Solapur University, Solapur

M. C. A. Part - III

Syllabus (Semester – V and VI)
(Effective from June 2016)

MCA – III Semester V and VI
Syllabus

M. C. A. Part – III Semester-V

Paper Code	Title of the Paper	Contact hours/week	Distribution of Marks for Examination			Credits
			Internal	**University**	**Total**	
MCA-501	Artificial Intelligence	04	30	70	100	04
MCA-502	Web Design Techniques	04	30	70	100	04
MCA-503	Network Security	04	30	70	100	04
MCA-504	OPTIONAL COURSES	04	30	70	100	04
MCA-505	(GROUP-I, GROUP-II) SELECT ANY ONE GROUP	04	30	70	100	04
MCA-506	Practical - V	12	30	70	100	04
MCA-507	Project -V	02	30	70	100	04
Total		**34**	**210**	**490**	**700**	**28**

Group-I : MCA504 – Digital Image Processing

MCA505 - Mobile Computing

Group-II : MCA504 – Pattern Recognition

MCA505 - Real Time Systems

M. C. A. Part – III Semester-VI

Paper Code	Title of the Paper	Contact hours/week	Distribution of Marks for Examination			Credits
			Internal (Project Viva)	**University (Project Viva)**	**Total**	
MCA-601	Project - VI	02	50	200	250	10

MCA 501 – Artificial Intelligence

Unit – 1 :
1. What is Artificial Intelligence: The AI Problems, The underlying Assumption, What is an AI Technique? (4)
2. Problems, Problem Spaces and Search: Defining the problem, as a state space search, production systems, problem characteristics, production system characteristics, Issues in the design of search programs. (4)
3. Heuristic Search Techniques: Generate-and-Test, Hill Climbing, Best-First Search, Problem Reduction, Constraint Satisfaction Means-Ends Analysis. (7)

Unit – 2 :
1. Knowledge Representation Issues : Approaches to Knowledge representation, Issues in Knowledge representation. (5)
2. Using Predicate Logic : Representing Simple Facts in Logic, Representing Instance and ISA Relationships, Computable Functions and Predicates, Resolution, Natural deduction. (5)
3. Representing Knowledge Using Rules   :Procedural Versus Declarative Knowledge, Forward Versus Backward Reasoning, Matching. (5)

Unit – 3 :
1. Statistical Reasoning : Probability and Bayes' Theorem, Certainty Factors and Rule-Based Systems, Bayesian Networks, Dempster-Shafer Theory, Fuzzy Logic. (5)
2. Weak Slot-and Filler Structures : Semantic Nets, Frames. (5)
3. Strong Slot-and-Filler Structures :Conceptual Dependency, Scripts. (5)

Unit – 4 :
1. Game Playing : Overview, The Minmax Search Procedure, Adding Alpha-Beta Cutoffs, Additional Refinements, Iterative Deepening. (5)
2. Natural Language Processing : Introduction, Syntactic Processing, Semantic Analysis, Discourse and Pragmatic Processing. (5)
3. Expert Systems : Representing and Using Domain Knowledge, Expert System Shells, Explanation, Knowledge Acquisition. (5)

Reference Books :
1. Artificial Intelligence by Elaine Rich, Kevin Knight, TMH, 3rd Edition.
2. Artificial Intelligence : Structures and Strategies for Complex Problem solving by George F Luger, 4th Edition, Pearson Education, Asia.
3. Introduction to Artificial Intelligence and Expert Systems by D W Patterson, PHI, 2nd Edition.

MCA 502 – Web Design Techniques

Unit – 1 :

1. Introduction to HTML : World Wide Web, Web Publishing, Physical & logical HTML, Structure of HTML, HTML Text formatting tags, Ordered and unordered List tags, Inserting image, HTML Links : text, image and image mapping, Tables, Frames, HTML Forms: controls (7)

2. Cascading Style Sheet : Introduction to CSS, Types of style sheets, Text formatting properties, CSS Borders, Margin Properties, Color properties, Use of <div> and <span> tag, Use of classes in CSS with an example (8)

Unit – 2 :

