Dr. A.P.J. ABDUL KALAM UNIVERSITY, INDORE (M.P.)

MCA, Fourth –Semester

Elective –IV MCA 401 (1) Advanced Python

UNIT I

Introduction to Python, use IDE to develop programs, Basic coding skills, working with data types and variables, working with numeric data, working with string data, Python functions, Boolean expressions, selection structure, iteration structure, working with lists, work with a list of lists, work with tuples, work with dates and times, get started with dictionaries

UNIT II

Classes in Python: OOPS Concepts, Classes and objects , Classes in Python, Constructors, Data hiding, Creating Classes, Instance Methods, Special Methods, Class Variables, Inheritance, Polymorphism, Type Identification, Custom Exception Classes, Iterators, generators and decorators.

UNIT III

I/O and Error Handling In Python :Introduction, Data Streams, Creating Your Own Data Streams, Access Modes, Writing Data to a File, Reading Data From a File, Additional File Methods, Handling IO Exceptions, Errors, Run Time Errors, The Exception Model, Exception Hierarchy, Handling Multiple Exceptions, Working withDirectories.

UNIT IV

An Introduction to relational databases: SQL statements for data manipulation, Using SQLite Manager to work with a database, Using Python to work with a database, Creating a GUI that handles an event, working with components.

UNIT V

Implement Machine Learning algorthims:Usage of Numpy for numerical Data, Usage of Pandas for Data Analysis, Matplotlib for Python plotting, Seaborn for Stati stical plots, interactive Dynamic visualizations, SciKit for Machine learning.

TEXT BOOKS

1. Michael Urban and Joel Murach, Python Programming, Shroff/Murach,2016
2. Haltermanpython
3. Mark Lutz, Programming Python, O`Reilly, 4th Edition,2010.

Elective –IV MCA 401 (2) Advanced Web Technology

UNIT I

Responsive web design and introduction to Bootstrap : Bootstrap grid, bootstrap components and plugins

UNIT II

XML – Introduction to XML, Comparing XML with HTML, Describing the Structure of XML – Declaration, Elements, Attributes, Comments, CDATA, XML Entity References, Parsers ,Describing Document Type Definitions, Using XSLT with

XML :xsl:template Element, xsl:apply –templates Element,xsl:import , xsl:include Element, Element,xsl:element Element, xsl:attribute Element, xsl:value –of Element, using Conditional Statements, Sorting Elements, XSLTfunctions, Creating Well –formed and Valid Documents.

UNIT III

Introduction to Ajax – AJAX Web Application Model, Working of AJAX, Asynchronous Data Transfer with XMLHttpRequest – Creating the XMLHttpRequest Object, XMLHttpRequest Properties, XMLHttpRequest Methods, Using the XMLH ttpRequest Object in Different Browsers, Reading a File Synchronously, Reading a File Asynchronously, Performing Tasks Using the XMLHttpRequest Object, Integrating PHP and AJAX –Sending Data from a Web Application to a Server, Validating a Field Using AJAX and PHP

UNIT IV

Handling XML Data using PHP and AJAX –JavaScript, properties for Extracting with nodeValue,

Accessing XML, Elements by Name, Accessing Attribute Values in XML Elements. Validating XML Documents in Ajax Applications Retrieving Data from a Da tabase Using PHP and AJAX Consuming Web Services Using AJAX –Exploring Web Service Protocols –SOAP,Web Service Description Language, UDDI, REST, Consuming Web Services Using AJAX

UNIT V

jQuery–JavaScript DOM objects their methods and properties–Window,

History, Location Document, Form etc. Fundamentals of jQuery, Loading and using jQuery, using jQuery Library files, Callback functions, jQuery Selectors , jQuery Methods to Access HTML Attributes, jQuery Methods of traversing, jQuery Manipulators, jQuery Event s, jQuery Effects, jQuery with AJAX

Books

1. Bootstrap: Responsive Web Development
2. XML: A Beginner's Guide by Steven Holzner
1. AJAX For Beginners , Ivan Bayross and Sharanam Shah, SPD
2. Web Development with jQuery (WROX) by Richard York
3. Learning PHP, MySQL & amp; JavaScript with j Query, CSS & HTML5 – by Robin Nixon ,SPD
4. Ajax in Action Dave Crane, Eric Pascarello, Darren James
5. Ajax for Dummies Steve Holzner,PhD, Wiley Publishing Inc.

