RAJASTHAN TECHNICAL UNIVERSITY, KOTA

RTU MCA SYLLABUS – YEAR-I (SEMESTER – II)

Java Technologies
[As per Choice Based Credit System (CBCS) Scheme)
SEMESTER-II

Subject Code	MCA-201	INTERNAL ASSESSMENT (IA) MARKS	30
Number of Lecture Hours / Week	03	END TERM EXAM (ETE) MARKS	70
Total Number of Lecture Hours	40	SEMESTER END EXAM HOURS	03

Credits: 03

CONTENTS	Teaching Hours
Unit-1	**08 Hours**
Introduction to Java OOP in Java, Characteristics of Java, Fundamental Programming Structures in Java, Abstract Class, Interfaces, Defining Methods, Inheritance, Overloading, Overriding, Packages, Exception Handling, Threads, Thread Life-Cycle	
Unit-2	**08 Hours**
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-3	**08 Hours**
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-4	**08 Hours**
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.	
Unit-5	**08 Hours**
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.	

Text 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, KenanSevindik, Rod Johnson, Jurgen Holler, "Beginning Spring", Wrox publication, Feb 2015.

Reference Books:

1. Bruce Eckel, "Thinking in Java", 4th Edition, Prentice Hall, 2006.
2. Cay S. Horstmann, "Core Java, Volume I: Fundamentals", 9th Edition, Pearson Education, 2014.
3. Santosh Kumar K, "JDBC, Servlet, and JSP: Black Book", Kogent Solutions Inc., 2008.
4. MadhusudhanKonda, "Just Spring", 1st edition, O'Reilly, 2011.
5. E. Balagurusamy, "Programming with Java: A Primer", Tata McGraw-Hill, 2010.
6. Bryan Basham, Kathy Sierra & Bert Bates , "Head First Servlets and JSP" Paperback, 2008

RAJASTHAN TECHNICAL UNIVERSITY, KOTA

Computer Networks [As per Choice Based Credit System (CBCS) Scheme) SEMESTER-II			
Subject Code	**MCA-202**	**INTERNAL ASSESSMENT (IA) MARKS**	**30**
Number of Lecture Hours / Week	**03**	**END TERM EXAM (ETE) MARKS**	**70**
Total Number of Lecture Hours	**40**	**SEMESTER END EXAM HOURS**	**03**
Credits: 03			

CONTENTS	Teaching Hours
Unit-1	**08 Hours**
Networking Fundamentals Introduction, Data & Information, Data Communication-Characteristics of Data Communication, Components of Data Communication, Data Representation, Data Flow- Simplex, Half Duplex, Full Duplex, Computer Network- Categories of a network, Protocol- Elements of a Protocol, Networking Standards, Reference Models- OSI Model, TCP/IP Model, Comparison of OSI and TCP/IP Model	
Unit-2	**08 Hours**
The Physical Layer Transmission Media- Guided & Unguided, PSTN: Structure of the Telephone System, Data & Signals Data types, Signal types- Analog & Digital, Modulation Techniques, Modem, Cable Modem, Protocols: DSL, ISDN. **The Data Link Layer Design Issues** Framing, Error Control-Error Detection and Correction, Flow Control, Protocols: FDDI, CDDI, Frame Relay, ATM, 802.11, PPP, HDLC.	
Unit-3	**08 Hours**
The Medium Access Sub-Layer Multiple Access Protocols: ALOHA, CSMA, Ethernet: Switched Ethernet, Fast Ethernet, Gigabit Ethernet, DLL Switching: Internetworking, Repeaters, Hubs, Bridges, Switches, Routers, Gateways, Virtual LANs.	
Unit-4	**08 Hours**
The Network Layer Design Issues, Routing Algorithms: Link State Routing, Distance Vector Routing, Flooding, Routing Protocols: RIP, IGRP, EIGRP, OSPF, Internetworking: Tunneling, Fragmentation, IPV4, IPV6 Basics, BGP. The Transport Layer Protocols: UDP, TCP, Headers	
Unit-5	**08 Hours**
The Application Layer DNS: The DNS Name Space, Name Servers-Mail: SMTP, POP3, HTTP, FTP, Telnet, Network Management: SNMP. **Network Security** Cryptography: Encryption, Decryption, Private/Public Key, Digital Signatures,	

SSL, Firewalls, PGP, S/MIME.

Text 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.

Reference Books:
1. Andrew S.Tanenbaum, "Computer Networks ", Prentice Hall, 5thEdition (Paperback) January 2013
2. Douglas E.Comer& M. S. Narayana, "Computer Networks and Internets with Internet Applications", Pearson Education, 4th Edition, 2009.
3. Fred Halsall, "Data Communications, Computer Networks and Open Systems", Addison Wesley, 4th Edition, 2001.
4. William Stallings, "Cryptography and Network Security: Principles and Practice", Pearson Education, 5thEdition, 2011.

