Syllabus of MCA II Semester: 2020-21

Note :

1. Papers MCA 201, MCA 202, MCA 203, MCA 211 and MCA 212 are compulsory(CCC) and Papers MCA 204, MCA 205, MCA 206 and MCA 213 are elective(ECC).
2. Continuous assessment(Internal) will be done by the concerned teacher on the basis of test papers, regularity in the class and performance of the student. Maximum marks in continuous assessment of each paper is 100.

MCA-201: Programming in Python

Theory & Tutorial: 4 hours per week (4 Credits)
Examination: Theory Paper – 3 hours; Max. Marks – 100

Note:

1. Candidate has to attempt five questions in all. All questions carry equal marks.
2. Question No. 1 covering whole syllabus will consists of 10 short answer questions carrying 2 marks each.
3. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

Unit-I

Introduction: Installing Python; basic syntax, interactive shell, editing, saving, and running a script. data types; variables, assignments; immutable variables; numerical types; arithmetic operators and expressions; comments in the program; understanding error messages; Conditions, boolean logic, logical operators; ranges; Control statements: if-else, loops (for, while); short-circuit (lazy) evaluation.

Unit-II

String manipulation: subscript operator, indexing, slicing a string; strings and number system: converting strings to numbers and vice versa.
Regular Expression : Regular Expression: Introduction/Motivation, Special Symbols and Characters for REs, REs and Python.
Lists, tuples, and dictionaries: basic list operators, replacing, inserting, removing an element; searching and sorting lists; dictionary literals, adding and removing keys, accessing and replacing values; traversing dictionaries.
Design with functions: complexity; arguments and return values; formal vs actual arguments, named arguments. Program structure and design. Recursive functions.

Unit-III

Text files : manipulating files and directories, os and sys modules; text files: reading/writing text and numbers from/to a file; creating and reading a formatted file (csv or tab-separated).

Classes and OOP: classes, objects, attributes and methods; defining classes; design with classes, data modeling; persistent storage of objects, inheritance, polymorphism, operator overloading (_eq_, _str_, etc); abstract classes;

Excetipton Handling : Exceptions in Python, Detecting and Handling Exceptions, Exceptions as Strings, Raising Exceptions, Assertions, Standard Exceptions.

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Unit-IV

Multithreading : Understanding threads, Forking threads, synchronizing the threads, Programming using multithreading.

Graphical user interfaces : event-driven programming paradigm; tkinter module, creating simple GUI; buttons, labels, entry fields, dialogs; widget attributes - sizes, fonts, colors layouts, nested frames

Database Interaction : MySQL Database Connection using Python, Creating and Searching Tables, Reading and storing config information on database, Programming using database connections Python

Recommended Books:

1. R. Nageswara Rao, "Core Python Programming", Dreamtech Press, 2nd Edition, 2018
2. Dr. M. Suresh Anand, Dr. R. Jothikumar, Dr. N. Vadivelan, "Python Programming" , Notion Press, 1stEdition, 2020
3. Martin C. Brown, "The Complete Reference Python", McGraw Hill Education, 4thEdition, 2018
4. Allen B. Downey, "Think Python", O'Reilly Media, 2016
5. Amit Ashok Kamthane, Ashok NamdevKamthane, " Programming and Problem Solving with Python" , McGraw Hill HED, 1st Edition, 2017
6. SakisKasampalis, Quan Nguyen, Dr Gabriele Lanaro, Ingram, "Advanced Python Programming", short title, 2019

MCA 202: Advanced Java Programming

Theory & Tutorial: 4 hours per week (4 Credits)
Examination: Theory Paper – 3 hours; Max. Marks – 100

Note:

1. Candidate has to attempt five questions in all. All questions carry equal marks.
2. Question No. 1 covering whole syllabus will consists of 10 short answer questions carrying 2 marks each.
3. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

Unit-I

J2EE Overview : Need of J2EE, J2EE Architecture, J2EE APIs, J2EE Containers. Web Application Basics, Architecture and Challenges of Web Application, Servlet Life Cycle, Developing and Deploying Servlets, Exploring Deployment Descriptor (web.xml), Handling Request and Response, Initializing a Servlet. Servlet Chaining, Session Tracking and Management .

