

**SRI VENKATESWARA UNIVERSITY, TIRUPATI**  
**Department of Computer Science**  
**ADOPTION OF CBCS SYSTEM FOR TWO YEAR MCA PROGRAMME**  
**WITH EFFECT FROM 2020-21**

**MCA IV SEMESTER**  
**MCA 401A: Cloud Computing**

**UNIT I**

Cloud Architecture and Model: Technologies for Network-Based System – System Models for Distributed and Cloud Computing – NIST Cloud Computing Reference Architecture, Cloud Models: Characteristics – Cloud Services – Cloud models (IaaS, PaaS, SaaS) – Public Vs Private Cloud – Cloud Solutions - Cloud ecosystem – Service management – Computing on demand.

**UNIT II**

Virtualization: Basics of Virtualization - Types of Virtualization - Implementation Levels of Virtualization - Virtualization Structures - Tools and Mechanisms - Virtualization of CPU, Memory, I/O Devices - Virtual Clusters and Resource management – Virtualization for Data-center Automation. VMWare, Virtual Box Virtualization software.

**UNIT III**

Cloud Infrastructure: Architectural Design of Compute and Storage Clouds – Layered Cloud Architecture Development – Design Challenges - Inter Cloud Resource Management – Resource Provisioning and Platform Deployment – Global Exchange of Cloud Resources. Federation in the Cloud – Four Levels of Federation – Federated Services and Applications – Future of Federation

**UNIT IV**

Programming Model: Parallel and Distributed Programming Paradigms – MapReduce , Twister and Iterative MapReduce – Hadoop Library from Apache – Mapping Applications - Programming Support – Software environments for service development; Amazon, Azure, GoogleApp Engine, AWS - Cloud Environments - Eucalyptus, Open Nebula, OpenStack, Aneka, CloudSim. Cloud Storage – Storage-as-a-Service – Advantages of Cloud Storage – Cloud Storage Providers – S3.

## **UNIT V**

Security In The Cloud : Security Overview – Cloud Security Challenges and Risks – Software-as-a-Service Security – Security Governance – Risk Management – Security Monitoring – Security Architecture Design – Data Security – Application Security – Virtual Machine Security - Identity Management and Access Control.

### **Text Books:**

1. Kai Hwang, Geoffrey C Fox, Jack G Dongarra, “Distributed and Cloud Computing, From Parallel Processing to the Internet of Things”, Morgan Kaufmann Publishers, 2012.
2. Rittinghouse, John W., and James F. Ransome, —Cloud Computing: Implementation, Management and Security, CRC Press, 2017.

### **Reference Books**

1. John W.Rittinghouse and James F.Ransome, “Cloud Computing: Implementation, Management, and Security”, CRC Press, 2010.
2. Kumar Saurabh, “Cloud Computing – insights into New-Era Infrastructure”, Wiley India,2011.

## **MCA 401B: Dot Net Technologies**

### **UNIT I**

The .NET Framework : Introduction, Common Language Runtime, Common Type System, Common Language Specification, The Base Class Library, The .NET class library Intermediate language, Justin Time compilation, garbage collection, Application installation & Assemblies, Web Services, Unified classes.**C# Basics** -Introduction, Data Types, Identifiers, variables & constants, C# statements, Object Oriented Concept, Object and Classes, Arrays and Strings, System Collections, C# - Regular Expressions.

### **UNIT II**

C# Using Libraries -Namespace-System, Input Output, Multi-Threading, Networking and Sockets, Data Handling, Windows Forms, C# in Web application, Error Handling.

### **UNIT III**

Advanced Features Using C#:Delegates and Events, Indexes Attributes, versioning, Web Services, Windows services, messaging, Reflection, COM and C#, localization. Distributed Application in C#, XML and C#, Unsafe Mode, Case Study (Messenger Application).

### **UNIT IV**

Advanced Programming Constructs: Database Connectivity with ADO.NET Creating Distributed Web Applications, XML and ADO.NET, Graphics, Printing, data Reports, crystal Reports,C# libraries for Image Processing, .Net applications to Azure platform

### **UNIT V**

ASP.NET 2.0: Features of ASP.NET 2.0, Stages in Web Forms Processing, Introduction to Server Controls, HTML Controls, Validation Controls, User control, Data Binding Controls, Master-detail forms, Configuration, Personalization, Session State, Database Connectivity with ADO.NET.

### **Text Books:**

1. Joe Mayo, “C# 3.0 Unleashed: With the .NET Framework 3.5”, Pearson Education, 2009.
2. `Powell R & Weeks R, “C# and The .NET Framework”, BPB Publications, 2007.
3. Chappell D, “Understanding .NET”, Pearson Education, 2007.

