Evaluation Scheme and Syllabus

For

Second Year M.C.A.
(Master of Computer Application)

On

Choice Based Credit System

(Effective from the Session: 2017-18)
# Master of Computer Application

## Third Semester

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Subject Code</th>
<th>Subject Name</th>
<th>Periods</th>
<th>Evaluation Scheme</th>
<th>Credit</th>
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<tr>
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<tr>
<td>1.</td>
<td>RCA301</td>
<td>Operating Systems</td>
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<td>Web Technology</td>
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<td>Design &amp; Analysis of Algorithms</td>
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<td>4.</td>
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<td>5.</td>
<td>RCA305</td>
<td>Cyber Security</td>
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<td>6.</td>
<td>RCAA01*</td>
<td>Introduction to Programming and Computer Organization*</td>
<td>3</td>
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### Practical

|       | RCA351       | Operating Systems Lab                      | 0 | 0 | 3 | 30 | 20 | 50   | 50  | 100   | 02     |
|       | RCA352       | Design & Analysis of Algorithms Lab        | 0 | 0 | 6 | 30 | 20 | 50   | 50  | 100   | 03     |

**Total**

|       |            |                                             |   | 6 | 7 | 00   | 24  |

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## Fourth Semester

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<td>Database Management Systems</td>
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<td>Artificial Intelligence</td>
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<td>Compiler Design</td>
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<td>5.</td>
<td>RCEA12 to E15</td>
<td>Elective –I</td>
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<td>RCAA02*</td>
<td>Fundamental of Data Structure, Numerical and Computational Theory*</td>
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### Practical

|       | RCA451       | Mini Project                                | 0 | 0 | 6 | 30 | 20 | 50   | 50  | 100   | 03     |
|       | RCA452       | Database Management Systems Lab             | 0 | 0 | 3 | 30 | 20 | 50   | 50  | 100   | 02     |

**Total**

|       |            |                                             |   | 6 | 7 | 00   | 24  |

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*Note: MCA Lateral Entry candidates are required to qualify following two audit courses also. These courses will be of qualifying nature and shall not be considered towards semester total of marks.*

* Audit Courses to be completed by MCA Lateral Entry Students only.

1. Audit Course 1: RCA-A01
2. Audit Course 2: RCA-A02

### List of Electives

**Elective – I**

1. RCA-E11: Design & Development of Applications
2. RCA-E12: Client-Server Computing
3. RCA-E13: Data Warehousing & Data Mining
4. RCA-E14: Advanced Computer Architecture
5. RCA-E15: Mobile Computing
RCA-301 Operating Systems


UNIT IV–MEMORY:- Memory management requirements, Partitioning, Paging and Segmentation, Virtual memory - Hardware and control structures, operating system software, Linux memory management, Windows memory management.

UNIT V - INPUT/OUTPUT AND FILE SYSTEMS: - I/O management and disk scheduling – I/O devices, organization of I/O functions; OS design issues, I/O buffering, disk scheduling, Disk cache. File management – Organization, Directories, File sharing, and Record blocking, secondary storage management.

References:-
2. Andrew S. Tanenbaum, “Modern Operating System”, PHI Learning
RCA-302 Web Technology

UNIT I- INTRODUCTION & WEB DESIGN:- Introduction: Concept of WWW, Internet and WWW, HTTP Protocol: Request and Response, Web browser and Web servers, Features of Web 2.0

Web Design: Concepts of effective web design, Web design issues including Browser, Bandwidth and Cache, Display resolution, Look and Feel of the Website, Page Layout and linking, User centric design, Sitemap, Planning and publishing website, Designing effective navigation.

UNIT II- HTML & STYLE SHEETS:- HTML: Basics of HTML, formatting and fonts, commenting code, color, hyperlink, lists, tables, images, forms, XHTML, Meta tags, Character entities, frames and frame sets, Browser architecture and Web site structure. Overview and features of HTML 5

Style sheets : Need for CSS, introduction to CSS, basic syntax and structure, using CSS, background images, colors and properties, manipulating texts, using fonts, borders and boxes, margins, padding lists, positioning using CSS, CSS2, Overview and features of CSS3

UNIT III- JAVASCRIPT & XML:- JavaScript : Client side scripting with JavaScript, variables, functions, conditions, loops and repetition, Pop up boxes, Advance JavaScript: JavaScript and objects, JavaScript own objects, the DOM and web browser environments, Manipulation using DOM, forms and validations, DHTML : Combining HTML, CSS and JavaScript, Events and buttons