Unit-II

Java Server Pages : Basic JSP Architecture, Life Cycle of JSP, JSP Tags & Expressions, JSP Implicit Objects, JSP Directives, Tag Libraries ,Using JDBC with JSP , Accessing a Database, Adding a Form, Updating the Database.

Ajax and jQuery: Introduction to Ajax, Cross-Browser DOM, Advantages and Disadvantages, Ajax the jQuery way: using load, post, get functions, jQuery: jQuery Basics, Selecting Element with jQuery, Managing Events, Hiding and Showing Elements, Toggling visibility using jQuery.

Unit-III

JDBC: The JDBC Connectivity Model, Types of JDBC Drivers., Basic steps to JDBC, setting up a connection to database, Creating and executing SQL statements, ResultSet and ResultSet Metadata Object,Accessing Database.

Unit-IV

Introduction to Spring : Overview of Spring Framework- Inversion of Control / Dependency Injection Concepts, Aspect Oriented Programming - concept ,Spring MVC Architecture , Bean Factory and Application Context, Attaching and Populating beans, Injecting data through setters and constructors , Listening on events, Publishing events, Spring MVC Layering, Dispatcher Servlet, Writing a Controller, DAO, Models, Services, Spring Configuration File, Error handling Strategy.

Recommended Books:

1. Herbert Schildt, "Java: The Complete Reference", 10th Edition, McGraw-Hill, 2017.
2. Marty Hall and Larry Brown, "Core Servlets and Java Server Pages", 2nd Edition, 2003.
3. MertCaliskan, Kenan Sevindik, Rod Johnson, Jurgen Holler, "Beginning Spring", Wrox publication, Feb 2015.
4. E. Balagurusamy, "Programming with Java: A Primer", Tata McGraw-Hill, 2019.
5. Bryan Basham, Kathy Sierra & Bert Bates, "Head First Servlets and JSP" Paperback – 2011
6. Bruce Eckel, "Thinking in Java", 4th Edition, Prentice Hall, 2006.
7. Cay S. Horstmann, "Core Java, Volume I: Fundamentals", 9th Edition, Pearson Education, 2014.
8. Santosh Kumar K, "JDBC, Servlet, and JSP: Black Book", Kogent Solutions Inc., 2008.
9. Madhusudhan Konda, "Just Spring", 1st edition, O'Reilly, 2011.

MCA 203: Data Communication and Computer Networks

Theory & Tutorial: 4 hours per week (4 Credits)
Examination: Theory Paper – 3 hours; Max. Marks – 100

Note:

1. Candidate has to attempt five questions in all. All questions carry equal marks.
2. Question No. 1 covering whole syllabus will consists of 10 short answer questions carrying 2 marks each.
3. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

Unit-I

Overview of Data Communication and Networks: Need of Networking, Basic concept –Computer communication methods, Data Transmission modes, Signals, Modulation – Principles of Modulation, AM and FM Modulator Circuits, pulse Code Modulation, signaling and decoding Digital Band-pass Modulation, Demodulation – detection, signals and Noise, Detection of Binary Signal in Gaussian Noise, Demodulation of shaped Pulses, Digital Band Pass demodulation.

Network Models : Internet model, OSI seven layer network model, Functions of OSI layers, LAN technologies – protocols and standards, LAN hardware, TCP/IP (Protocols, architecture, layers, services).

Unit-II

Data transmission: Data Communication Systems, DTE-DCE Interface, Modems, Transmission media (Guided & Unguided), Multiplexing – FDM, WDM, TDM, Digital Subscriber Line, Error detection and correction; Microwave-Electromagnetic spectrum, Characteristics, use of MIW in communications; Satellite- Artificial Satellite, Geosynchronous Satellites, Orbital classification, Multiple accessing.

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Optical fiber communication : Basic concept of light propagation, Fiber Cables, Light sources, Optical Detectors, Fiber cable losses, wave division multiplexing, fiber distributed data interface, the fiber channel

Unit-III

Internet: Internet Architecture, Internet protocol and datagram, Routing protocols, UDP, Internet standard services, DNS.

Networking Technology: ISDN (Services, Channels, Layers, Broadband ISDN), Cable Modem System, SMDS, Frame relay, fast Ethernet, 100VG-any LAN and Gigabit Ethernet, FDDI and CDDI, Asynchronous Transfer, ATM (Architecture, layers, classes, services).