Elective –IV MCA 401 (3) BIG DATA ANALYTICS

UNIT I INTRODUCTION TO BIG DA TA

Evolution of Big data – Best Practices for Big data Analytics – Big data characteristics – Validating – The Promotion of the Value of Big Data – Big Data Use Cases- Characteristics of Big Data Applications – Perception and Quantification of Value –Understanding Big Data Storage – A General Overview of High –Performance Architecture – HDFS – MapReduce and YARN – Map Reduce Programming Model

UNIT II CLUSTERING AND CLASSIFICATION

Advanced Analytical Theory and Methods: Overview of Clustering – K-means – Use Cases – Overview of the Method – Determining the Number of Clusters – Diagnostics – Reasons to Choose and Cautions .- Classification: Decision Trees – Overview of a Decision Tree – The General Algorithm – Decision Tree Algorithms – Evaluating a Decision Tree – Decision Trees in R – Naïve Bayes – Bayes' Theorem – Naïve Bayes Classifier.

UNIT III ASSOCIATION AND RECOMMENDATION SYSTEM

Advanced Analytical Theory and Methods: Association Rules – Overview – Apriori Algorithm – Evaluation of Candidate Rules – Applications of Association Rules – Finding Association& finding similarity – Recommendation System: Collaborative Recommendation- Content Based Recommendation – Knowledge Based Recommendation- Hybrid Recommendation Approaches.

UNIT IV STREAM MEMORY

Introduction to Streams Concepts – Stream Data Model and Architecture – Stream Computing, Sampling Data in a Stream – Filtering Streams – Counting Distinct Elements in a Stream – Estimating

moments – Counting oneness in a Window – Decaying Window – Real time Analytics Platform(RTAP) applications – Case Studies – Real Time Sentiment Analysis, Stock Market Predictions. Using Graph Analytics for Big Data: Graph Analytics

UNIT V NOSQL DATA MANAGEMENT FOR BIG DATA AND VISUALIZATION 9

NoSQL Databases : Schema-less Models : Increasing Flexibility for Data Manipulation –Key Value Stores- Document Stores – Tabular Stores – Object Data Stores – Graph Databases Hive – Sharding --

Hbase – Analyzing big data with twitter – Big data for E-Commerce Big data for blogs – Review of Basic Data Analytic Methods using R.

Books

1. Anand Rajaraman and Jeffrey David Ullman, "Mining of Massive Datasets", Cambridge University Press,
2. David Loshin, "Big Data Analytics: From Strategic Planning to Enterprise Integration with Tools, Techniques, NoSQL, and Graph", Morgan Kaufmann/El sevier Publishers, 2013.
3. EMC Education Services, "Data Science and Big Data Analytics: Discovering, Analyzing,Visualizing and Pres enting Data", Wiley publishers, 2015.

4. Bart Baesens, “Analytics in a Big Data World: The Esse ntial Guide to Data Science and its Applications”, Wiley Publishers .
5. DietmarJannach and Markus Zanker, “Recommender Systems: An Introductio n”, Cambridge University Press
6. Kim H. Pries and Robert Dunnigan, “Big Data Analytics: A Practical Guide for Managers “CRC Press,

MOOC REFERENCES:

1. www.swayam.gov.in: Big Data Computing
2. www.coursera.org:Big Data Essentials: HDFS, MapReduce and Spark RDD
3. www.udemy.com: Big Data and Hadop: Interactive Intense Course
4. www.edx.org: Big Data Fundamentals, Processing Big Data wit h Hadoop in Azure HDInsight