RAJASTHAN TECHNICAL UNIVERSITY, KOTA

Data Structures **[As per Choice Based Credit System (CBCS) Scheme)** **SEMESTER-II**		
Subject Code	**MCA-203**	**INTERNAL ASSESSMENT (IA) MARKS**	**30**
Number of Lecture Hours / Week	**03**	**END TERM EXAM (ETE) MARKS**	**70**
Total Number of Lecture Hours	**40**	**SEMESTER END EXAM HOURS**	**03**
Credits: 03			

CONTENTS	Teaching Hours
Unit-1	**08 Hours**
Introduction Basic data structures such as arrays, linked list, stack, trees and queues and theirapplications, linked and sequential representation Basic Terminology, Elementary Data organization, Data Structure operations. Preliminaries of algorithm, Algorithm analysis and complexity. **Stack** Implementation of stack, operations on stack. Applications of stack: Conversion of infix-expressions to prefix and postfix expressions, evaluation of postfix expression.	
Unit-2	**08 Hours**
Queues Implementation of queues, Operations on Queue, Types of Queues - Circular queue, Dequeue and Priority Queue. **Linked List** Representation and Implementation of Singly Linked Lists, Two-way Header List, Traversing and Searching of Linked List, insertion and deletion to/from Linked Lists, insertion and deletion Algorithms, Doubly linked list, Header lists, circular lists, sorted lists.	
Unit-3	**08 Hours**
Trees Basic terminology and definitions. Array and Linked Representation of Binary trees, Traversing Binary trees. Binary Search Trees: Binary Search Tree (BST), Traversal, Insertion and Deletion in BST, and Introduction to balanced BST (AVL Trees)	
Unit-4	**08 Hours**
Searching: Sequential search, binary search, comparison and analysis. **Sorting** Insertion Sort, Bubble Sort, Quick Sort, Two-Way-Merge Sort, Heap Sort, Sorting on Different Keys, Practical consideration for internal Sorting.	
Unit-5	**08 Hours**

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Graphs Terminology & Representations, Graphs & Multi-graphs, Directed Graphs, Sequential Representations of Graphs, Adjacency Matrices, Traversal, Connected Component and Spanning Trees, Minimum Cost Spanning Trees	

Text Books:
1. A. Tannenbaum, "Data Structure Using C", Pearson Education, 2019.
2. AnanyLevitin, "Introduction to the Design and Analysis of Algorithms", Third Edition, Pearson Education, 2012.
3. Thomas H.Cormen, Charles E.Leiserson, Ronald L. Rivest and Clifford Stein, "Introduction to Algorithms", Third Edition, PHI Course Private Limited, 2012.

Reference Books:
1. Donald E. Knuth, "The Art of Computer Programming", Volumes 1& 3 Pearson Education, 2009.
2. Steven S. Skiena, "The Algorithm Design Manual", Second Edition, Springer, 2008.
3. D.S Malik, "Data Structures using C++", Cengage Learning, 2nd edition, 2009
4. E. Horowitz &Sahni, "Fundamental Data Structure", Galgotia Book Source, 2007.

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Software Engineering & UML [As per Choice Based Credit System (CBCS) Scheme) SEMESTER-II			
Subject Code	**MCA-204**	**INTERNAL ASSESSMENT (IA) MARKS**	**30**
Number of Lecture Hours / Week	**03**	**END TERM EXAM (ETE) MARKS**	**70**
Total Number of Lecture Hours	**40**	**SEMESTER END EXAM HOURS**	**03**
Credits: 03			

CONTENTS	Teaching Hours
Unit-1	**08 Hours**
Software Engineering Fundamentals Software Engineering - A layered Technology, The importance of software, software myths, software engineering paradigms, Software Process Models: Linear Sequential Model, Prototyping Model, RAD Model Evolutionary Software Process Models: Incremental Model, Spiral Model Component Assembly Model, Formal Methods, Fourth-Generation Techniques.	
Unit-2	**08 Hours**
Analysis Concepts and Principles Analysis Concepts and Principles, the Elements of the Analysis Model Data Modifying, Functional Modeling and Information Flow and Behavior Modeling, Mechanics of Structured Analysis, Data Dictionary. Requirement analysis, tasks, analyst, software prototyping, specification principles, representation and the software requirements specification.	
Unit-3	**08 Hours**
Software Project Planning Software Project Planning, 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. Software Design Process, Design Principles, and Design Concepts: Effective ModularDesign, Design Heuristics, Design Documentation, Design Methods: Data Design, Architectural Design, Interface Design, Human Computer Interface Design, Procedural Design. Case Study for Design of any Application Project.	
Unit-4	**08 Hours**
Software Testing S/W Testing Fundamentals, White Box Testing, Black Box Testing, software testing strategies, verification and Validation, System Testing, Unit testing, Integration testing and Debugging. Software Maintenance Maintainability – maintenance Tasks, Characteristics of a good quality software. Case Study for Testing Techniques	
Unit-5	**08 Hours**

