

SOLAPUR UNIVERSITY, SOLAPUR



Faculty of Science & Technology

M. C. A. Part-III

Syllabus (Semester-V & VI)

CBCS (True Spirit)

(Effective from June 2018)

MCA – III Semester V and VI Syllabus

5. Structure of the 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	
Hard Core – Theory						
HCT 5.1	Digital Image Processing	04	30	70	100	04
HCT 5.2	Web Design Techniques	04	30	70	100	04
HCT 5.3	Mobile Computing	04	30	70	100	04
Soft Core - Theory (Any One Group)						
Group – I						
SCT 5.1	Artificial Intelligence	04	30	70	100	04
SCT 5.2	Network Security	04	30	70	100	04
Group - II						
SCT 5.3	Pattern Recognition	04	30	70	100	04
SCT 5.4	Real Time Systems	04	30	70	100	04
Hard Core – Practical						
HCP 5.1	Practical based on HCT 5.1 – Digital Image Processing	04	15	35	50	02
HCP 5.2	Practical based on HCT 5.2 - Web Design Techniques	04	15	35	50	02
HCP 5.3	Practical based on HCT 5.3 - Mobile Computing	04	15	35	50	02
HCP 5.4	Project -V	02	15	35	50	02
Total		-	210	490	700	28

M. C. A. Part – III Semester – VI

Paper Code	Title of the Paper	Contact hours/ Week	Distribution of Marks for Examination			Credits
			Internal	University	Total	
Hard Core – Practical						
HCP 6.1	Project – VI	02	50	200	250	10
Total		02	50	200	250	10

MCA – III Semester V

HCT5.1 – 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).

HCT 5.2 – 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 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)

References:

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, PERL CGI, 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 Hofstetterfred, 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>

HCT 5.3 – 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. (7)

References:

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 – I

SCT 5.1 – 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)

References:

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.

SCT 5.2 – Network Security

Unit – 1:

- 1. Introduction:** Security Concepts, Threats and Risks, Attacks – Passive and Active Security 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, PGP's / 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 Servers - Firewall setting in Proxy, ACL in Proxy (15)

References:

1. William Stallings, "Network Security Essentials", Prentice-Hall.
2. Edward Amoroso, "Fundamentals of Comp. 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 – II

SCT 5.3– 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, Hopfield 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., Hart P. E., Pattern Classification and Scene Analysis, John Wiley (1973).

SCT 5.4 – 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, non-preemptive, 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 – III Semester VI

Paper Code	Title of the Paper	Contact hours/ Week	Distribution of Marks for Examination			Credits
			Internal	University	Total	
Hard Core – Practical						
HCP 6.1	Project – VI	02	50	200	250	10
Total		02	50	200	250	10

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 1.5 inches Right 1.5 inches
Top 1.5 inches Bottom 1.5 inches
- (c) Paper A4 size Bond Paper

COPIES

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

FORMAT FOR TITLE PAGE AND FOR EMBOSSING

<p style="text-align: center;">PROJECT REPORT ON <i>NAME OF THE SYSTEM</i></p> <p style="text-align: center;"><i>NAME OF THE COMPANY</i></p> <p style="text-align: center;">BY <i>NAME OF STUDENT</i></p> <p style="text-align: center;">Department of Computer Applications Solapur University, Solapur</p> <p style="text-align: center;">MASTER OF COMPUTER APPLICATIONS 200__ - 200__</p>

The Guidelines regarding the documentation

Title Page

Certificate from Company

Certificate from Guide and Head of the Department

Acknowledgement

Index with printed page Numbers

CHAPTER 1: INTRODUCTION

- 1.1 Company Profile
- 1.2 Existing System and Need for System
- 1.3 Scope of Work
- 1.4 Operating Environment – Hardware and Software
- 1.5 Detail Description of Technology Used

CHAPTER 2: PROPOSED SYSTEM

- 2.1 Proposed System
- 2.2 Objectives of System
- 2.3 User Requirements

CHAPTER 3: ANALYSIS & DESIGN

- 3.1 Class Diagram
- 3.2 Object Diagram
- 3.3 Use Case Diagrams
- 3.4 Module Hierarchy Diagram
- 3.5 Component Diagram
- 3.6 Deployment Diagram (in case of Web Deployment)
- 3.7 Module Specifications
- 3.8 Interface Diagram (in case of WAP and Embedded Systems)
- 3.9 Web Site Map Diagram (in case of Web Site)
- 3.10 User Interface Design (Screens etc.)
- 3.11 Table specifications (in case back end is a database)
- 3.12 Test Procedures and Implementation

CHAPTER 4: USER MANUAL

- 4.1 User Manual
- 4.2 Operations Manual / Menu Explanation
- 4.3 Program Specifications / Flow Charts

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.

Equivalence of papers (MCA – III)

MCA III Syllabus From June 2018		MCA III Syllabus From June 2016	
Semester V		Semester V	
Paper Code	Title of the paper	Paper Code	Title of the paper
HCT 5.1	Digital Image Processing	MCA-504	Digital Image Processing
HCT 5.2	Web Design Techniques	MCA-502	Web Design Techniques
HCT 5.3	Mobile Computing	MCA-505	Mobile Computing
SCT 5.1	Artificial Intelligence	MCA-501	Artificial Intelligence
SCT 5.2	Network Security	MCA-503	Network Security
SCT 5.3	Pattern Recognition	MCA-504	Pattern Recognition
SCT 5.4	Real Time Systems	MCA-505	Real Time Systems
Semester VI		Semester VI	
HCP 6.1	Project - VI	MCA-601	Project - VI