Elective –V MCA 402 (1) DEEP LEARNING

UNIT I NEURAL NETWORK

Building Intelligence Machine-Expressing Linear Perceptron as Neurons -Feed Forward Neural Netwoks - Activation function. Supervised and Unsu pervised Learning:Single Layer Perceptron Perceptron Learning Algorithm - Least Mean Square Learning Algorithm - Multilayer Perceptron - Back Propagation Algorithm - XOR problem - Limitations of Back Propagation Algorithm- Implementing Neural Networks in TensorFlow.

UNIT II CONVOLUTION NEURAL NETWORK

Introduction-Filter and Feature Maps-Full Description of CNN -Max Pooling- Full Architectural Description of CNN -Image Preprocessing Pipeline Enable More Roburst Models -Accelerating Training with Batch N ormalization-Visualizing Learning with Convolution Network - Leveraging and Learning Convolution Filters - Predefined Convolutional Filters Network (PCFNet)- Transfer Learning with Convolutional Neural Networks.

UNIT III DEEP NETWORKS

History of Deep Learning- A Probabilistic Theory of Deep Learning - Backpropagation and regularization, batch normalization- VC Dimension and Neural Nets -Deep Vs Shallow Networks - Convolutional Networks - Generative Adversarial Networks (GAN), Semi - supervised Learning

UNIT IV OPTIMIZATION AND GENERALIZATION

Optimization in deep learning- Non-convex optimization for deep networks- Stochastic Optimization Generalization in neural networks- Spatial Transformer Networks- Recurrent networks, LSTM - Recurrent Neural N etwork Language Models - Word-Level RNNs & Deep Reinforcement Learning.

UNIT V DEEP REINFORCEMENT LEARNING

Markov Decision Processes-Explore versus Exploit-Policy versus Value Learning -Pole-Cart with Policy Gradients-Q Learning and Deep Q Networks-Improving and Moving Beyond DQN

BOOKS

Nikiil Buduma, Nicholas Locascio, "Fundamentals of Deep Learning: Designing Next-Generation Machine Intelligence Algorithms", First Edition, O'ReillyMedia, 2017

SudharsanRavichandiran, Hands on Deep Learning Algori thms with Python, FirstEdition, Packt Publishing Limited, 2019.

François Chollet, Deep Learning with Python, First Edition,Manning Publications Company, 2017.

Ian Goodfellow, YoshuaBengio and Aaron Courville, Deep Learning, First editionMIT Press, London, 2016

Rachel Schutt, Cathy O'Neil, "Doing Data Science", O'Reilly

Elective –V MCA 402 (2) Cloud Computing Tecnhologies

UNIT I

Cloud Computing Fundamentals: Cloud Computing definition, Types of cloud, Cloud services: Benefits and challenges of cloud computing, Evolution of Cloud Computing , NIST architecture of cloud computing, Applications cloud computing, Business models around Cloud – Major Players in Cloud Computing – Eucalyptus ,Nimbus ,Open Nebula, CloudSim, VMware.

UNIT II

Types of Computing and Clouds: Cluster Computing, Grid Computing, Grid Computing Versus Cloud Computing, Key Characteristics of Cloud Computing, Cloud Models, Benefits of Cloud Models, Public Cloud, Private Cloud, Hybrid Cloud, Community Cloud, Shared Private Cloud, Dedicated Private Cloud, and Dynamic Private Cloud.

UNIT III

Cloud Services and File System: Types of Cloud services: Software as a Service – Platform as a Service – Infrastructure as a Service – Database as a Service– Monitoring as a Service – Communication as services. Service providers– Google App Engine, Amazon EC2, Microsoft Azure, Sales force, Clarizen.

