SARVAJANIK UNIVERSITY
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Faculty of Science

Shree Ramkrishna Institute of Computer Education & Applied Sciences, Surat

B.Sc. Computer Science

SEMESTER- 4

DSC-7 : Fundamental of Data science with Python

Course Code	
Course Title	**Fundamentals of data science with Python**
Credit	4
Teaching per Week	4 Hrs
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Last Review / Revision	---
Purpose of Course	The purpose of the course is to make students capable of implementing concepts, methods and tool related to python programming. And basic data science functions.
Course Objective	This subject aims to cover the python language programming with emphasis on various python data structures and various libraries like Pandas, NumPy, Matplotlib for performing various data science functions.
Pr-requisite	Only those Students who have completed any one of the following courses 1) Programming Concept 2) Arithmetic and Logic
Course Out come	After completion of this course, the student will be capable to perform basic data science and data analytics related operations.
Course Content	**Unit 1 Introduction to Data Science and Data-Analytics** 1.1 Data, Different Kinds of Data 1.2 Data Science, Engineering, and Data-Driven Decision Making 1.3 High Level Programming Languages and IDE 1.4 Overview of the data science process 1.5 Exploratory Data Analysis **Unit 2 Introduction to Python** 2.1 Python History and Usability 2.1.1 Application area's of Python 2.1.2 Technical Strengths of Python 2.2 Program Execution in Python - Program Execution, Python Virtual Machine (PVM) 2.3 IDLE of Python, Jupyter Notebook 2.4 Python Programming Basics 2.4.1 Comments, Indentations, Operators, Assignment, Expressions and Data Types 2.4.2 Selection Control, 2.4.3 Iterative Control **Unit 3 Python Object Types and Operations** 3.1 String : Indexing, Slicing, Text Parsing 3.2 List : Indexing, Slicing and Merging List 3.3 Dictionaries : Add, Update, Remove and Sort 3.4 Tuples and Sets **Unit 4 Python Functions** 4.1 Function Basics

	4.1.1 Definition, Call, Passing Arguments 4.1.2 Lambda Functions 4.2 Function Parameter and Call 4.2.1 Calling value returning function 4.2.2 Calling non-value returning function 4.2.3 Parameter Passing 4.2.4 Function arguments and variable scope **Unit 5 Python Modules** 5.1 Modules 5.2 Modules and Name-spaces 5.3 Module Import, Load and execution 5.4 Top-Down Design 5.5 Built-in name-spaces in python **Unit 6 Processing Text Files** 6.1 Opening, Reading and Writing Text file in python 6.2 File traversal 6.3 String and Text operations 6.4 Reading CSV, XML, JSON files **Unit 7 Python Libraries for Data Science** 7.1 Numeric Python - NumPy 7.1.1 Introduction to Numpy 7.1.2 Array Operations using Numpy 7.1.3 N-dimensional Array Processing 7.2 Data Analysis - Pandas 7.2.1 Introduction to Pandas 7.2.2 Pandas Objects - Series and Dataframes 7.2.3 Dataframe Operations 7.2.4 Reading and Writing Files 7.3 Plotting Graphs using Matplotlib 7.3.1 Plot Creation 7.3.2 Plot Routines 7.3.3 Saving, Showing and Clearing Graphs 7.3.4 Customize Matplotlib **Unit 8 Working with Real Data** 8.1 Reading Data from CSV, Excel, Text File 8.2 Validating Your Data, Removing duplicates 8.3 Dealing with Dates in Your Data, Formatting date and time values, 8.4 Dealing with Missing Data, Finding the missing data, Encoding missingness, 8.5 Slicing and Dicing: Filtering and Selecting Data, Slicing rows, Slicing columns, Dicing, Concatenating and Transforming the data

