

Digital Image Fundamentals: Elements of visual perception, light and the electromagnetic spectrum, image sensing and acquisition, image sampling and quantization, relationships between pixels.

### UNIT-II

Image Enhancement in the Spatial Domain: Background, gray level transformations, histogram processing, enhancement using arithmetic/logic operations, spatial filtering, smoothing spatial filters, sharpening spatial filters, combining spatial enhancement methods.

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, implementation.

### UNIT-III

Image restoration: 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, linear, position-invariant degradations, estimating the degradation function, inverse filtering, minimum mean square error (Wiener) filtering, constrained least squares filtering.

### UNIT-IV

Color image processing: Color fundamentals, and models, color image processing, transformations, smoothing and sharpening, color segmentation.

Image compression: Image compression models, error-free compression, lossy compression, image compression standards.

Edge detection – Thresholding; Region Based segmentation; Boundary representation: chain codes, Polygonal approximation, Boundary segments, boundary descriptors.

#### Text/Reference Books:

1. Rafael C. Gonzalez and Richard E. Woods. Digital Image Processing, Pearson Education 2003.
2. Ralf Steinmetz, Klara nahrstedt; Multimedia, Pearson Education.
3. William K Pratt, Digital Image Processing John Willey (2001)
4. Image Processing Analysis and Machine Vision – Millman Sonka, Vaclav hlavac, Roger Boyle, Broos/colic, Thompson Learniy .
5. A.K. Jain, PHI, New Delhi -Fundamentals of Digital Image Processing.
6. Chanda Dutta Magundar – Digital Image Processing and Applications, Prentice Hall of India,2000.

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### MCA 311 Programming in Java Lab

Practical Lab : 6 Hours per Week (4 Credits)

Examination : Practical Examination – 4 Hours

Max. Marks- 100

Lab Exercises based on Theory Paper MCA 301

### MCA 312 Linux OS and Shell Programming Lab

Practical Lab : 6 Hours per Week (4 Credits)

Examination : Practical Examination – 4 Hours

Max. Marks- 100

Lab Exercises based on Theory Paper MCA 303

### MCA 313 .NET Lab

Practical Lab : 6 Hours per Week (4 Credits)

Examination : Practical Examination – 4 Hours

Max. Marks- 100

Lab Exercises based on Theory Paper MCA 304

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## Course Content in Detail- MCA IV Semester (2012-2013)

- Note : 1. Papers I to V are compulsory and paper VI is elective core course. Elective core course will be chosen out of four Elective Core Courses.
2. Internal assessment will be done by teacher concerned on the basis of test papers, regularity in the class and performance of the candidate. Maximum marks in internal assessment of each paper is 100.

### MCA 401: COMPUTER BASED OPTIMIZATION TECHNIQUES

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 consist 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

**Linear Programming Problems (LPP):** Formulation of an LPP, Solution of an LPP using graphic method and simplex method, Slack, Surplus & Artificial variables, Two-phase and big-M method.

**Special cases in LPP:** Alternate optimum solution, An unbounded solution, Infeasible Solution, Duality in LPP, Revised Simplex method.

#### UNIT- II

**Transportation Problems:** Definition, methods for finding initial basic feasible solutions - North West corner rule, least cost cell entry method, Vogel's approximation method, methods for finding optimal solution - MODI Method,.

**Assignment problems:** Definition & concept, solution of an assignment problem for optimum solution - Hungarian Method.

**Sequencing :** Job - problems for processing N Jobs on 2 machines, processing N jobs on 3 machines, processing N jobs on processing M machines, Processing 2 jobs on M machines (Graphic Method).

#### UNIT- III

**Inventory Models:** What is Inventory? Types of Inventories, Inventory Decisions, Cost involved in inventory problems, Controlled & Uncontrolled variables, deterministic inventory control system, concept of an average inventories, concept of economic order quantity (EOQ). (In short Model-I, II and Model III).

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**Replacement Models:** Introduction - The replacement problem, replacement of items that deteriorate (With money value), replacement of items that fail completely (Mortality theorem).

#### UNIT - IV

**Project Management by PERT & CPM:** Introduction - Historical Development of CPM/PERT, Application of PERT - CPM techniques, network diagram representation, rules for drawing network, time estimation & critical path in network analysis.

**Queuing theory:** Introduction queuing system, queuing problem, transient & steady states, traffic intensity, distribution of queuing system (Birth & Death Process), Queuing Models - I, II & III.