XML: Introduction to XML, uses of XML, simple XML, XML key components, DTD and Schemas, Using XML with application. Transforming XML using XSL and XSLT

UNIT IV- PHP:- PHP : Introduction and basic syntax of PHP, decision and looping with examples, PHP and HTML, Arrays, Functions, Browser control and detection, string, Form processing, Files, Advance Features: Cookies and Sessions, Object Oriented Programming with PHP

UNIT V- MYSQL:- PHP and MySQL : Basic commands with PHP examples, Connection to server, creating database, selecting a database, listing database, listing table names, creating a table, inserting data, altering tables, queries, deleting database, deleting data and tables, PHP myadmin and database bugs

References:-
1. Developing Web Applications, Ralph Moseley and M. T. Savaliya, Wiley-India
2. Web Technologies, Black Book, Dreamtech Press
3. HTML 5, Black Book, Dreamtech Press
4. Web Design, Joel Sklar, Cengage Learning
5. Developing Web Applications in PHP and AJAX, Harwani, McGraw Hill
6. Internet and World Wide Web How to program, P.J. Deitel & H.M. Deitel, Pearson

UNIT-II ADVANCED DATA STRUCTURES: - Red-Black trees, B-trees, Binomial Heaps, Fibonacci Heaps.


UNIT-IV DYNAMIC PROGRAMMING, BACKTRACKING AND BRANCH AND BOUND: - Dynamic programming with examples such as Knapsack, All pair shortest paths – Warshall’s and Floyd’s algorithms, Resource allocation problem. Backtracking, Branch and Bound with examples such as Travelling Salesman Problem, Graph Colouring, n-Queen Problem, Hamiltonian Cycles and Sum of subsets.

Unit -V Selected Topics: Algebraic Computation, Fast Fourier Transform, String Matching, Theory of NP-completeness, Approximation algorithms and Randomized algorithms.

References:-

RCA 304 COMPUTER BASED OPTIMIZATION TECHNIQUES

UNIT I-PRELIMINARIES:- Inventory Models and Replacement problems: Inventory models – various costs-deterministic inventory models, Single period inventory model with shortest cost, stochastic models, Application of inventory models, Economic lot sizes-price breaks, and Replacement problems-capital equipment-discounting costs-replacement in anticipation of failure-group replacement-stochastic nature underlying the failure phenomenon.

UNIT II-LINEAR PROGRAMMING PROBLEMS (LPP):- Definition of LPP, Graphical Solutions of Linear Programming Problems, Simplex Method, and Artificial Variable Method, Two Phase Method, Charnes’ Big-M Method, Sensitivity Analysis, Revised Simplex Method, Duality, Dual Simplex Method


UNIT V-QUEUING THEORY:-Introduction to Queues, Basic Elements of Queuing Models, Queue Disciplines, Memoryless Distribution, Role of Exponential and Poisson Distributions, Markovian Process, Erlang Distribution, Symbols and Notations, Distribution Of Arrivals, Distribution of Service Times, Definition of Steady and Transient State, Poisson Queues.

References:-
1. Hadley, G., “Linear Programming, and Massachusetts”, Addison-Wesley
5. Swarup K etal, “Operation Research”, S. Chand
RCA-305 Cyber Security

UNIT I


UNIT II

Application security (Database, E-mail and Internet), Data Security Considerations-Backups, Archival Storage and Disposal of Data, Security Technology-Firewall and VPNs, Intrusion Detection, Access Control.

Security Threats -Viruses, Worms, Trojan Horse, Bombs, Trapdoors, Spoofs, E-mail viruses, Macro viruses, Malicious Software, Network and Denial of Services Attack, Security Threats to E-Commerce- Electronic Payment System, e-Cash, Credit/Debit Cards. Digital Signature, public Key Cryptography.