Unified Modeling Language (UML)

Unified Modeling Language, Basic structures and modeling classes, common modeling techniques, relationships, common mechanism, class diagrams. Advanced structured modeling, advanced classes and relationships, interfaces, types and roles, instances and object diagram. Basic idea of behavioral modeling. State diagrams, Interaction diagrams, Use case diagrams Object- oriented concepts and principles. Identifying the elements of an object model. Object oriented projects metrics and estimation

Text Books:
1. Roger S Pressman, Bruce R Maxim, "Software Engineering: A Practitioner's Approach", 8th Edition, 2019.
2. Ian Sommerville," Software engineering", Addison Wesley Longman, 9th Edition, 2017.

Reference Books:
1. Grady Booch, James Rumbaugh, IvarJacobson.," The Unified Modeling Language User Guide", 2nd Edition, 2017.
2. James Rumbaugh. MichealBlaha "Object oriented Modeling and Design with UML", 2011.
3. Ali Behforooz, Hudson, "Software Engineering Fundamentals", Oxford, 2009.
4. Charles Ritcher, "Designing Flexible Object Oriented systems with UML", TechMedia , 2008.

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Python Programming [As per Choice Based Credit System (CBCS) Scheme) SEMESTER-II			
Subject Code	MCA-205	INTERNAL ASSESSMENT (IA) MARKS	30
Number of Lecture Hours / Week	03	END TERM EXAM (ETE) MARKS	70
Total Number of Lecture Hours	40	SEMESTER END EXAM HOURS	03
Credits: 03			

CONTENTS	Teaching Hours
Unit-1	**08 Hours**
Introduction and Overview Introduction, What is Python, Origin, Comparison, Comments, Variables and Assignment, Identifiers, Basic Style Guidelines, Python Objects, Standard Types, Other Built-in Types, Internal Types, Operators, Built-in Functions, Numbers and Strings. Introduction to Numbers, Integers, Floating Point Real Numbers, Complex Numbers, Sequences: Strings, Sequences, Strings, String-only Operators, Built-in Functions, String Built-in Methods, Special Features of Strings, Memory Management, Python Application Examples.	
Unit-2	**08 Hours**
Lists and Dictionaries Built-in Functions, List type built in Methods, Special Features of Lists, Tuples, Tuple Operators and Built-in Functions, Special Features of Tuples, Introduction to Dictionaries, Built-in Functions, Built-in Methods, Dictionary Keys, Conditionals and Loops: if statement, else Statement, elif Statement, while Statement, for Statement, break Statement, continue Statement, pass Statement, else Statement	
Unit-3	**08 Hours**
Object, Classes and Files Classes in Python, Principles of Object Orientation, Creating Classes, Instance Methods, Class variables, Inheritance, Polymorphism, Type Identification, File Objects, File Built-in Function, File Built-in Methods, File Built-in Attributes, Standard Files, Command-line Arguments, File System, File Execution, Persistent Storage Units.	
Unit-4	**08 Hours**
Regular Expression and Exception Handling Regular Expression: Introduction/Motivation, Special Symbols and Characters for REs, REs and Python. What Are Exceptions? Exceptions in Python, Detecting and Handling Exceptions, Exceptions as Strings, Raising Exceptions, Assertions, Standard Exceptions	
Unit-5	**08 Hours**

Database Interaction SQL Database Connection using Python, Creating and Searching Tables, Reading and storing config information on database, Programming using database connections, Python Multithreading: Understanding threads, Forking threads, synchronizing the threads, Programming using multithreading	
Text Books: 1. R. NageswaraRao, "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	
Reference Books: 1. Allen B. Downey, "Think Python", O'Reilly Media, 2016 2. Amit Ashok Kamthane, Ashok NamdevKamthane, " Programming and Problem Solving with Python" , McGraw Hill HED, 1st Edition, 2017 3. SakisKasampalis, Quan Nguyen, Dr Gabriele Lanaro, Ingram, "Advanced Python Programming", short title, 2019	

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colspan: **Business Informatics** **[As per Choice Based Credit System (CBCS) Scheme)** **SEMESTER-II**			
Subject Code	**MCA-206**	**INTERNAL ASSESSMENT (IA) MARKS**	**30**
Number of Lecture Hours / Week	**03**	**END TERM EXAM (ETE) MARKS**	**70**
Total Number of Lecture Hours	**40**	**SEMESTER END EXAM HOURS**	**03**
Credits: 03			