Text and Reference Literature	1. Data Science, Kiran Gurbani and Ansari Neha HimalyaPublishing 2. Learning Python -Mark Lutz : O'Reilly Media 3. Core Python Programming – by Wesley J Chun ISBN-13: 978- 0132269933 4. Introduction to Computer Science using Python - A computational problem solving focus - Charles Dierbach, Wiley 5. Python for Everybody: Exploring Data in Python 3, by Charles Severance (Author), Aimee Andrion (Illustrator), Elliott Hauser (Editor), Sue Blumenberg (Editor) 6. An Introduction to Python - by van Rossum Guido ISBN: 9780954161767, 0954161769 7. Core Pyhton Applicaiton Programming – by Wesley J Chun Prentice Hall 8. Introduction to Computer Science using Python
Teaching Methodology	The course is composed of readings, discussion, videos and presentation, code competition activity and assignments of computational problem solving. Practical assignments – 80% (Approximately)
Evaluation Method	70% Internal assessment is based on class attendance, participation, class test, quiz, assignment, seminar, internal examination etc. 30% assessment is based on semester end written examination

DSC-8: Computer Networks

Course Code	
Course Title	Computer Networks
Credit	04
Teaching per week	04
Minimum weeks per semester	15 (Including Class work, examination, preparation, holidays etc.)
Purpose of course	To make student understand about basic of network and how one can design the same.
Course objective	1. Learn about how computer networks are organized and it's protocol with the concept of layered approach 2. Learn concept of network management & it's tool 3. Learn more about basic of Information & network security
Pre-requisite	Knowledge of basics of operating system and any programming language.
Course outcome	After successful completion of the course students should be able to: • analyze the requirements for a given organizational structure and select the most appropriate networking architecture and technologies; • Analyze, specify and design the topological and routing strategies for an IP based networking infrastructure • Analyze the requirements of company or organization security and its purpose and select to apply appropriate tools needed for the same; • Evaluate the authentication and encryption needs of an information system
Course content	**Unit 1. Introduction to Computer Networks** 1.1.Basics of computer network, advantages, disadvantages, Analogue and Digital Signals, Frequency, bandwidth, datagram , packets, frames, message, Synchronous and Asynchronous communication, Simplex, half-duplex and full-duplex transmission 1.2.Connecting devices: NIC, Bridges, router, switches, Repeater, Access Points 1.3.Network types: LAN, MAN, PAN, WAN 1.4.Network topology: Bus, Star, Ring, Mesh, Hybrid 1.5.Different Types of Transmission Media, Guided and unguided data transmission **Unit 2. Reference Model** 2.1.Physical Layer: End to end data transmission 2.2.Data Link Layer - MAC & LLC Sub layers 2.3.Error classification-Delay distortion Attenuation, noise 2.4.Types of errors – Single bit error and burst errors. 2.5.Error detection – Parity check (VRC) , LRC, CRC

	2.6.CSMA/CD, CSMA/CA, IEEE Standards **Unit 3 Upper Level Layers** 3.1 Network Layer: Addressing - IP Address, subnet, gateway , Physical and logical address , Class A to E, IP Binding and IP cloning, Proxy, Static IP address and its benefits, routing table 3.2 Concept of Unicast, Broadcast, Multicast and anycast 3.3 Protocols: NAT, ARP, RARP, ICMP, IPv4, IPv6, DHCP **Unit 4. Transport layer** 4.1 UDP and TCP-packet heads, services, communication, Flow and Error & congestion control 4.2 Session, Presentation, and Application Layers: SMTP, IMAP, SNMP, HTTP, FTP, DNS, VOIP. **Unit 5.Network Management** 5.1 Managing ACL 5.2 VPN: Concept, Protocols, Applications 5.3 VLAN: Concept, Protocols, Applications 5.4 Concept of Broadcasting, Looping, Routing 5.5 Network performance management and administration **Unit 6 Configuring servers** 6.1 PDC, BDC and File server 6.2 Configuration of web server 6.3 Configuration of DHCP Server 6.4 Configuring Proxy Server 6.5 Configuring print server **Unit 7 Information security fundamentals** 7.1 Security mindset, Computer Security Concepts (CIA), Threats, active & passive Attacks 7.2 Data integrity, data confidentiality and availability , honey pot 7.3 Software Security: Vulnerabilities and protections, malware, program analysis **Unit 8 Network Security** 8.1 Network security issues, Sniffing, IP spoofing, Common threats, E-Mail security, IPSec, SSL, TSL , PGP, Intruders, Virus, Worms 8.2 Firewalls-need and features of firewall, Types of firewall 8.3 Symmetric Key Cryptography, Asymmetric Key Cryptography, Authentication
Reference Books:	1. Data communications and network Behrouz A Forouzan, McGraw Hill 2. Data communications and networks, Achyut S Godbole, McGraw Hill