UNIT IV

Virtualization: Basics of Virtualization, Types of Virtualization, Implementation Levels of Virtualization, Virtualization Structures, Tools and Mechanisms , Virtualization of CPU, Memory, I/O Devices and OS ,Virtualization for Data –center Automation, Introduction to MapReduce, GFS, HDFS, Hadoop Framework.

UNIT V

Security in the Cloud: Security Overview – Cloud Security Challenges and Risks – Software–as– a–Service Security – Security Monitoring – Security Architecture Design – Data Security – Application Security – Virtual Machine Security – Identity Management and Access Control – Autonomic Security.

Books

1. Cloud Computing "A Practical Approach" A nthony T. Velte, Toby J. Velte, Robert Elsenpeter. McGraw □Hill. Kai Hwang, Geoffrey C Fox, Jack G Dongarra,
2. "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, 2012.
3. John W.Rittinghouse and James F.Ransome, "Cloud Computing: Implementation, Management, and Security", CRC Press, 2010.
4. Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing, A Practical Approach", TMH, 2009.
5. Kumar Saurabh, " Cloud Computing – insights into New –Era Infrastructure", Wiley India, 2011.
6. Ronald L. Krutz, Russell Dean Vines, "Cloud Security – A comprehensive Guide to Secure Cloud Computing", Wiley – India,

Elective –V MCA 402 (3) Digital Marketing

UNIT I

Introduction to Digital Marketing: What is Digital Marketing,Why Digital Marketing,Digital Marketing platforms,Digital Marketing – Organic & Paid,Digital Marketing era and the way forward,Digital Marketing for students, professionals and businesses
Search Engine Optimization (SEO): What is SEO,Growth of SEO in the recent years,Ecosystem of a search engine,What are the kinds of traffic

UNIT II

On Page Optimisation (OPO): What is on-page optimization,HTML basics,CSS basics,Meta Tags usage,Using Javascript to our Advantage,Graphics Optimization,Contextual interlinking,Microformats & schemas,Improving demographic score
Off-Page Optimization:Linking Strategies,Competitor Analysis,Sculpting,Link Baiting,Professional Article Exchange,Social Book Marking and Promotions,Directory submissions

UNIT III

Search Engine Marketing (SEM): Introduction to SEM,SEM platforms – paid platforms,Introduction to Google AdWords,What is Google AdWords?,How is it different from other platforms?,Create an AdWords account,Key terminologies in Google AdWords,Google AdWords Account Structure ,Ad approval process,Campaign creation process,Search & Display network,Keyword Match types,Keyword selection (Keyword planner),Display Planner,Ad Extensions,Different types of extensions,Creating location extensions,Creating call extensions,Create Review extensions,Ad creation process,Keyword Grouping,Bidding techniques – Manual / Auto,Site Targeting,Keyword targeting,Demographic Targeting / Bidding,CPC-based, CPA-based & CPM-based accounts

UNIT IV

Mobile Ads: What is mobile ads?,Creating mobile ads?,What are the types of mobile ads?,AdWords for mobile
Click to Call Campaigns:Create click to call campaign,Analyze the campaigns,Optimize the ads for mobile
Youtube Advertising: What is youtube advertising?,Why should one advertise on youtube?,Creating youtube campaigns,Choose the audience for video ads,Instream ads,In-video ads,In-search ads,In-display ads,Measuring your YouTube ad performance,Drive leads and sales from YouTube ads
Facebook Marketing:Facebook Paid Marketing,Running paid campaigns,Managing interests,Create custom audiences,Create multiple adverts,Power editor
Billing in AdWords: Different types of billing,Postpay and Prepay [Automatic and Manual],Billing issues,Retry card,Troubleshooting issues,Primary card and back up card,Promo codes and working with them.
Content Marketing:Blog Marketing,Article Marketing,Cross promotions,How to effectively market content,Call to action via content,Guest blogging,Content Marketing tools (Around 30 of them)