Unit-IV

Network Performance, Analytical approaches, simulation, traffic monitoring, Network Management-SNMP, RMON and RMNv2, TMN, Directory services and network management.
Issue related to network reliability and security, SSL and VPN, Introduction only to firewalls and Kerberos, Cyber Laws.

Recommended Text / Reference Books:

1. Andrew S.Tanenbaum, "Computer Networks", Prentice Hall, 5th Edition, January, 2013.
2. A. BehrouzForouzan, "Data Comm. & Netw.5e Global Ed (English)" , McGraw Hill Education(India) Private Limited, 5thEdition, 2013.
3. William Stallings, "Cryptography and Network Security: Principles and Practice", Pearson Education, 5thEdition, 2011.
4. Andrew S.Tanenbaum, "Computer Networks ", Prentice Hall, 5thEdition (Paperback) January 2013
5. Douglas E.Comer& M. S. Narayana, "Computer Networks and Internets with Internet Applications", Pearson Education, 4th Edition, 2009.
6. Fred Halsall, "Data Communications, Computer Networks and Open Systems", Addison Wesley, 4th Edition, 2001.
7. M.A. Miller, Data and Netowork Communications, Thomosn Kearning
8. Gilbert Held, Understanding Data Communication, Techmedia.
9. Fred Harshal, Data Communications Communications, Networks, Pearson Education Asia.

MCA 204 : Algorithms and Data Structures

Theory & Tutorial: 4 hours per week (4 Credits)
Examination: Theory Paper – 3 hours; Max. Marks – 100

Note:

1. Candidate has to attempt five questions in all. All questions carry equal marks.
2. Question No. 1 covering whole syllabus will consists of 10 short answer questions carrying 2 marks each.
3. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

Unit-I

Introduction : Algorithms, pseudo code, efficiency of algorithms, analyzing algorithms and problems, complexity measures, basic time analysis of an algorithm, space & time complexity. Data abstraction and basic data structures, data types and abstract data types.

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Basic data structures – Arrays, Stack, Queues and their applications, dequeue and priority queues. linked and sequential representation of arrays, stacks & queue. Polish notations, Arithmetic expressions

Unit-II

Linked lists : Representation of linked list in memory. insertion, deletion, traversal and searching of linked list, Circular linked list, Doubly linked list.
Trees: Basic concepts, linked representation, representation in continuous memory. Binary and N-ary trees, Searching, insertion and deletion in binary search tree, traversing algorithms using stacks, header nodes threads.

Unit-III

Graphs : Graphs and their representations, sequential representation- Adjacent matrix, incidence matrix, linked representation of graphs, operations on graph, traversing a graph. DFS and BFS algorithms.
Heap : Heap structures, heap sort algorithm.

Unit-IV

Sorting and Searching: Use various data structures for searching and sorting, Internal and external sorting techniques, linear and binary search, Hash tables & Hashed searching, Bubble sort, Insertion sort, Selection sort, Merge sort, Radix sort, quick sort.

Recommended reference books :

1. S. Lipschutz: Data Structures; Mc Graw Hill International Edition,2008.
2. E. Horowitz &Sahni, "Fundamental Data Structure", Galgotia Book Source, 2007
3. A.V. Aho, J.E. Hopcroft, and J.D. Ullman, Data Structures and Algorithms, 3rd Edition; Pearson Education Asia,2008
4. Salaria R.S.: Data Structure and Algorithms Using C/C++; 4th Edition; Khanna.
5. Jean-Paul Tremblay and Paul G. Sorenson, An Introduction to Data structures with applications TMH Publishing Co.Ltd.
6. A. Michael Berman: Data Structures via C++ Oxford University Press.
7. Jean-Paul Tremblay and Paul G. Sorenson, An Introduction to Data Structures with application, TMH Publishing Co. Ltd.
8. A. Tannenbaum, "Data Structure Using C", Pearson Education, 2019.