	3. Fundamentals of computer networks, Sudakshina Kundu, PHI 4. Data communications and networking, Jain, BPB 5. Introduction to networking, McMahon, McGraw Hill 6. Data communications and networks, D B Rathod, K R Vishwa Jhananic, Himaliya publishing 7. Computer Security: Principles and Practice, 4th Edition, William Stallings, Lawrie Brown, Pearson 8. Introduction to Computer Security, Matt Bishop, Addison Wesley 9. Information security, Dhiren Patel
Teaching Methodology	Discussion, Independent Study, Seminars and Assignment
Evaluation Method	70% Internal assessment is based on class attendance, participation, class test, quiz, assignment, seminar, internal examination etc. 30% assessment is based on semester end written examination

SEC-2: Web Application Development (ASP.Net)

Course Code	
Course Title	**Web Application Development (ASP.Net)**
Credit	4
Teaching per Week	4 Hrs
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Last Review / Revision	---
Purpose of Course	To provide an in-depth knowledge of most recent server side programming technology.
Course Objective	The purpose of the course is to make students capable of developing basic web applications using latest tools and technologies of C#.Net.
Pr-requisite	Basic understanding of Web, HTTP, HTML, JavaScript.
Course Out come	After completion of this course, the student will be capable of developing basic web applications using latest tools and technologies of C#.Net.
Course Content	**Unit-1: Overview of .net framework** 1.1 .Net framework & its benefits 1.2 Managed/Unmanaged code, Compilation 1.3 Memory Management, Garbage Collection 1.4 The .Net Framework Class Library. 1.5 ASP.NET - Event Driven Programming 1.6. Files & Directories 1.7 Page Lifecycle 1.8 Concept of Post back **Unit 2: Client Server Communication & Application Management** 2.1 Communications with Web Browser 2.2. Response Object 2.3. Session Management and Variable Scope 2.4 Web.Config File 2.5 Global.asax File **Unit 3: Web Server Control** 3.1 Basic Web Server Controls 3.2 Html Server Controls (basic HTML Server Control) 3.3 Validation Controls 3.4 Navigation Controls (Treeview, Menu, Sitemap) 3.5 Master - Content Page 3.6 Themes & CSS **Unit-4: Data Access objects** 4.1 Overview of ADO.NET 4.2 The Server Explorer