Email Marketing: Importance of email marketing,email Marketing platforms,Creating e-mailers,Tracking emailers,Open rates and CTR of emailers,Drive leads from emailers,What is opt-in lists,Create forms
Social Media Marketing: Social Media, Social networking & Social Media Marketing Defined,Blogging and microblogging,Social networking,Video Sharing
Social Shopping & Opinions:Social News and Social Bookmarking,Social events,wikis,Social Media Strategy

UNIT V

Remarketing Campaigns:What is remarketing?,How do I create a remarketing campaign?,Remarketing campaigns,Creating custom combinations,Creating URL rule,Creating a remarketing tag
AdWords Editor: AdWords Editor,Creating optimized campaigns,Understanding AdWords Editor options,Easy optimization of accounts,Analysis of accounts using AdWords Editor, AdWords Editor sh ortcuts,Analysing existing accounts,Exporting accounts into different formats.
Getting Your Company Ready for Social Media: Content Management, Scheduling & Creating content, Managing content programs,Trademark Implications, Working with Tumblr
Influencers: Who are they? How to find them, How to use them to benefit your brand.

Books

1. Big Book of Digital Marketing, Publisher: Digital Firefly Marketing
2. Fifty Shades of Digital Marketing, Francesca James, Hannan Durham
3. Understanding Digital Marketing, Damian Ryan, Calvin Jones, Publisher: Kogan Page
4. Understanding Digital Marketing- Basics and Actions, Teresa Pineiro-Otero and Xabier Martinez-Rolan, Publisher: Springer International Publishing
5. Internet Marketing, Alex Trengove Jones, Anna Malczyk and Justin Ben eke, Publisher: GetSmarter

Elective –VI MCA 403 (1) Information Security

UNIT 1

Introduction : What is Information Security?, Critical Characteristics of Information, NSTISSC Security Model, Components of an Information System, Securing the Components, Balancing Security and Access, The SDLC, The Security SDLC.

UNIT 2

Security Investigation : Need for Security, Business Needs, Threats, Attacks, Legal, Ethical and Professional Issues, An Overview of Computer Security, Access Control Matrix, Security Policies, Integrity Policies and Hybrid Policies.

UNIT 3

Security Analysis : Risk Management : Identifying and accessing Risk, Accessing and Controlling Risk. Systems : Access Control Mechanism, Information Flow and Confinement Problem.

UNIT 4

Logical Design : Blueprint for Security, Information Security Policy, Standards and Practices, ISO 17799/BS7799, NIST Models, VISA International Security Model, Design of Security Architecture, Planning for Continuity.

UNIT 5

Physical Design : Security Technology, IDS, Scanning and Analysis Tools, Cryptography, Access Control Devices, Physical Security, Security and Personnel.

References –

1. Michael E Whitman and Herbert J Mattord, —Principles of Information Security, Vikas Publishing House, New Delhi, 2003

2. Micki Krause, Harold F. Tipton, — Handbook of Information Security Management, Vol 1-3 CRCPress LLC, 2004.

3. Stuart McClure, Joel Scrambray, George Kurtz, —Hacking Exposed, Tata McGraw- Hill, 2003

4. Matt Bishop, — Computer Security Art and Science, Pearson/PHI, 2002.

Elective –VI MCA 403 (2) Block Chain And Cryptocurrency

UNIT – I OVERVIEW OF BLOCKCHAIN:

Why Blockchain – The Structure of Blockchain – Data Structure of Blockchain – Data Distribution in Blockchain – Block Validation. Block Validators: P roof of Work – Proof of Stake – Proof of Activity – Proof of Elapsed Time – Proof of Burn.

UNIT – II CRYPTOCURRENCY

Overview. Bitcoin: Bitcoin Working – Bitcoin Transactions – Bitcoin Mining – Value of Bitcoin – Community, Politics and Regulations – Advantages – Disadvantages. Ethereum: Overview – Decentralized Application. Components of Ethereum: Smart contracts – Ether – Ethereum Clients – Ethereum Virtual Machine – Etherscripter.