1. JavaScript : Concept of script, Types of Scripts, Introduction to Javascript, Variables, identifiers, constants, Operators, Control and looping structure, Array and its predefined functions, Math object and its predefined functions, string object and its predefined functions, date object and its predefined functions, event handling, DOM concept, DOM objects : Window navigator, History object and its methods, Location object with methods, Validations in JavaScript (15)

Unit – 3 :

1. jQuery and AJAX : Introduction to jQuery, Syntax Overview, Anatomy of a jQuery Script, Creating first jQuery script, Traversing the DOM, Selecting Elements with jQuery, Refining & Filtering Selections,
Selecting Form Elements, Working with Selections - Chaining, Getters & Setters, CSS Styling and Dimensions,
Manipulating Elements - Getting and Setting Information about Elements, Moving, Copying, and Removing Elements, Creating New Elements
Manipulating Attributes, Utility Methods Events - Connecting Event to Elements, Namespacing Events, Event handling,Triggering Event handlers, Event Delegation Animating effects - animate(), click(), hover(), toggle()
Plugins - Create a basic plugin, Finding & Evaluating Plugins, Writing Plugins, Tabs, Panels and Panes examples
jQuery UI and Forms
AJAX Overview, jQuery's AJAX related methods, Ajax and Forms, Ajax Events (15)

Unit – 4 :

1. XML : Concept of XML, features of XML, Writing XML elements, attributes, etc.
XML with CSS, XML with DSO, XML Namespace, XML DTD, XML schemas, writing simple sheet using XSLT, SAX Parser, DOM Parser
Introduction to SOAP and Examples on XML (9)

2. Web Server: Concept of Web Server, Obtaining and Installing Apache Http Server on Windows, Editing httpd.conf configuration file, Configuration directives in httpd.conf

-ServerRoot, PidFile, ServerName, Add site to /etc/hosts file, DocumentRoot, ErrorLog, Listen, Directory, Files, Location   (6)

Reference Books:
1. Complete reference HTML, TMH, 4th Ed.
2. HTML, DHTML, JavaScript, Perl & CGI Ivan Bayross, BPB Pub, 3rd Ed.
3. Web enabled commercial application development using HTML, DHTML, JavaScript, PERLCGI, BPB Pub,3rd Ed.
4. Programming the World Wide Web Robert W. Sebesta,Pearson,4th Ed.
5. JavaScript Bible, Wiley Pub.
6. Learning jQuery - Jonathan Chaffer, Karl Swedberg
7. Professional Ajax, 2nd Edition Wrox Press
8. Apache Server 2.0: The Complete Reference - Ryan B. Bloom, TMH Pub.
9. Apache HTTP Server Reference Manual - for Apache version 2.2.17 – Apache Software Foundation
10. Internet Technology at work Hofstetter fred, TMH.
11. Beginning XML Wrox Press 12. XML how to program Deitel & Deitel, Pearson Pub.

Reference Sites:
1. http://www.w3schools.com
2. http://www.apache.org

MCA 503 – Network Security

Unit – 1 :

1. **Introduction :** Security Concepts, Threats and Risks, Attacks – Passive and ActiveSecurity Services, Confidentiality, Authentication, Non-Repudiation, Integrity, Access Control, Availability, Model for Internetwork Security, Internet Standards and RFCs (8)

2. **Access Control Mechanisms :** Access Matrix, HRU, TAM, ACL and capabilities, Access Control Models, Chinese Wall, Clark-Wilson, Bell-LaPadula, Non-Interference and Role Base Model (7)

Unit – 2 :

1. **Cryptography** : Secret Key and Public Key Cryptosystems, Symmetric Ciphers, Block Ciphers and Stream Ciphers, DES, IDEA and Key Escrow, RSA and ElGamal, Secure Hash and Key management, Digital Signature and Non-repudiation, cryptanalysis (15)

Unit – 3 :

1. **Network Security** : Objectives and Architectures, Internet Security Protocols, IP encapsulating Security Protocol, Network and Transport Layer Security (7)

2. **Network Security Applications** : Authentication Mechanisms – Passwords, Cryptographic authentication protocols, Smart Card, Biometrics, Digital Signatures and seals, Kerberos, X.509 LDAP Directory,
Web Security - SSL Encryption, TLS, SET, E-mail Security, PGPs / MIME, IP Security (8)

