraries and Installed packages
  - Installing Packages
  - Maintaining Packages
- **Dates and Time**

Unit -4 Data Visualization and Graphics (10 hrs)

- Reading and getting data into R (External Data): Using CSV files, XML files, Web Data, JSON files, Databases, Excel files.
- Working with R Charts and Graphs: Histograms, Boxplots, Bar Charts, Line Graphs, Scatterplots, Pie Charts

Unit -5 Analytics Using R (10 hrs)

- Big Data analytics using R.
- Business Foundation Analytics Using R
- Data Flow and Management for Business Operations and Problem Solving
- Typical Analytical Process Flow
- Data Collections Method
- Data Summarization and Presentation
- Managing Data using Analytics Tools (R)
- Data Manipulation and Report Generation Using R

Reference Books

1. *Data Manipulation with R by Phil Spector ISBN 978-0-387-74731-6*
2. *Learning R by Richard cotton*
   - ***Reference Link:***
   https://books.google.co.in/books?id=7dyzAAAAQBAJ&printsec=frontcover#v=onepage&q&f=false
3. *The R Book by Michael J. Crawley*
   - ***Reference Link:***
   https://books.google.co.in/books?id=XYDl0mlHmoC&printsec=frontcover&dq=r+programming&hl=en&sa=X&redir_esc=y#v=onepage&q=r%20programming&f=false
4. *Software for Data Analysis Programming with R. by John M. Chambers*
   - ***Reference Link:***
   http://www.e-reading.club/bookreader.php/137398/Software_for_Data_Analysis_-_Programming_with_R.pdf

DISCIPLINE SPECIFIC ELECTIVE - III

(Student shall select any one of the following subject as Elective in **3rd semester**)

S. No	Semester	Theory	
		Course code	**Course**
1.	III	16PITDC07 /	Hybrid Mobile Applications Development using Web Technologies /
		16PITDC08	Networking and Server Administration

16PITDC07	Core 1: Hybrid Mobile Applications Development using Web Technologies	05 hrs/wk	5 Credits

Objectives:

To enable the students to

1. Focuses on developing multiplatform mobile applications using the Web skills (HTML5, CSS and Javascript).
2. Understand AngularJS basic and advanced in depth concepts.
3. Using the Cordova hybrid application framework to develop and target multiple mobile platforms with a single codebase.
4. Using Ionic framework, one of fastest growing mobile application frameworks, that is built with mobile-optimized HTML5 and CSS based components and AngularJS.
5. Understand NodeJS concepts.
6. Publish mobile app on play store and app store.
7. Understand UI development with Ionic and then using Cordova's modules to access the native mobile platform's capabilities from Javascript.

Unit -1 Introduction to Hybrid application, development platforms (12 hrs)

- What is hybrid application?
- Need of hybrid application development
- Tool and platforms in used for development of hybrid mobile application development
    - Phonegap-cordova
    - Ionic
    - Mobile angular UI
- Step by step installation of coredova using git and npm
- Introduction to HTML 5 and HTML 5 APIs
    - Forms validation
    - Audio video tags
    - Data storage APIs
        - Local storage
        - Web sql

    - IndexedDB
- Introduction to CSS, Sscss, less
- Using bootstrap.css with mobile application development

Unit -2 Java Script for Mobile Application Development (12 hrs)

- Introduction to Java Script
- Variables, Scopes and functions in Java Script
- What is jquery?
- Forms, data validation and storage using jqueryImportant! iOS9 Breaking Changes
- Storage on client side(HTML 5 storage APIs)
    - Sending data over server side (may serverside be
    - PHP or NodeJs)
- What is angularjs?
- Role of angularjs in platforms like mobile angular UI and Ionic
- $scope and $rootScope
- Config() and Run()
- Directives in angularjs
    - Ng-model, Ng-bind, Ng-app, Ng-click, Ngshow/ ng-hide, Ng-init, Ng-submit, Ng-repear, User-define dierctives
- Filters in angularjs, Angular forms, Angular validation, Angular module, angular controller, angular factory, service
- ui-router (restful application development)
- $state, $statParms, $statProvider.stat()
- MVC architecture of angularjs
- Implementation of model (FACTORY/SERVICE), controller and view for data handling
- Development a TO-DO, task application using angularjs

Unit – 3 Ionic -1 (12 hrs)

- Introduction to iconic platform for hybrid mobile application development
- Step by step installation of iconic
- Command line interface handling of ionic-1
- Creating project in iconic (CLI APPROACH)
- Component of iconic-1
    - Colors, header, button, list, card, forms, checkgbox, radiobuttons, range, select (drop down), tabs, grid
- Ionic java script components
    - Action sheet, backdrop, content, forms, model, popover, popup, SideMenu, SlideBox
- Platform management in iconic-1
- Plugins for ionic-1
- ngCordova plugins
- Stateful approach of developing ionic applications ($stateProvider.state())

    - Passing data into the state by URL
    - States hierarchy
- Injection of controllers and factories in modules
- Icon and Splash Screen for ionic applications
- Implementation of MVC architecture (exactly as MVC of angularJS)
- http request and promises in factory()
- Populating data into view from controller
- Themes in ionic