MCA 205 : Software Engineering

Theory & Tutorial: 4 hours per week (4 Credits)
Examination: Theory Paper – 3 hours; Max. Marks – 100

Note:

1. Candidate has to attempt five questions in all. All questions carry equal marks.
2. Question No. 1 covering whole syllabus will consists of 10 short answer questions carrying 2 marks each.
3. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

Unit-I

Introduction to System, Software and Software Engineering : Systems concepts and definitions: System's theory, Definition of System, System Characteristics/ features, System Components.
The Evolving Role of Software, Software: A Crisis on the Horizon and Software Myths, Software Engineering: A Layered Technology, Software Process Models, The Linear Sequential Model, The Prototyping Model, Spiral model,The RAD Model, Evolutionary Process Models, Component-Based

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Development, Process, Product and Process, SDLC Agility and Agile Process model, Extreme Programming, Other process models of Agile Development and Tools.

Unit-II

Software Project Requirement Analysis and Specification : Software Metrics (Process, Product and Project Metrics), Software Project Estimations, Software Project Planning (MS Project Tool), Project Scheduling & Tracking, Basic idea of behavioral modeling in UML. State diagrams, Interaction diagrams, Use case diagrams, Understanding the Requirement, Requirement Modeling, Requirement Specification (SRS), Requirement Analysis and Requirement Elicitation, Requirement Engineering.

Project Planning & Scheduling : Size Estimation, Cost Estimation, Models, Static, single variable models, Static, Multivariable Models, COCOMO, The Putnam Resource Allocation Model, Risk Identification and Projection: RMMM, Project scheduling and Tracking. Object- oriented concepts and principles. software risks, Risk identification, Risk projection, risk refinement, risk mitigation, monitoring and management, the RMMM plan

Unit-III

Software Design & Quality Management : Design Concepts and Design Principal, Design Documentation, Design Tools- ER Diagram, DFD, Decision Tree, Decision Table, Dictionary, Design Methods: Data Design, Architectural Design, Interface Design, Component Level Design (Function Oriented Design, Object Oriented Design) (MS Visio Tool),User Interface Design, Web Application Design, Advanced structured modeling in UML

Quality Planning: Quality Concepts, Procedural Approach to Quality Management, Software Quality assurances, software reviews, formal technical reviews, Formal approaches to SQA, Statistical Software Quality assurances, Change Management: software Configuration Management, The SCM repository, SCM Process, Configuration Management for Web Engineering.

Unit-IV

Software Testing : Fundamentals, White Box Testing, Black Box Testing, software testing strategies, verification and Validation, System Testing, Unit testing, Integration testing and Debugging.

Software Maintenance and Configuration Management: Types of Software Maintenance, Re-Engineering, Reverse Engineering, Forward Engineering, The SCM Process, Identification of Objects in the Software Configuration, Risk-Related Monitoring. Emerging Trends in software Engineering.

Emerging technologies- Introduction to Security engineering, Service- Oriented s/w engineering, Aspect-Oriented s/w engineering and S/W Reengineering. CMM level-5(concept and advantages).

Reference /Text Books

1. Pressman, Roger (2001) Software Engineering; A Practitioner's Approach, 8th ed. M Graw-Hill,2014.
2. Sommerville Lan; Software Engineering, 9th Ed. Pearson Education,2014
3. Jalote, Pankaj (1997) An integrated Approach to Software Engineering 2nd Ed.
4. James Rumbaugh. MichealBlaha, "Object oriented Modeling and Design with UML", 2nd Edition, 2007.
5. Simon Bennett, Steve McRobb and Ray Farmer, " Object-Oriented Systems Analysis and Design Using UML" 4th Edition,McGraw Hill Education, 2010
6. Charles Ritcher, "Designing Flexible Object Oriented systems with UML", Tech Media, 2008.
7. Grady Booch, James Rumbaugh, IvarJacobson., "The Unified Modeling Language User Guide", 2nd Edition, Pearson, 2007.

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MCA 206 : Data Warehousing & Data Mining

Theory & Tutorial: 4 hours per week (4 Credits)
Examination: Theory Paper – 3 hours; Max. Marks – 100

Note:

1. Candidate has to attempt five questions in all. All questions carry equal marks.
2. Question No. 1 covering whole syllabus will consists of 10 short answer questions carrying 2 marks each.
3. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

Unit-I

Introduction to Data Warehousing : Introduction, Data Warehouse importance and functions, Multidimensional Data Model, Data Matting and it's usage, Cost of data marting, Metadata, Data warehouse Architecture, Building a Data warehouse, Implementation, Further Development, Planning and Project Management of Data Warehouse.