UNIT III


UNIT IV


UNIT V

References:-

3. Dr. Surya Prakash Tripathi, Ritendra Goyal, Praveen kumar Shukla ,“Introduction to Information Security and Cyber Law” Willey Dreamtech Press.
5. CHANDER, HARISH, “Cyber Laws And It Protection”, PHI Learning Private Limited, Delhi, India
Audit Course-1

RCA-A01 Introduction to Programming and Computer Organization

UNIT-I

Natural Numbers: - Well Ordering Principle, Principle of Mathematical Induction.
Set Theory: - Ordered Sets, Relations, Equivalence Relations and Partitions, Modular Arithmetic.
Functions: - Functions, Composition of Functions, one-one, onto and Inverse of a function

UNIT-II

Data representation: - signed and unsigned number representation, fixed and floating point representations.
Basic Electronics: - Digital Logic Boolean algebra. Combinational and sequential circuits, Gate Minimization.

UNIT-III

CPU Organization: Fundamentals, Instruction Set formats, modes, types, Fixed and Floating point arithmetic.
Pipelining: Basic concepts of pipelining, throughput and speedup, pipeline hazards.

UNIT-IV

Introduction to programming: - Problem solving and expression of solution through flow chart and algorithm.
Parts of a program: - primitive data types, variables, operators and their precedence, expressions, input/output, conditionals and branching, looping statements.
Stored Programs: Procedures, Functions, Storage classes-scope and life time, recursion.

References:-
1. Discrete Mathematics and Its Applications: Kenneth H. Rosen
2. Digital Logic and Computer Design: M. Morris Mano
RCA-351 Operating Systems Lab

1. To implement CPU Scheduling Algorithms
   - FCFS
   - SJF
   - SRTF
   - PRIORITY
   - ROUND ROBIN

2. Simulate all Page Replacement Algorithms
   - FIFO
   - LRU

3. Simulate Paging Technique of Memory Management

RCA-352 Design & Analysis of Algorithms Lab
(Using Java and Dot Net Framework)

Objective:-
1. Program for Recursive Binary & Linear Search.
2. Program for Heap Sort.
3. Program for Merge Sort.
4. Program for Selection Sort.
5. Program for Insertion Sort.
6. Program for Quick Sort.
7. Study of NP-Complete theory.
8. Study of Cook’s theorem.
RCA- 401 Database Management Systems


UNIT V - FAILURE RECOVERY AND CONCURRENCY CONTROL: - Issues and Models for Resilient Operation- Undo/Redo Logging- Protecting against Media Failures

CONCURRENCY CONTROL: Serial and Serializable Schedules- Conflict Serializability- Enforcing Serializability by Locks- Locking Systems with Several Lock Modes- Concurrency Control by Timestamps, validation.

TRANSACTION MANAGEMENT: Serializability and Recoverability- View Serializability- Resolving Deadlocks- Distributed Databases: Commit and Lock

References:-
RCA- 402 COMPUTER NETWORK

UNIT I - DATA COMMUNICATIONS :-

UNIT II – DATA LINK LAYER:-

UNIT III – NETWORK LAYER:-
Switching–Logical addressing – IPV4 – IPV6–Address mapping–ARP, RARP, BOOTP and DHCP–Delivery, Forwarding and Unicast Routing protocols.

UNIT IV – TRANSPORT LAYER:-

UNIT V – APPLICATION LAYER:-

References:-
RAC- 403 Artificial Intelligence

Unit-I INTRODUCTION:- Introduction to Artificial Intelligence, Foundations and History of Artificial Intelligence, Applications of Artificial Intelligence, Intelligent Agents, Structure of Intelligent Agents. Computer vision, Natural Language Possessing.

UNIT-II INTRODUCTION TO SEARCH:- Searching for solutions, Uniformed search strategies, Informed search strategies, Local search algorithms and optimistic problems, Adversarial Search, Search for games, Alpha - Beta pruning.

UNIT-III KNOWLEDGE REPRESENTATION & REASONING:- Propositional logic, Theory of first order logic, Inference in First order logic, Forward & Backward chaining, Resolution, Probabilistic reasoning, Utility theory, Hidden Markov Models (HMM), Bayesian Networks.

UNIT-IV MACHINE LEARNING:- Supervised and unsupervised learning, Decision trees, Statistical learning models, Learning with complete data - Naive Bayes models, Learning with hidden data - EM algorithm, Reinforcement learning,

UNIT-V PATTERN RECOGNITION:- Introduction, Design principles of pattern recognition system, Statistical Pattern recognition, Parameter estimation methods - Principle Component Analysis (PCA) and Linear Discriminant Analysis (LDA), Classification Techniques – Nearest Neighbour (NN) Rule, Bayes Classifier, Support Vector Machine (SVM), K – means clustering.