Unit – 4 :

1. **Access and System Security** : Intruders, Intrusion Detection and Prevention
   Firewalls - Hardware Firewall, Software Firewall, Application Firewall, Packet Filtering, Packet Analysis
   Proxy Severs - Firewall setting in Proxy, ACL in Proxy (15)

References :

1   William Stallings, "Network Security Essentials", Prentice-Hall.
2   Edward Amoroso, "Fundamentals of Computer Security Technology", Prentice-Hall.
3   Dorothy E. Denning, "Cryptography and Data Security", Addison-Wesley.
4   Peter J. Denning, "Computers under Attack", Addison-Wesley.
5   Douglas R. Stinson, "Cryptography: Theory and Practice", CRC Press.
6   D. Brent Chapman and Elizabeth D. Zwicky, "Building Internet Firewalls", O'Reilly and Associates

GROUP – I
MCA 504 (GROUP-I) – Digital Image Processing

Unit – 1 :
1. Introduction - Digital image processing, Applications of digital image processing, Fundamental steps in digital image processing, and Components of an image processing system. (5)
2. Digital image fundamentals - Image sampling and quantization, some basic relationships between pixels, Linear and nonlinear operation (5)
3. Image enhancement in the spatial domain - Some basic gray level transformations, Histogram processing, Enhancement using arithmetic/logic operations, Basics of spatial filtering, Smoothing spatial filters, Sharpening spatial filters (5)

Unit – 2 :
1. Image enhancement in the frequency domain - Introduction to the Fourier transform and the frequency domain, Smoothing frequency-domain filters, Sharpening frequency domain filters, homomorphic filtering (7)
2. Image restoration - A model of the image degradation/restoration process, Noise models, Restoration in the presence of noise only-spatial filtering, Periodic noise reduction by frequency domain filtering (8)

Unit – 3 :
1. Morphological image processing - Preliminaries, Dilation and erosion, Opening and closing, The hit-or-miss transformation, Some basic morphological algorithms (7)
2. Image segmentation - Detection of discontinuities, Edge linking and boundary detection, Thresholding, Region-based segmentation, Segmentation by morphological watersheds (8)

Unit – 4 :
1. Representation and description - Representation, Boundary descriptors, Regional descriptors, Use of principal components for description, Relational descriptors (7)
2. Object recognition - Patterns and pattern classes, Recognition based on decision-theoretic methods, Structural methods (8)

References :
1. Digital image processing by Gonzalez and Woods PHI
2. Image Processing, Analysis and Machine Vision: Milan Sonka, Vaclav Hlavac, Roger Boyle (Thomson Brooks / Cole Edition).
3. Fundamentals of Digital Image Processing: Anil K. Jain (Prentice Edition Hall of India)

MCA 505 (GROUP-I) – Mobile Computing

Unit – 1 :
1. WIRELESS TRANSMISSION: Frequencies for radio transmission, Regulations. Signals, Antennas, Signal propagation-Path loss of radio signals, Additional signal propagation effects, Multipath propagation. Multiplexing-Space, Frequency, Time, Code division multiplexing. Modulation- Amplitude, Frequency, Phase Shift Keying, Advanced frequency and phase shift keying, spread spectrum- DSSS, FHSS. Cellular System (8)
2. MEDIUM ACCESS CONTROL: CSMA/CD, Hidden and exposed terminals, Near and Far terminals, SDMA, FDMA, TDMA- Fixed TDM, Classical Aloha, Slotted Aloha, Carrier sense multiple access, Demand assigned multiple access, PRMA, Reservation TDMA,MACA , Polling, CDMA. (7)

Unit – 2 :
1. TELECOMMUNICATION SYSTEM: GSM – Mobile services, Architecture of a GSM System, Protocol Architecture, Radio Interface, Localization and calling: MTC, MOC, Handover, Security-Authentication, Encryption. (6)
2. WIRELESS LAN: Introduction, Infrared vs radio transmissions, architecture of an infrastructure based IEEE 802.11 and Ad-hoc networks, Protocol architecture, Physical Layer, Format of an IEEE 802.11 frame using DSS. MAC management-synchronization, power management, roaming. Bluetooth Architecture, simple Bluetooth Pico-net. (9)