	4.3 ADO.NET Architecture- Data provider, Adapter, Reader, command objects 4.4 Disconnected Architecture – Dataset **Unit 5: Data access controls and operations** 5.1 Data binding with controls 5.2 Basic CRUD Operations 5.3 Rich Data Controls - Grid View, List Box, Data list, Repeater, Form view **Unit 6: ASP.Net MVC Application** 6.1 Introduction to ASP.Net MVC Framework 6.2 Building an MVC page 6.3 Web Page Routing 6.4 Controller, Model, and View 6.5 Data Access and Modeling 6.6 TempData, ViewBag and ViewData 6.7 CRUD operation in MVC **Unit 7: Exception Handling** 7.1 Overview of Exception Handling 7.2 Types of Exception Handling 7.2.1 Unstructured Exception Handling 7.2.2 Structured Exception Handling **Unit 8: Fundamentals of Web service** 8.1 Basics of Web Services 8.2 Building structure of Web service 8.2.1 SOAP 8.2.2 UDDI 8.2.3 WSDL 8.3 Interacting with web services 8.4 Introduction to AJAX server control toolkit
Reference Book	1. Pro ASP.NET 4 in C# 2010– Matthew MacDonald – Apress 2. ASP.NET 4.0 Unleashed – Stephen Walther – Sams 3. Professional ASP.NET 3.5: In C# and VB (Programmer to Programmer)– by Bill Evjen – Wrox 4. Beginning ASP.NET 3.5 in VB 2008– Matthew MacDonald – Apress 5. ASP.Net 4.0 Black Book – dreamtech press 6. Essential Windows Communication Foundation(WCF) : For .Net Framework 3.5 - Steve Resnick – Pearson 7. Beginning ASP.NET 4.0 in C# and VB by Imar Spaanjaars Wrox Pubs. Web References: http://www.asp.net https://www.c-sharpcorner.com/ http://www.tutorialspoint.com for ASP.NET

Teaching Methodology	Discussion, Independent Study, Seminars and Assignment
Evaluation Method	70% Internal assessment is based on class attendance, participation, class test, quiz, assignment, seminar, internal examination etc. 30% assessment is based on end semester written examination

DSE- 4: Data Structure

Course Code	
Course Title	**Data Structure**
Credit	**2**
Teaching per Week	**2 Hrs**
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Last Review / Revision	---
Purpose of Course	This course imparts the knowledge of Data Structure. The concepts of Primitive and non-primitive data structures are covered in this course. It covers concepts of Arrays, Stack, Queue, Link list and sorting searching methods. The course is aimed to give inner depth of non-primitive data structures and its related applications.
Course Objective	To make students understand concepts of Primitive and non-primitive Data structure. To make students understand concepts of stack, queue and types of queues. To make students understand concepts of Link-list and related applications. To make students work with searching and sorting techniques.
Pre-requisite	Students are expected to have understanding of computer programming & utilization
Course Out come	At the end of the course, student is expected to have clear concepts about the primitive and non-primitive data structure. Depth of non-primitive data structure using stack, queue, link list.
Course Content	**Unit 1 Searching** 1.1 Searching Techniques 1.2 Linear search 1.3 Binary search **Unit 2 Sorting** 2.1 Sorting - Internal and external sort 2.2 Bubble sort 2.3 Selection sort 2.4 Insertion sort **Unit 3 Analysis of Algorithm** 3.1 Algorithm performance 3.2 Analysis criteria (Time / Space) 3.3 Concept of Algorithm analysis 3.4 Average case / Best Case / Worst case **Unit 4 Introduction to Data Structure** 4.1 Introduction 4.2 Types of data structure 4.3 Structure,

	4.4 Record 4.5 Self-referential structure **Unit 5 Array** 5.1 Array and its advantages and limitations 5.2 Types of Arrays 5.3 Memory representations of Array 5.4 Operations with Array **Unit 6 Stack** 6.1 Stack data structure 6.2 Operations on stack (Push, Pop, Peep) 6.3 Applications of stack-Recursion **Unit 7 Queue** 7.1 Simple Queue data structure 7.2 Operations with Queue (insert, delete and view) 7.3 Circular queue 7.4 Introduction to Dequeue and priority queue 7.5 Applications of queue 7.5.1 Printer queue simulation, 7.5.2 Round robin algorithm simulation **Unit 8 Linked list** 8.1 Linked list - representation, advantages and disadvantages 8.2 Various operations on one way (singly) linked list 8.3 Various operations on two way (doubly) linked list 8.4 Various operations on circular linked list
Reference Book	1. An Introduction to Data Structure with Applications : Trembley & Sorenson – McGraw Hill 2. Data Structures Using C & C++ - Langsam, Augenstein & Tanenbaum - PHI 3. Wirth, Niclaus, Algorith+Data Structure Programs, Prentice Hall. 4. Horwith E and Sahni S, Fundamental of Data Structure, Computer Science Press. 5. Aho A.V., Hopcrott and Ullman, Data Structure and Algorithms , Addition Wesslely.
Teaching Methodology	Discussion, Independent Study, Seminars and Assignment
Evaluation Method	30% Internal assessment is based on class attendance, participation, class test, quiz, assignment, seminar, internal examination etc. 70% assessment is based on semester end written examination