Unit-II

Data Mining : Data Warehousing to Data Mining, Evolution Analysis, Classification of Data Mining Systems, Architecture of data mining system, Major Issues in Data Mining. Data preprocessing : Needs preprocessing the Data, Data Cleaning, Data Integration and Transformation, Data Reduction, Deserialization and Concept Hierarchy Generation; Analysis of Attributes Relevance. Discriminating between Different Classes. Data Warehouse and OLAP Technology for Data Mining.

Unit-III

Association Rules : Association Rule Mining, Single- Dimensional Boolean Association Rules from Transactional Databases. Apriori algorithm, Use of sampling for frequent item-set, FP tree algorithm, Multi-Level Association Rules from Transaction Databases. Issues regarding classification & prediction. Different Classification Methods- Decision Tree, Bayes Classification, Rule based, Classification by Back-Propagation, Prediction.

Unit-IV

Clustering and Applications of Data Mining : Cluster Analysis, Types of Data Categorization of Major Clustering Methods, Kmeans, Partitioning Methods, Hierarchical Methods, Density Based Methods, Grid Based Methods, Model-Based Clustering Methods, Clustering High Dimensional Data, Constraint Based Cluster Analysis, Outlier Analysis, Data Mining Applications.

Future Trends : Multidimensional Analysis and Descriptive Mining of Complex Data Objects, Active learning, Reinforcement learning, Text mining, Graphical models, Web Mining , Basics of Data Mining Tools. Spatial Databases, Multimedia Databases, Time Series and Sequence Data, Text Databases, Web Mining, Spatial mining, Temporal Mining, Applications and Trends in Data Mining.

Recommended Books :

1. Data Warehousing in the Real World – SAM ANAHORY & Dennis MURRAY. Peasrson Edn Asia.
2. Data Mining – Concepts and Techniques- JIA WEI HAN & MICHELINE KAMBER Hareourt India.
3. Data Warehousing ; Reema Thareja; Oxford
4. Data Mining Introductory and advanced topics MARGARET H DUNHAM PEARSON EDUCATION.

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5. Data Warehousing in Real World Anahory, Pearson Education.
6. Data Mining Techniques- ARUN K PUJARI, University Press.
7. Bulding the Data Warehouse- W. H. Inmon, 3rd Edition, Wiley, 2003.
8. Data Warehousing Fundamentals- PAULRAJ PONNAIAH WILLEY STUDENT EDN.

Practical Examination :

Each practical paper shall be of 3 hours duration on one day and carry 100 marks for the practical examination. The practical examination will involve 3 exercises, each of 20 marks, practical record of 15 marks and viva-voce examination of 25 marks.

MCA 211: Python Lab

Practical Lab
Examination: Practical Examination-
Exercises based on the Theory paper MCA 201.

List of Experiments:

1. Implement a sequential search
2. Create a calculator program
3. Explore String Functions
4. Implement Selection Sort
5. Implement Stack
6. Read and Write into a file
7. Demonstrate usage of basic regular expression
8. Demonstrate use of advanced regular expressions for data validation
9. Demonstrate use of List
10. Demonstrate use of Dictionaries
11. Create Comma separate files(CSV), Load CSV files into internal data structure
12. Write script to work like a SQL SELECT statement for internal data structure

MCA 212: Advanced Java Lab
Practical Lab :
Examination: Practical Examination-
Exercises based on the Theory paper MCA 202.

List of Experiments:

1. Dynamic HTML using Servlet
2. Use of get() and Post() methods
3. Cookies in Servlet
4. Session tracking and Management
5. JDBC
6. JSP Actions elements
7. Directives elements in JSP
8. JSP Tags
9. Implement JDBC with JSP
10. Implement JDBC with Servlet
11. Applications using Spring Web MVC

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MCA 213: Data Structures Lab
Practical Lab
Examination: Practical Examination-
Exercises based on the Theory paper MCA 204

List of Experiments:

1. Array implementation of Stack and Queue
2. Linked list implementation of List, Stack Queue
3. Array implementation of QUEUE
4. Applications of List, Stack and Queue ADTs
5. Implementation of Binary Trees and operations of Binary Trees
6. Implementation of Binary Search Trees
7. Implementation of AVL Trees
8. Implementation of Heaps using Priority Queues.
9. Graph representation and Traversal algorithms
10. Applications of Graphs
11. Implementation of searching and sorting algorithms

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