Unit - 3 :
1. MOBILE NETWORK LAYER: Entities & terminology in Mobile IP, IP packet delivery agent discovery, Registration. Dynamic Host Configuration Protocol (DHCP) (7)
2. MOBILE TRANSPORT LAYER: Traditional TCP- Congestion control, Slow start, fast retransmit/Fast recovery, implications on mobility. Classical TCP- Indirect TCP, Snooping TCP, Mobile TCP (8)

Unit – 4 :
1. INTRODUCTION TO ANDROID: Android System Architecture, Creating and Running Android Applications, Types of Android Applications, Building blocks, Application Manifest, Application Life Cycle, Application Priority and Process States, Creating and Using Resources, The Activity Life Cycle, Android GUI architecture, Views, Layouts, Creating simple android GUI based applications with event handling such as Sudoku game and To-do list. (8)
2. USING BLUETOOTH AND MANAGING NETWORKS IN ANDROID: Using Bluetooth -Introducing the Bluetooth Service, Controlling the Local Bluetooth Device, Discovering and Bonding with Bluetooth Devices, Managing Bluetooth Connections, Communication with Bluetooth. Managing Networks - Monitoring and Managing Your Internet Connectivity, Managing Active Connections, Managing Your Wi-Fi

Reference Books:

1. Mobile communication (2 nd Edition) – John Schiller (Pearson Edition)
2. Wireless LAN: Peter T Davis, Craig R McGuffin (MGH International)
3. Professional Android Development – Reto Meier (Wrox Publication)
4. Hello Android - Ed Burnette (Pragmatic Bookshelf)
5.Android Application Development - Rick Rogers, John Lombardo (O'Reilly Publication)

GROUP – II
MCA 504 (GROUP-II) - Pattern recognition

Unit – 1 :

1. Introduction : Application of Pattern Recognition, statistical decision theory, Image processing and analysis   (5)

2. Probability: Probability of Events, Random Variables, Joint Distribution and Densities, Moments of Random variables, Estimation of Parameters from samples, Minimum Risk Estimations.   (10)

Unit – 2 :

1. Statistical Decision Making : Baye's Theorem, Multiple Features, Conditionally Independent Features, Decision Boundaries Estimation of Error rates, Characteristic centers, Estimating the Composition of Populations.   (8)

2. Non Parametric Decision Making : Histograms, Kernel and windows estimators, nearest neighbor classification techniques, adaptive decision boundaries, adaptive discriminant functions, minimum squared   (7)

Unit – 3 :

1. Clustering : Hierarchical clustering, partitioned clustering   (7)

2. Artificial Neural Networks : Nets without hidden layers, nets with hidden layer, the Back-Propagation algorithm, Hopfied nets – an application : Classifying sex from facial images.   (8)

Unit – 4 :

1. Processing of Wave form and images : gray level scaling, transformations, equalizations, geometric image scaling and interpolations, logarithmic gray level scaling, the statistical significance of image features.   (15)

References :

1. Earl Gose, Richard Johnsonbaugh and Steve Jost, Pattern Recognition and Image Analysis, PHI 1997

2. Fu. K. S., Syntactic Methods in Pattern Recognition, Acaemis Press 1974

3. Tray Y Young and Thomas W Calvers, Classification, Estimation and Pattern Recognition, American Elsevier Publication Company Inc. 1994

4. Duda R. O. and Hart P. E., Pattern Classification and Scene Analysis, John Wiley (1973)

GROUP – II
MCA 505 (GROUP-II) - Real Time Systems

Unit -1 :
1. Introduction : Issues in real-time computing, structure of a real-time system, performance measures for real time systems, estimating program run times, introduction to hardware components of real time systems (microcontroller, sensor and actuator, interrupts)   (15)

Unit – 2 :
1. Task Assignment and Scheduling : Pre-emptive, nonpreemptive, scheduling, classical microprocessor scheduling algorithms, rate-monotonic scheduling algorithm and preemptive earliest deadline first (EDF)algorithm, Allowing for precedence and exclusion conditions, using primary and alternative task, Introduction to IRIS tasks, task assignment and allocation algorithms, Utilization : Balancing algorithm, A next-fit algorithm for RM scheduling, A bin-packing assignment algorithm for EDF, A myopic offline scheduling (MOS) algorithm, fault-tolerant scheduling,   (15)