#### RECOMMENDED BOOKS:

1. Gillette B.E.: Introduction to Operations Research - A Computer Oriented Algorithmic approach, Tata McGraw Hill Pub. Co., New Delhi.
2. Taha Hatndy: A Operation Research - An Introduction, Fifth Edn. PHI, New Delhi.
3. Metal K.V. & Mohan C.: Optimization Methods in Operations Research and systems Analysis, 3rd Edn., New age International Publishers, New Delhi.
4. Hiller, F.S. & Limerman, G.L.: Introduction to Operations Research, 2nd Edn. Holden day inc., London, 1974.
5. Sharma S.D. Operations Research, Kedar Nat R. & Com., Meerut, 2003.
6. Kapoor V.K.: Operations Research, Sultan Chand & Sons, 1999.
7. P. K Gupta & D.S Hira : Operation Research, S. Chand & Company Ltd, New Delhi 2000

### **MCA 402 Advanced Java Programming & Technology**

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 consist 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 Advance Java Application:** Networking with Java - Networking basics, Socket, port, Proxy servers, Internet addressing and URL, java.net –networking classes and interfaces, Implementing TCP/IP based Server and Client. Classes to be covered Socket, Server-Socket, IP Address, URL connections.

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**Java Applets:** Introduction, Applet Architecture ; The java.applet.Applet Class; The Five Stages of an Applet's Life Cycle, Methods for Adding UI Components, Methods for Drawing and Event Handling.

**Unit -II**

**Applications in distributed environment:** Remote method Invocation – activation models – RMI custom sockets – Object Serialization – RMI – IIOP implementation – CORBA – IDL technology – Naming Services – CORBA programming Models - JAR file creation.

**Database Application :** The JDBC Connectivity Model, Database Programming, Connecting to the Database Types of JDBC Drivers, Writing JDBC applications using select, insert, delete, update; Types of Statement objects (Statement, Prepared-Statement and Callable-Statement); ResultSet, ResultsetMetaData; Inserting and updating records, Connection Pooling.

**Unit III**

**Introduction to J2EE :** J2EE Overview, Need of J2EE; J2EE Architecture, J2EE APIs, J2EE Containers. Overview of J2ME and its Features- Building MIDlets, User Interface, Event Handling, Screens, List and Forms. **J2ME – Overview,** MIDlets, Create User Interface, Event Handling with Command Tickers, Screen, Text Box, List and Forms.

**Servlet :**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, Accessing Database, Servlet Chaining, Session Tracking & Management, Dealing with cookies, Transferring Request, Accessing Web Context, Passing INIT and CONTEXT Parameter, Sharing information using scope object, Controlling concurrent access, User Authentication, Filtering Request and Response- Programming Filter, Filter Mapping, Servlet Listeners.

**Java Server Pages Technology:** Basic JSP Architecture , Life Cycle of JSP (Translation, Compilation), JSP Tags and Expressions , Role of JSP in MVC-2, JSP with Database, JSP Implicit Objects, Tag Libraries, JSP Expression Language (EL), Using Custom Tag. JSP Capabilities - Exception Handling, Session Management, Directives, JSP with Java Bean.

**Unit -IV**

**Java Beans :** Introduction to Java Bean, Rules for writing a Simple Bean, Java Naming Directory Interface API ,Java Naming Directory Interface concept.

**Enterprise JAVA Beans :** Enterprise Bean overview, Types of enterprise beans, Advantages of enterprise beans, The Life Cycles of Enterprise Beans, Working with Session Beans, Statefull vs. Stateless Session Beans, Working with Entity Beans, Message Driven Beans.

**Introduction to Struts :** (A Web Application Framework) – Struts-config.xml; Understanding MVC architecture; ActionServlet, ActionForm, ActionMapping, Action classes.

**Reference/Text Books :**

1. Cay S Horstmann and Gary Cornell, "Core Java 2, Volume I - Fundamentals", Pearson Education, USA, 2005.

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2. Cay S Horstmann and Gary Cornell, "Core Java 2, Volume II - Advanced Features", Pearson Education, USA, 2005.
3. Nicholas C Zakas, Jeremy McPeak and Joe Fawcett, "Professional Ajax", Wrox, USA, 2006.
4. Steve Holzner, "Inside XML", Techmedia, New Delhi, 2001.
5. Kathy Sierra and Bryan Basham, "Head First Servlets and JSP", Shroff Publishers and Distributors, Mumbai, 2007.
6. Marty Hall and Larry Brown, "Core Servlets and JavaServer Pages: volume 1: core technologies", Pearson Education, USA, 2008.
7. Marty Hall, "Core Servlets and JavaServer Pages: volume 2 Advanced technologies", Pearson Education, USA, 2008.
8. Steve Graham, Doug Davis, Simeon Simeonov, Glen Daniels, et.al, "Building Web Services with Java", Pearson Education, USA, 2004.
9. Enterprise JavaBeans (3rd Edition), O'Reilly' by Richard Monson-Haefel,
10. Developing Java Beans, O'Reilly Media By Robert Englander,