UNIT – III – HYPERLEDGER

Introduction. Digital Tokens: Overview – Initial Coin Offering – OmiseGO – EOS – Tether. MetaMask: Wallet Seed – MetaMask Transactions. Mist: Overview – Mist wallet. Truffle: Features of Truffle – Development Truffle boxes – Community truffle box.

UNIT – IV SOLIDITY

Smart Contracts – Contract and Interfaces – Hyperledger Fabric: Introduction – Fabric v/s Ethereum – HyperledgerIroha – Features of Iroha. HyperledgerSawtooth: Components of sawtooth – Proof of Elapsed time.

UNIT – V BLOCKCHAIN PLATFORMS

Multichain – HydraChain. Future Blockchain: IOTA – Corda – Chain Core.Blockchain Framework: CoCo Framework – Tierion – BigchainDB

REFERENCES:

1. Josh Thompson, 'Blockchain: The Blockchain for Beginnings, Guild to Blockchain Technology and Blockchain Programming', Create Space Independent Publishing Platform, 2017.
2. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, and Steven Goldfeder. Bitcoin and cryptocurrency technologies: a comprehensive introduction. Princeton University Press, 2016.
3. Joseph Bonneau et al, SoK: Research perspectives and challenges for Bitcoin and cryptocurrency, IEEE Symposium on security and Privacy, 2015.
4. https://www.blockchainexpert.uk/book/blockchain -book.pdf

MOOC Website references (Example website references are only given; it's not an exhaustive list)

1. www.coursera.org
    a. Blockchain and cryptocurrency explained
    b. Blockchain revolution
    c. Bitcoin and Cryptocurrency technologies
    d. Blockchain basics
    e. Introduction to Blockchain

    f. Introduction to Blockchain technologies
    g. Blockchain foundations and use cases
2. www.udemy.com
    a. Build a blockchain and cryptocurrency from scratch
    b. The Basics of Blockchain
    c. Blockchain advanced level

Elective –VI MCA 403 (3) Mobile Computing

UNIT I : WIREL ESS COMMUNICATION FUNDAMENTALS

Introduction to Mobile Computing– Mobile Computing V/S Wireless Computing –Mobile Computing Applications– Characteristics of Mobile Computing– Structure of Mobile Computing Applications.

Generations of Mobile Communication Technologies– Multiplexing – Spread spectrum– MAC Protocols –SDMA – TDMA – FDMA – CDMA

UNIT II : TELECOMMUNICATION SYST EMS

Introduction to Cellular Systems–GSM – System Architecture – Protocols – Connection Establishment – Frequency Allocation Routing – Mobility Management – Security – GPRS– Architecture – Handover

UNIT III : MOBILE NETWORK LAYER

Mobile IP – DHCP – Proactive protocol–DSDV, Reactive Routing Protocols – DSR, AODV , Hybrid routing –ZRP, Wireless LAN – IEEE 802.11 Standards – Architecture – services – HIPERLAN – Ad– Hoc Network – Blue Tooth.

UNIT IV : Mobile AD–HOC Networks9 AD – HOC Basics

Basic Concepts – Characteristics – Applications – Design Issues – Routing – Essential of Traditional Routing Protocols –Popular Routing Protocols – Vehicular Ad Hoc networks (VANET) – MANET Vs VANET – Security.

UNIT V : MOBILE PLATFORMS AND APPLICAT IONS 9 Mobile

Device Operating Systems – Special Constrains & Requirements – Commercial Mobile Operating Systems – Software Development Kit: Ios, Android, BlackBerry, Windows Phone – M Commerce – Structure – Pros & Cons – Mobile Payment System – Security Issues.

TEXT BOOKS:

1. Jochen Schiller, “Mobile Communications”, Second Edition, Prentice Hall of India / Pearson Education, 2003.

2. William Stallings, “Wireless Communications and Networks”, SecondEdition, Prentice Hall of India / Pearson Education, 2004.