References:-

3. E Charniak and D McDermott, “Introduction to Artificial Intelligence”, Pearson Education
4. Dan W. Patterson, “Artificial Intelligence and Expert Systems”, Prentice Hall of India

UNIT II- LEXICAL ANALYSIS: - Lexical analysis- handles - token specification - design of lexical analysis (LEX) - Automatic generation of lexical analyzer - input buffering - A language for specifying lexical analyzers - implementation of lexical analyzer

UNIT III - SYNTAX ANALYSIS – PARSING: - Definition - role of parsers - top down parsing - bottom-up parsing - Left recursion - left factoring - Handle pruning , Shift reduce parsing - operator precedence parsing – FIRST- FOLLOW- LEADING- TRAILING- Predictive parsing - recursive descent parsing. LR parsing – LR (0) items - SLR parsing – Canonical LR - LALR parsing - generation of LALR - Ambiguous grammars - error recovery


References: -

RCA-E11: Design & Development of Applications

**Unit 1 - INTRODUCTION:**
Introduction to Android, Activities and Intents, Testing and Debugging, and Backwards Compatibility.

**Unit 2- User Interface:**
User Interaction and intuitive navigation, Delightful User Experience, Testing your UI

**Unit 3- Background Tasks:**
Connect to the Internet, Notifications and Background Tasks, Triggering, Scheduling and Optimizing Background Tasks

**Unit 4- Data Saving, Retrieving, Loading:**
Storing Data in your app, Storing Data using SQLite, Sharing Data: Content Resolvers and Content Providers, Loading Data using Loaders

**Unit 5- Polish and Publish:**
Permissions and Libraries, Security best practices, Widgets, Publishing your App, Multiple Form Factors, Google Services, Firebase, Google Cloud Messaging, Making your app data searchable

**References:-**
UNIT I CLIENT/SERVER COMPUTING: DBMS concept and architecture, Single system image, Client Server architecture, mainframe-centric client server computing, downsizing and client server computing, preserving mainframe applications investment through porting, client server development tools, advantages of client server computing.

UNIT II COMPONENTS OF CLIENT/SERVER APPLICATION: The client: services, request for services, RPC, windows services, fax, print services, remote boot services, other remote services, Utility Services & Other Services, Dynamic Data Exchange (DDE), Object Linking and Embedding (OLE), Common Object Request Broker Architecture (CORBA). The server: Detailed server functionality, the network operating system, available platforms, the network operating system, available platform, the server operating system.

UNIT III CLIENT/SERVER NETWORK: connectivity, communication interface technology, Interposes communication, wide area network technologies, network topologies (Token Ring, Ethernet, FDDI, CDDI) network management, Client-server system development: Software, Client–Server System Hardware: Network Acquisition, PC-level processing unit, Macintosh, notebooks, pen, UNIX workstation, x-terminals, server hardware.


References:

2. Dawna Travis Dewire, “Client/Server Computing”, TMH
RCA-E13 Data warehousing and Mining

UNIT I DATA WAREHOUSING:- Overview, Definition, Data Warehousing Components, Building a Data Warehouse, Warehouse Database, Mapping the Data Warehouse to a Multiprocessor Architecture, Difference between Database System and Data Warehouse, Multi Dimensional Data Model, Data Cubes, Stars, Snow Flakes, Fact Constellations, Concept hierarchy, Process Architecture, 3 Tier Architecture, Data Marting.


UNIT III - DATA MINING:- Overview, Definition & Functionalities, Data Processing, Form of Data Preprocessing, Data Cleaning: Missing Values, Noisy Data, (Binning, Clustering, Regression, Computer and Human inspection), Inconsistent Data, Data Integration and Transformation. Data Reduction:- Data Cube Aggregation, Dimensionality reduction, Data Compression, Numerosity Red.


UNIT V - DATA VISUALIZATION AND OVERALL PERSPECTIVE:- Aggregation, Historical information, Query Facility, OLAP function and Tools. OLAP Servers, ROLAP, MOLAP, HOLAP, Data Mining interface, Security, Backup and Recovery, Tuning Data Warehouse, Testing Data Warehouse. Warehousing applications and Recent Trends: Types of Warehousing Applications, Web Mining, Spatial Mining and Temporal Mining.