### MCA 403 : Advanced Database systems

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 consist 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 relational algebra and Structured Query Language (SQL)~~

**Transaction Management and Concurrency Control :** Transaction -Evaluating Transaction Results, Transaction Properties, Transaction Management with SQL, The Transaction Log ; Concurrency Controls; Concurrency Control with Locking Methods; Concurrency Control with Time Stamping Methods - Wait/Die and Wound/Wait Schemes , Concurrency Control with Optimistic Methods, Database Recovery Management.

**Parallel database Systems:** Concepts, Architecture of Parallel Databases, Inter-Query and Intra-Query Parallelism, Inter-Operational and Intra-Operational Parallelism, Design of Parallel Database Systems.

#### Unit II

**Introduction to Object-Based Databases :** Object Oriented Database concepts, Advantages, OODBMS Features, Groups and Languages; Object Relational Database concepts and Design.

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**Database Performance Tuning and Query Optimization** : Database Performance and Tuning; Statistics ; Query Processing; Indexes and Query Optimization ; Optimizer Choices; SQL Performance Tuning.

**PL/SQL** : Concepts of Embedded SQL, Dynamic SQL, SQLJ. PL/SQL Concepts, Elements, Structures, Cursors, Triggers, Database Stored Procedures and SQL/PSM.

~~XML - XML Hierarchical Data Model, XML Document and Databases, XML Queries.~~

**Unit III**

**Distributed Database Management Systems** : Evolution, Characteristics, DDBMS Components; Levels of Data and Process Distribution(i.e. SPSD, MPSD, MPMD); Distributed Database Transparency Features; DDBMS Design- Data Fragmentation, Data Replication, Data Allocation; Client/Server vs. .DDBMS.

**Introductions to Data Warehousing and Data Mining** : Data Warehouse – Decision Support Architectural Styles; Twelve Rules that Define a Data Warehouse; Data Mining Concepts. OLAP – Concepts, Architecture relation, OLAP V/s OLTP, Star V/s Clouding Architecture.

**Unit IV**

**Database Connectivity and Web Technologies** : Database Connectivity - Native SQL Connectivity, ODBC, DAO, and RDO, OLE-DB, ADO.NET, Java Database Connectivity (JDBC); Internet Databases - Web-to-Database Middleware: Server-Side Extensions, Web Server Interfaces, The Web Browser, Client-Side Extensions, Web Application Servers.

**Database Administration and Security** : The Need for and Role of a Database in an Organization; The Evolution of the Database Administration Function; The Database Environment's Human Component- The DBA's Managerial Role, The DBA's Technical Role; Security - Security Policies, Security Vulnerabilities, Database Security; Database Administration Tools - The Data Dictionary; Developing a Data Administration Strategy.

**Text/ Reference Books :**

1. Prescribed: Hoffer, J.A., Prescott, M. &Topi, H. (2008) Modern database management. (9 th ed.) .NJ: Prentice Hall.
2. Silberschatz A, Korath H., Sudarshan S. ; Database System Concepts; McGraw Hill.
3. Recommended: Date, C. J. (2003) An introduction to database systems. (8 th ed.). NJ: Addison Wesley.
4. Shah, N. (2004) Database systems using oracle. (2nded.). NJ: Prentice Hall.
5. Elmasri R., Navathe S.B; Fundamentals of Database Systems; Pearson Edu.
6. Singh S.K ; Database Systems; Pearson Education.
7. Leao A. Leao M; Database Management System; Leao Press.
8. Thomas M. Colnolly, Begg C.E.; Database Systems; Pearson.

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## MCA 404 : MANAGEMENT INFORMATION SYSTEM

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 consist 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 MIS:** Meaning and Role of MIS, Definition of MIS, System Approach to MIS. MIS Organization within a company. Concept of Balanced MIS, effectiveness and efficiency criteria.

**MIS Planning:** MIS structure and components, MIS features, Problem and Derivation of MIS plans, Prioration and developmental strategies.

### Unit II

**Conceptual Design of MIS :** Definition of problem, System objectives and system constraints. Analysis of information source, alternative system design and selection optimal system.

**Detailed System Design and Implementation:** Application of basic design concepts to MIS, Involvement of end- user and role of MIS department and System Analyst, Role of Top Management during design and implementation.