Unit – 4 Interaction with server side PHP (12 hrs)

- Database connection to MySQLAasa
- Associative arrays and array handling in PHP
    - Array_push(), array_pop(), array_search(), in_array()
- Reading JSON as input
    - file_get_contents("php://input");
    - json_encode() and json_decode()
- Data communication and interaction with client side using JSON
- CRUD operation with PHP and MySQL
    - C=create (INSERT QUERY), R=read (SELECT QUERY), u = update (UPDATE QUERY) D=delete(DELETE QUERY)
- Introduction to Nodejs
- Architecture of Nodejs
- Step by step installation of Nodejs
- Introduction to express-Nodejs
- Create a server and listen to port in Nodejs

Unit – 5 Accessing Native Services using Iconic and Application Signing and Development (12 hrs)

- Iconic-cordova integration, iconic-camera, iconic-native audio, iconic-media, iconic-InApp browser
- Introduction to git
- Basic commands in git
    - Push, pull, commit, rollback, status, init, branch
- Git branches
- Git push & pull operations
- Significance and importance of git in development of applications
- Maintaining version of applications using git
- Android
    - Signing application (keystore)
    - Publishing application on play store
- IOS
- Build and publication application in App store

Text Books

1. *Arvind Ravulavaru, July* 2015. **Learning Ionic** [First Edition]. PACKT Publications

Reference Books

1. *Hoc Phan*, October 2015, **Ionic Cookbook,** [First Edition], Published by PACKT Publications.
2. *Arvind Ravulavaru*, April 2017, **Learning Ionic,** [Second Edition], Published by PACKT Publications.

16PITDC08	Advance Network Administration & Simulation	05 hrs/wk	5 Credits

Objectives:

To enable the students to

1. Understand basic concepts of network
2. Understand how network works
3. Understand requirements and importance of different transmission media
4. Understand role of different network devices
5. Install and configure server
6. Learn different network simulator tools
7. Learn to simulate and monitor network using tools
8. Learn to configure the basic server and DNS in detail with implementation

Unit -1 Basics of network & Transmission media (12 hrs)

- Network concepts
  - What is network, Network model-Peer to peer, Client-server
- Network models and LAN sharing (OSI reference model in detail)
- Network Cable
  - Guided media
    - Co-axial cable, Twisted pair cable, Fibre optic cable
  - Unguided media
    - Infrared, laser, microwave, Bluetooth
- Network devices

  LAN card, MODEM, DSL & ADSL, HUB (Active, passive and smart), Repeater, switch, bridge, router, Wireless switch, wireless router, access point
- Switching technology

  Circuit switching, Message switching, Packet switching

Unit – 2 Network Protocols (12 hrs)

- Protocols
  - HTTP, FTP, SMTP, POP3,TCP /IP,
- IP addressing
  - IPv4 with class structure
  - Migration from IPv4 to IPv6

Unit – 3 Advance Server Administration (12 hrs)

- Installation of Server
- Installation and configuration of Active Directory
    - Active Directory Installation & Configuration
    - Securing active directory domain services
    - Domains, Trees, Forests concept
    - Accounts(User, Group, Computer)
    - Policy (Security and audit)
    - Logging Events
    - Creating network drive
    - DNS & Installing DNS

Unit – 4 Network Simulation and Implementation using tools (12 hrs)

- Network Simulation Tools details
- Network Monitoring Tools (Online/ Offline)
    - Packet Tracer
    - WireShark
    - OpenNMS
    - Zenoss Core etc
    - Monitor Network performance
- Network Simulation applications(Using any of the above Tool)
    - Basic router setup
    - Setting up router name and password
    - Basic switch setup
    - Switch configuration
    - Setting up telnet
    - Interfaces Configuration
    - VLAN & VTP setup

Unit – 5 Connection oriented networks Network Analysis and Modelling (10 hrs)

- Frame relay,
- B-ISDN, ATM protocol stack,
- ATM switching, internetworking with ATM Networks,
- Traffic management in ATM.
- Queuing theory,
- modeling network as a graph,
- network management system and standard

Reference Books

1. *Glenn Berg,* 1998, **MCSE Networking Essential**, Glenn Berg Tech. Media
2. *Behrouz A. Forouzan*, 2006, **Data Communication and Networking (SIE),** McGraw-Hill
3. *Andrew S. Tanenbaum,* 2002, **Computer Networks** [Fourth Edition], Pearson Publication
4. Computer networks: Tanenbaum, Andrew S, Prentice Hal

5. Computer network protocol standard and interface Uyless, Black

16PITCC13	**Core Practical 2:** Web Application Development Using DJANGO Practical	**04 hrs/wk**	**02 Credits**

- Practical based on DJANGO Framework

16PITCC14	**Core Practical 3:** Programming With R for Data Science Practical	**04 hrs/wk**	**02 Credits**

- Practical based on R Language

16PITDC07 / 16PITDC08	**DSE Practical 2:** Hybrid Mobile Applications Development using Web Technologies Practical / Networking and Server Administration Practical	**04 hrs/wk**	**02 Credits**

- Practical based on Ionic / Administration of Server

16PITCC15	Project	**06 hrs/wk**	**04 Credits**

- Project Development