References:-

1. Alex Berson, Stephen J. Smith “Data Warehousing, Data-Mining & OLAP”, TMH
3. Margaret H. Dunham, S. Sridhar, "Data Mining: Introductory and Advanced Topics” Pearson Education
5. Pieter Adriaans, Dolf Zantinge, “Data-Mining”, Pearson Education


UNIT – IV: PARALLEL ALGORITHMS:- PRAM Algorithms: Parallel Reduction, Prefix Sums, Preorder Tree Traversal, Merging two Sorted lists; Matrix Multiplication: Row Column Oriented Algorithms, Block Oriented Algorithms; Parallel Quicksort, Hyper Quicksort; Solving Linear Systems: Gaussian Elimination, Jacobi Algorithm; Parallel Algorithm Design Strategies.


References:-

2. Matthew, ”Beginning Linux Programming”, SPD/WROX
5. Quinn, “Parallel Computing: Theory & Practice”, TMH
6. Quinn, “Parallel Programming in C with MPI and Open MP”, TMH
UNIT – I
Introduction, issues in mobile computing, overview of wireless telephony: cellular concept, GSM: air-interface, channel structure, location management: HLR-VLR, hierarchical, handoffs, channel allocation in cellular systems, CDMA, GPRS.

UNIT - II

UNIT – III
Data management issues, data replication for mobile computers, adaptive clustering for mobile wireless networks, File system, Disconnected operations.

UNIT - IV
Mobile Agents computing, security and fault tolerance, transaction processing in mobile computing environment.

UNIT – V
Ad Hoc networks, localization, MAC issues, Routing protocols, global state routing (GSR), Destination sequenced distance vector routing (DSDV), Dynamic source routing (DSR), Ad Hoc on demand distance vector routing (AODV), Temporary ordered routing algorithm (TORA), QoS in Ad Hoc Networks, applications.

References:-
1. J. Schiller, Mobile Communications, Addison Wesley.
2. A. Mehrotra, GSM System Engineering.
Audit Course-2  
RCA-A02 Fundamental of Data Structure, Numerical and Computational Theory

UNIT-I  
**Arrays:** Array Definition, Representation and Analysis, Single and Multidimensional Arrays, Searching: Sequential search, binary search, comparison and analysis, Sorting: Insertion Sort, Bubble sort, Quick Sort, Two Way Merge Sort, Heap Sort.  
**Linked list:** Representation and Implementation of Singly Linked Lists, Two-way Header List, Traversing and Searching of Linked List, Overflow and Underflow, Insertion and deletion to/from Linked Lists algorithm (Beginning, end and middle).

UNIT-II  
**Binary Search Trees:** Binary Search Tree (BST), Insertion and Deletion in BST, Complexity of Search Algorithm.  
**Curve fitting and Approximation:** Method of least squares, fitting of straight lines, polynomials, exponential curves.  
**Regression analysis:** Linear and Non-linear regression, multiple regressions

UNIT-III  
**Time series Analysis and Hypothesis Testing:** forecasting models and methods. Test of significance, Chi-square test, t-test, F-Test  
**Finite State Machines (FSM):** Introduction, Deterministic (DFA), Nondeterministic (NFA). Conversions and Equivalence: Equivalence between NFA with and without $\varepsilon$ transitions. NFA to DFA conversion. Minimization of FSM.

UNIT-IV  
**Regular Expression & Regular Set:** Definition, Properties, Pumping Lemma, and Decision problem for regular language.  
**Grammar:** Introduction, Definition, Different types, Derivation Tree, Different Normal Forms, Ambiguous Grammar and its implications, Chomsky hierarchy. Different Classes of Languages.  
**Pushdown Automata (PDA):** Definition, PDA and CFL (Context-Free Language), Acceptance of Strings.  
**Turing Machine:** Introduction, Turing Machine Model.

**References:**  
RCA-452 Database Management Systems Lab

Objectives:-

1. Installing oracle.
2. Creating Entity-Relationship Diagram using case tools.
3. Writing SQL statements Using ORACLE/MYSQL:
   a) Writing basic SQL SELECT statements.
   b) Restricting and sorting data.
   c) Displaying data from multiple tables.
   d) Aggregating data using group function.
   e) Manipulating data.
   f) Creating and managing tables.
4. Normalization in ORACLE.
5. Creating cursor in oracle.
6. Creating procedure and functions in oracle.
7. Creating packages and triggers in oracle.