### Unit III

**System Evaluation :** System evaluation review and update. Management and control of MIS function. Advanced MIS concept, Pitfalls in MIS development.

**Decision Making System :** Decision Making Definition and Concept, Phases of Decision Making Process, Modeling Process, Static and Dynamic Models, Sensitive Analysis, Heuristic Programming, Simulation.

### Unit IV

**Decision Support System :** DSS Definition, Characteristics, Application, Case Study. Expert System : Concept, Structure, Application and Case Study.

**Application of MIS(see note at end):** MIS for Accounting and Finance Function, MIS for Personnel Systems, For Marketing Systems, Inventory system, DSS, EMS, Decision Support System, Enterprise Management Systems.

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Note: A Standard layout is to be adopted for all MIS:

- (1) Key Information Needs.
- (2) Transaction Processing and Management Control.
- (3) Reports Design and Data Collection Methods routing, frequency, Input, Output and Control Reports.
- (4) Computer System Design- Master and Transaction files, Checks & Control Reports.

Reference/Text Books :

- 1. Murdick R.G., Ross J E.& Claggett J.R., "Information system for Modern Management", PHI.
- 2. James A.O Brien, "Management Information Systems", Galgotia Pubn.
- 3. Wigarders K, Svensson A., Sehong L, "Structrured Analysis & Design of Inormation Systems", Mc-Graw Hill.
- 4. Locus, "Analysis, Design and Implementation of Information system", 3<sup>rd</sup> Ed., McGraw-Hill
- 5. Jawadekar, "Information Systemfor Management"
- 6. Anderson Lavid L , Post Gerald V, "Management Information System ", Tata Mc-Graw Hill.
- 7. Efrain Turban; Decision Support & Intelligence System; 8<sup>th</sup> Edition; Pearson Education.

MCA 405 : E-Commerce

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 consist 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

Basic Concepts : Introduction, Definition, Objectives, Advantages and disadvantages, Forces driving E-Commerce, Traditional commerce Vs. E-Commerce, E-Commerce opportunities for industries, Growth of E-Commerce.

Electronic Data Interchange : Concepts of EDI and Limitation, Application of EDI, Disadvantages of EDI, EDI model; EDI Implementation, MIME and Value-Added Network, Internet-based EDI.

Unit II

E-Commerce Models: B2C,B2B, C2C, C2B, other models – Brokerage Model, Aggregator Model, Info-mediary Model, Community Model and value chain Model, Advertise Model.

Electronic Payment Systems: Special features required in payment systems, Types of E-payment systems, E-Cash, E-cheque, credit card, Smart Card, Electronic Purses, e-Billing, E- e-Micropayments , Point Of Sales System(POS) - Meaning, Uses, Structure.

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## Unit III

**Customer Relationship Management & Technologies :** E-Transition Challenges in Indian Corporates, E-Commerce and WWW, e- Marketing, E-Customer Relationship Management, E-CRM Problems and Solutions, CRM Capabilities and Customer life cycle, E-Supply Chain Management. E-Strategy- Planning the E-Commerce Project, E-Commerce Strategy and Knowledge Management, E-Business Strategy and Data Warehousing & Mining. ERP for E-Commerce. Customer-effective Web Design – Requirement, Strategy and Model.

## Unit IV

**m-Commerce:** Overview of mobile-Commerce, Mobile Delivery Technology & Switching Methods, Attributes of m-Commerce, Drivers of m-Commerce, m-Commerce Security issues, Mobile ATM(ICICI Bank Case Study). Applications of m-Commerce: Mobile Financial Applications, m-wallet, Mobile Shopping, Advertising And Content provision.  
**Case-Study**

**Security Issues in E-Commerce:** Security risk of E-Commerce, Types of threats, Security tools and risk management approach. Cyber laws, Business Ethics, IT Acts.

### Suggested Books:

- (1) Bharat Bhaskar, Electronic Commerce – Frameroork Technologies and Applications, Tata McGraw Hill.
- (2) Ravi Kalakota & A.B. Whinston, Frontiers of Electronic Commerce, Pearson Education.
- (3) Ravi Kalakota & A.B. Whinston, Electronic Commerce – A Manager's Guide, Pearson Education.
- (4) Agarwala Kamlesh, N and Agarwala Deeksha, Business on the Net\_Introduction to the E-Com., Macmillan India.
- (5) P. T. Joseph, E-Commerce: A Managerial Perspective, PHI, 2002.

## MCA 406 B01 : Network Management

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 consist 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

**Basic Concepts :** Data Communications and Network Management Overview, Basic Foundations, Standards, Models, and Language of Network Management.