### **Reference Books:**

1. Balagurusamy E, “Programming with C#”, Tata McGrawHill, 2008.
2. Onion Fritz and Keith Brown, “Essential ASP .NET 2.0”, Pearson Education, 2007.
3. Fundamentals of Azure, by Michael Collier, Robin Shahan,Microsoft Press-2016

## **MCA 401C:Software Testing**

### **UNIT I**

The role of process in software quality: Testing as a process - Overview of the Testing Maturity Model (TMM) - Basic definitions - Software testing principles - Origins of defects - Defect classes, Defect repository - Test design - Defect example: the coin problem

### **UNIT II**

Test case design strategies : Black box approach - Random testing - Equivalence class partitioning - Boundary value analysis - Cause and Effect graphing - State transition testing - Error guessing - White box approach - Test adequacy criteria - Coverage and control flow graphs - Covering code logic - Data flow and white box test design - Loop testing - Mutation testing - Evaluating test adequacy criteria.

### **UNIT III**

Levels of testing : Unit test: functions, procedures, classes and methods as units - Unit test planning - Designing test units - The class as a testable unit - The test harness - Integration test: goal - Integration strategies for procedures and functions - Integration strategies for classes - Designing integration test - System test - The different types - Regression testing - Alpha, beta and acceptance test - Test planning - Test plan components - Test plan attachments - Reporting test results.

### **UNIT IV**

Software quality: Defining Quality: importance of quality - Quality control v/s quality assurance - Quality assurance at each phase of SDLC - Quality assurance in software support projects - SQA function - Quality management system in an organization - Software quality assurance plans - Product quality.

### **UNIT V**

Software metrics and models: Walkthroughs and Inspections - Software Configuration Management - ISO:9001 Model - CMM Model - CMM and ISO comparative analysis - CMM-I .

### **Text Books**

1. IleneBurnstein, "Practical Software Testing", Springer International Edition, First Indian reprint, 2004.
2. Nina S Godbole, "Software Quality Assurance, Principles and Practice", Narosa Publishing House, 2004.

### **Reference Books**

1. P.C. Jorgensen, "Software Testing - A Craftman's Approach", CRC press, 1995.
2. Boris Beizer, van Nostrand Reinhold, "Software Testing Techniques", 2nd Edition, 1990.

## **MCA 402A: Essentials of Data Science**

### **UNIT I**

Introduction: What is Data Science? - Big Data and Data Science, Statistical Inference - Populations and samples - Statistical modeling, probability distributions, fitting a model - Intro to R Language.

### **UNIT II**

Exploratory Data Analysis and the Data Science Process - Basic tools (plots, graphs and summary statistics) of EDA - Philosophy of EDA - The Data Science Process - Case Study: RealDirect (online real estate firm)

### **UNIT III**

Feature Generation and Feature Selection (Extracting Meaning From Data) - Motivating application: user (customer) retention - Feature Generation (brainstorming, role of domain expertise, and place for imagination) - Feature Selection algorithms – Filters; Wrappers; Decision Trees; Random Forests.

## **UNIT IV**

Data Visualization: Basic principles, ideas and tools for data visualization 3 - Examples of inspiring (industry) projects - Exercise: create your own visualization of a complex dataset

## **UNIT V**

Data Science and Ethical Issues - Discussions on privacy, security, ethics - A look back at Data Science - Next-generation data scientists

### **Text Books**

1. Cathy O’Neil and Rachel Schutt. Doing Data Science, Straight Talk From The Frontline. O’Reilly. 2014.

### **References Books**

1. Jure Leskovek, AnandRajaraman and Jeffrey Ullman. Mining of Massive Datasets. v2.1, Cambridge University Press. 2014. (free online)
2. Kevin P. Murphy. Machine Learning: A Probabilistic Perspective. ISBN 0262018020. 2013.

## **MCA402B:Deep Learning**

### **UNIT I**

Basics Of Neural Networks: Basic concept of Neurons – Perceptron Algorithm – Feed Forward and Back Propagation Networks.

### **UNIT II**

Introduction To Deep Learning: :Feed Forward Neural Networks – Gradient Descent – Back Propagation Algorithm – Vanishing Gradient problem – Mitigation – ReLU Heuristics for Avoiding Bad Local Minima – Heuristics for Faster Training – Nestors Accelerated Gradient Descent – Regularization – Dropout.

### **UNIT III**

Convolutional Neural Networks: :CNN Architectures – Convolution – Pooling Layers – Transfer Learning – Image Classification using Transfer Learning

### **UNIT IV**

More Deep Learning Architectures\;LSTM, GRU, Encoder/Decoder Architectures – Autoencoders – Standard- Sparse – Denoising – Contractive- VariationalAutoencoders – Adversarial Generative Networks – Autoencoder and DBM

### **UNIT V**

Applications Of Deep Learning: Image Segmentation – Object Detection – Automatic Image Captioning – Image generation with Generative Adversarial Networks – Video to Text with LSTM Models – Attention Models for Computer Vision – Case Study: Named Entity Recognition – Opinion Mining using Recurrent Neural Networks – Parsing and Sentiment Analysis using Recursive Neural Networks – Sentence Classification using Convolutional Neural Networks – Dialogue Generation with LSTMs.