CONTENTS	Teaching Hours
Unit-1	**08 Hours**
Business Environment and Dependence on IT Introduction to Business Informatics, Organizational Structure and Design, Dependence on Technology, Integrating Technology with Business Environment, IT and Corporate Strategy, Sustaining a Competitive Edge through application of IT in Management Functions.	
Unit-2	**08 Hours**
E-Commerce Definition, Objectives, Components, Advantages and disadvantages, Scope, E-Commerce Models, E-Commerce Opportunities for Industries, Growth of E-Commerce, e-Commerce Applications- E-Marketing, E-Customer Relationship Management, E-Supply Chain Management, E-Governance, E-Buying, E-Selling, E-Banking, E-Retailing.	
Unit-3	**08 Hours**
E-Payments and Security issues in E-Commerce Introductions, Special features, Types of E-Payment Systems (EFT, E-Cash, E-Cheque, Credit/Debit Card, Smart Card, Digital Tokens and Electronic Purses/ Wallets), Security risk of E-Commerce, Types of threats, Security Tools, Cyber Laws, Business Ethics	
Unit-4	**08 Hours**
ERP Introduction, Needs and Evolution of ERP Systems, ERP Domain, ERP Benefits, ERP and Related Technologies, Relevance to Data Warehousing and Data Mining, ERP Drivers, Evaluation Criterion for ERP product, ERP Life Cycle: Adoption decision, Acquisition, Implementation, Use & Maintenance, Evolution and Retirement Phases, ERP Units, ERP Success & Failure Factors	
Unit-5	**08 Hours**
Information Systems Introduction, Categories of System: Open, Closed, Physical, Abstract, Dynamic, Static etc., Types of Information Systems: TPS, MIS, DSS, OLAP, OLTP, Expert System, Internet Based Systems, Learning Management Systems, Business Process	

Re-Engineering.	

Text Books:
1. Ravi Kalakota, "Electronic Commerce: A Manager's Guide", Addison-Wesley Professional, Edition
   2012.
2. Henry C. Lucas, Information Technology for Management, McGraw Hill, International Edition, July 2001.
3. Kenneth C. Laudon& Jane P. Laudon, Management Information System, Global Edition, Pearson Education, 2009.
4. ERP: A Managerial Perspective Book Description, Sadagopan S, Tata McGraw Hill, 2013

Reference Books:
1. Dr. K Abirami Devi & Dr. M Alagammai, "E-Commerce Essentials", Margham Publication, 2012.
2. Kenneth C. Laudon, Karol Traver, "E-Commerce 2014", Prentice Hall Publication, 2013.
3. Enterprise Resource Planning Systems System, Lifecycle, Electronic Commerce and Risk by Daniel E.O. Leary, 2011
4. WamanJawadekar, Management Information System: Text and Cases, Tata McGraw Hill, June 2009.

RAJASTHAN TECHNICAL UNIVERSITY, KOTA

Data Structures Lab **[As per Choice Based Credit System (CBCS) Scheme)** **SEMESTER-II**			
Subject Code	**MCA-251**	**INTERNAL ASSESSMENT (IA) MARKS**	**30**
Number of Lecture Hours / Week	**02**	**END TERM EXAM (ETE) MARKS**	**70**
Total Number of Lecture Hours	**40**	**SEMESTER END EXAM HOURS**	**03**
Credits: 01			
Lab 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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Java Technologies Lab [As per Choice Based Credit System (CBCS) Scheme) SEMESTER-II			
Subject Code	**MCA-252**	**INTERNAL ASSESSMENT (IA) MARKS**	**30**
Number of Lecture Hours / Week	**02**	**END TERM EXAM (ETE) MARKS**	**70**
Total Number of Lecture Hours	**40**	**SEMESTER END EXAM HOURS**	**03**
Credits: 01			
Lab Experiments			

1. Simple java applications for understanding references to an instant of a class
2. Handling strings in JAVA
3. Package creation
4. Developing user defined packages in java
5. Use of Interfaces
6. Threads, Multithreading
7. Exception Handling
8. Dynamic HTML using Servlet
9. Use of get() and Post() methods
10. Cookies in Servlet
11. Session tracking and Management
12. JDBC
13. JSP Actions elements
14. Directives elements in JSP
15. JSP Tags
16. Implement JDBC with JSP
17. Implement JDBC with Servlet
18. Applications using Spring Web MVC

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Python Programming Lab **[As per Choice Based Credit System (CBCS) Scheme)** **SEMESTER-II**			
Subject Code	**MCA-253**	**INTERNAL ASSESSMENT (IA) MARKS**	**30**
Number of Lecture Hours / Week	**02**	**END TERM EXAM (ETE) MARKS**	**70**
Total Number of Lecture Hours	**40**	**SEMESTER END EXAM HOURS**	**03**
Credits: 01			
Lab 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