Unit – 3 :
1. Programming languages for real-time applications : Desired language characteristics, data typing, control structures, hierarchical decomposition, exception handling, overloading, multitasking, low-level programming, tasks scheduling, timing specifications, programming environments, run-time support, real time database, real-time Vs. relative databases, main memory databases, transaction priorities, transaction aborts, concurrency control issues, disk scheduling algorithms, database for hard real-time systems   (15)

Unit – 4 :
1. Real-time communication : Network topologies, network architecture issues, protocols (Contention-bases protocols, token-based protocols, stop and Go multi hop protocol, polled bus protocol, hierarchical round robin protocol, deadline-based protocols, fault-tolerant routing) fault-tolerance techniques. Introduction to fault types, fault detection, hardware, software information and time redundancy, data diversity, Introduction to reliability evaluation and clock synchronization for hardware and software redundancy.   (15)
References :

1. C. M. Krishna and Kang G. Shin – Real-Time Systems, McGraw Hill International Editions, Computer Science Series, 1997

2. J. E. Cooling – Software Design for real-time systems, Chapman and Hall pub.

3. John B. Peatman – Design with Micro Controllers, McGraw-Hill International

MCA 506 – Practical – V

The practical course will contain 20 practical assignments covering syllabi of all theory papers

MCA 507 - Project and Viva - V

Project work.

Paper Code	Title of the Paper	Contact hours/week	Distribution of Marks for Examination		Total	Credits
			Internal (Project Viva)	University (Project Viva)		
MCA-601	Project – VI	02	50	200	250	06

GENERAL INSTRUCTION REGARDING PREPARATION OF PROJECT REPORT FOR MCA-III SEM-VI

TYPING

(a) The typing shall be standard 12 pts in double spaced
(b) Margins must be   Left 2 inches   Right   1.5 inches
                                    Top 2 inches   Bottom 1.5 inches
(c) Paper   A4 size Bond Paper

COPIES

Two hard-bound copies (Black Rexene with Golden Embossing as per format displayed herewith) One original and one clean Xerox Copy.

FORMAT FOR TITLE PAGE AND FOR EMBOSSING

<div style="border:1px solid black">

PROJECT REPORT
ON

NAME OF THE SYSTEM

NAME OF THE COMPANY

BY
NAME OF STUDENT

Department of Computer Science
Solapur University, Solapur

MASTER IN COMPUTER APPLICATION
200____ - 200__

</div>

The Guidelines regarding the documentation and scope of project are mentioned here below:

MCA-III SEM-VI (COMMERCIAL SYSTEM PROJECTS)
Project Report should be submitted in following format for Commercial Application

Projects viz. Payroll, Sales, Purchase, Inventory, Book Shop, Examination system etc.

Where VB, Access, Oracle, ASP and Java is used.

2 Blank Pages at beginning
Title Page
Certificate from Company
Certificate from Guide and Head of Department

Acknowledgement

MCA-III SEM VI   *** TECHNICAL PROJECTS ******

Project report should be submitted in following format for project using OOAD,

Embedded System, WAP and other technologies and Web Deployed Systems where C,

C++, J2EE, .NET, OOAD and JAVA, SDK's, API's are used.

2 Blank Pages at beginning
Title Page
Certificate from Company
Certificate from Guide and Head of the Department

Acknowledgement

Index with printed Page Numbers
CHAPTER 1 : INTRODUCTION

CHAPTER 2 : PROPOSED SYSTEM

CHAPTER 3 : ANALYSIS & DESIGN

CHAPTER 4 : USER MANUAL

Drawbacks and Limitations

Proposed Enhancements
Conclusions
Bibliography

ANNEXURES :
ANNEXURE 1 : USER INTERFACE SCREENS
ANNEXURE 2 : OUTPUT REPORTS WITH DATA (if any)
ANNEXURE 3 :   SAMPLE PROGRAM CODE (which will prove sufficient development is done by the student) and 2 Blank Pages at the end.