### **Text Books:**

1. Ian Good Fellow, YoshuaBengio, Aaron Courville, “Deep Learning”, MIT Press, 2017.
2. Navin Kumar Manaswi, “Deep Learning with Applications Using Python”, Apress, 2018.

### **Reference Books**

1. Francois Chollet, “Deep Learning with Python”, Manning Publications, 2018.
2. Phil Kim, “Matlab Deep Learning: With Machine Learning, Neural Networks and Artificial Intelligence”, Apress , 2017.
3. RagavVenkatesan, Baoxin Li, “Convolutional Neural Networks in Visual Computing”, CRC Press, 2018.

## **MCA402C:Internet of Things**

### **UNIT I**

Fundamentals of IoT: Introduction, Definitions & Characteristics of IoT, IoT Architectures, Physical & Logical Design of IoT, Enabling Technologies in IoT, History of IoT, About Things in IoT, The Identifiers in IoT, About the Internet in IoT, IoT frameworks, IoT and M2M.

### **UNIT II**

Sensors Networks : Definition, Types of Sensors, Types of Actuators, Examples and Working, IoT Development Boards: Arduino IDE and Board Types, RaspberriPi Development Kit, RFID Principles and components, Wireless Sensor Networks: History and Context, The node, Connecting nodes, Networking Nodes, WSN and IoT.

### **UNIT III**

Wireless Technologies ForIoT: WPAN Technologies for IoT: IEEE 802.15.4, Zigbee, HART, NFC, Z-Wave, BLE, Bacnet, Modbus. IP Based Protocols ForIoT:IPv6, 6LowPAN, RPL, REST, AMPQ, CoAP, MQTT. Edge connectivity and protocols

### **UNIT IV**

Data Handling& Analytics: Introduction, Bigdata, Types of data, Characteristics of Big data, Data handling Technologies, Flow of data, Data acquisition, Data Storage, Introduction to Hadoop. Introduction to data Analytics, Types of Data analytics, Local Analytics, Cloud analytics and applications, Edge/Fog Computing

### **UNIT V**

Applications of IoT: Home Automation, Smart Cities, Energy, Retail Management, Logistics, Agriculture, Health and Lifestyle, Industrial IoT, Legal challenges, IoT design Ethics, IoT in Environmental Protection.

### **Text Books:**

1. Olivier Hersent, David Boswarthick, and Omar Elloumi, — “The Internet of Things: Key Applications and Protocols”, Wiley Publications
2. Vijay Madiseti and Arshdeep Bahga, — “Internet of Things (A Hands-on-Approach)”, 1<sup>st</sup> Edition, VPT, 2014.

### **Reference Books**

1. Daniel Minoli, — “Building the Internet of Things with IPv6 and MIPv6: The Evolving World of M2M Communications”, ISBN: 978-1-118-47347-4, Wiley Publications
2. Pethuru Raj and Anupama C. Raman, "The Internet of Things: Enabling Technologies, Platforms, and Use Cases", CRC Press

## **MCA 310 P: Minor Project Work**

1. Students shall be grouped into teams not exceeding three per team for pursuing Minor Project work.
2. Each team shall identify a real-life problem pertaining to a Manufacturing / Service / Trading System and offer a solution in the form of a Computer – Based system.
3. The team should put in a combined effort of 360 student-hours (i.e, 3 students x 120 hours per student) and submit their combined report. However, the reports should reflect the contributions of individuals.
4. The students shall select appropriate: Analysis and Design Methodologies for the development of Computer Based System.
5. Operating system platform, programming Languages/ Front-End and Back-End Tools/ Packages for implementation.
6. The team shall follow the guidelines given below while preparing their project Report: 1The report should be given a title and it should have correlation with the contents of the report. Good quality A4 size papers shall be used of preparing the report and it shall be in the bound form. There shall be a front page depicting the Title of the Project Report, Authors Names and other information in the suggested format.

7. Minor Project Credits:

- a) Project Presentation and Project Report (2 Credits)
- b) Project Execution and Project Viva Voce (2 Credits)

**MCA307: Technical Seminar**

- 1. Every student shall give two seminars of 30 minutes of duration each. The seminar topics should be outside the syllabus and from the emerging areas of computer Applications.
- 2. The student shall submit the seminar material in type written form to the teacher concerned at least two days in advance of seminar presentation date.
- 3. The student shall use LCD Projector for seminar presentation. He shall not use Black Board except for answering the questions after the seminar presentation, if any.

**MCA 403. Major Project Work: 12 Credits**

- 1. Project Seminar &. Project Report: 6 credits
- 2. National / International Conference Publication Proceedings (External) : (paper based on National / International Journal Publication (External) (paper based on project should be submitted to the journal and should be published): 2 credits
- 3. Viva Voce (External) &. Project Execution (External) : 4 credits

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