DSE- 4: Graph Theory

Course Code	
Course Title	**Graph Theory**
Credit	**2**
Teaching per Week	**2 Hrs**
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Last Review / Revision	---
Purpose of Course	This course imparts the knowledge Graph theory and its associated components.
Course Objective	To impart the detail knowledge of implementation of
Pre-requisite	Basic knowledge of mathematics and computer science
Course Out come	Student shall be able to use different tools, techniques and methods of graph theory in problem solving.
Course Content	1. Unit 1 1.1. Introduction 1.2. Graph, subgraph 1.3. Graph of relation 1.4. self loop, parallel edges, 1.5. simple graph, 1.6. application of graph, 1.6.1. Konigsberg bridge problem 1.6.2. Utility problem 1.6.3. seating problem 2. Unit 2: 2.1. Degree of vertices and it's properties, 2.2. walk, path, circuit, 2.3. planar graph, non planar graph, 2.4. properties of planar graph, 2.5. connected graph, disconnected graph, 3. Unit 3 3.1. Components of graph, 3.2. Complete graph, 3.3. Regions, Euler's formula for regions of planar graph, 3.4. Weighted graph. 3.5. Operations of graph, 4. Unit 4 4.1. Euler's path and circuit, 4.2. Euler's graph, 4.3. conditions of a graph to be a Euler Graph, 4.4. Hamiltonian path and circuits, 4.5. Hamiltonian graph, 4.6. regular graph. 5. Unit 5

	5.1. Directed graph, 5.2. types of directed graphs, 5.3. digraphs and binary relations, 5.4. directed path and connectedness, 6. Unit 6: 6.1. Euler digraph, 6.2. incidence matrix, 6.3. adjacency matrix, 6.4. circuit matrix Unit 7. Unit 7 7.1. Trees and it's properties, 7.2. Rooted tree, Binary tree, 7.3. Properties of trees 8. Unit 8: 8.1. spanning tree, 8.2. Minimal spanning tree, 8.3. Prims algorithm to construct minimal spanning tree.
Reference Book	1. Narsingh Deo: Graph Theory with applications to Engineering and Computer Science, PHI, New Delhi. 2. J P Trambley and R Manohar: Discrete Mathematical Structures with applications to computer Science,Mc Graw International Ed. 3. Discrete Mathematics by B S Vatsava, Wishva Prakashan, Delhi. 4. Olympia Nicodemi : Discrete Mathematics, CBS-Publisher and Distributor, Delhi.
Teaching Methodology	Discussion, Independent Study, Seminars and Assignment
Evaluation Method	30% Internal assessment is based on class attendance, participation, class test, quiz, assignment, seminar, internal examination etc. 70% assessment is based on semester end written examination

Course Code	
Course Title	**Practical-4**
Credit	10
Teaching per Week	12 Hours
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Last Review / Revision	---
Purpose of Course	The purpose of course is to make students aware with practical implementation of concept learnt in theory subjects.
Course Objective	To provide Fundamental knowledge of practical implementation based on DSC7, DSC8 and SEC -2
Pre-requisite	---
Course Out come	Student should be able to demonstrate skills mentioned in DSC7, DSC8 and SEC-2 practically.
Course Content	As per theory subject content of relative subject
Reference Book	
Teaching Methodology	Discussion, Independent Study, Seminars and Assignment
Evaluation Method	70% Internal assessment is based on class attendance, participation, class test, quiz, assignment, seminar, internal examination etc. 30% assessment is based on semester end written examination