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**Network Management Technologies :** SGMP, CMIP, SNMP Network Implementation and Management Strategies, Review of Computer Network Technology, SNMP, Broadband, and TMN Management, Performance Management, Fault Management, Configuration Management, Security Managements, Accounting Managements. Network Management Configuration: Centralized Configuration, Distributed Configuration. Selected Management Strategy. *SONET - introduction.*

**Unit - II**

**Management Information Base (MIB):** Structure of Management Information, NMS Presentation of the SMI, NMS Meter-ware Network View. Remote Monitoring (RMON), RMON Group. Desktop Management: Desktop Management Interface(DMI), DMI Architecture, DMI Browser, DMI/SNMP Mapping, Desktop SNMP Extension Agents. Setting up LAN Access, SNMP Configuration.

**SNMP Technology :** SNMPv1 Network Management - Organization and Information Models. SNMPv1 Network Management- Communication and Functional Models. SNMPv2, SNMPv3, RMON SNMP Management.

**Unit - III**

**Delivery and Routing of IP Packets:** Routing Methods, Routing Module, Classless, Interior and Exterior Routing, Routing information protocol(RIP), Open shortest path first protocol (OSPF), BGP, GGP. Private Networks. Virtual Private Network (VPN), Network Address Translation.

**Internet Control Message Protocols (ICMP):** ICMP Package, Messaging, Transmission Operations and Protocols; Services.

**Unit - IV**

**Management Tools, Systems, and Applications:** Network Management Tools and Systems Network Management Applications, Web-Based Management .

**Security Management :** Secure Network Management and Network Security Management, Organizational Realities. Protocol Capabilities. Tool Capabilities. Secure Management Design Options. Network Security Management, Firewalls, Trusted systems, IT act and cyber laws.

- 1. Mani Subramanian, "Network Management: Principles and Practice", Addison Wesley.

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## MCA 406 B02 : Artificial Intelligence

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 consist 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

**Basic Concept :** Foundations of AI , scope, problems, and approaches of AI. Intelligent agents, reactive, deliberative, goal-driven, utility-driven, and learning agents ,Artificial Intelligence programming techniques

**Problem-solving through Search:** forward and backward, state-space, blind, heuristic, problem-reduction, A, A\*, AO\*, minimax, constraint propagation, neural, stochastic, and evolutionary search algorithms, sample applications.

### Unit : II

**Knowledge Representation and Reasoning:** Ontologies, foundations of knowledge representation and reasoning, representing and reasoning about objects, relations, events, actions, time, and space; predicate logic, situation calculus, description logics, reasoning with defaults, reasoning about knowledge, sample applications.

**Planning:** planning as search, partial order planning, construction and use of planning graphs

### Unit : III

**Representing and Reasoning with Uncertain Knowledge:** probability, connection to logic, independence, Bayes rule, bayesian networks, probabilistic inference, sample applications.

**Decision-Making:** basics of utility theory, decision theory, sequential decision problems, elementary game theory, sample applications. Expert System- Need, Componets, Categories, Stages of Expert System Development.

### Unit : IV

**Machine Learning and Knowledge Acquisition:** learning from memorization, examples, explanation, and exploration. learning nearest neighbor, naive Bayes, and decision tree classifiers, Q-learning for learning action policies, applications.

**Brief Survey of selected additional topics:** perception, communication, interaction, and action; multi-agent systems. Sample Applications of AI, student project presentations

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**Reference/Text Books :**

1. Artificial Intelligence: A Modern Approach, 3rd Edition, by Stuart Russell and Peter Norvig. , ISBN-13: 978-0-13-604259-4.
2. Artificial Intelligence, Rich & Knight, TMH
3. Introduction to AI & Expert Systems, Patterson, PHI
4. Neural Networks, Fuzzy Logic & Genetic Algorithms, Rajsekharan, PHI

**MCA 406 B03 : Compiler Design**

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 consist 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 Compilation** : Phases of Compilation – Lexical Analysis, Regular Grammar and regular expression for common programming language features, pass and Phases of translation, interpretation, bootstrapping, data structures in compilation – LEX lexical analyzer generator.

**Unit – II**

**Parsing** : Context free grammars, Top down parsing – Backtracking, LL (1), recursive descent parsing, Predictive parsing, Pre-processing steps required for predictive parsing. Shift Reduce parsing, LR and LALR parsing, Error recovery in parsing , handling ambiguous grammar, YACC – automatic parser generator.

**Unit – III**

**Symbol Tables** : Symbol table format, organization for block structures languages, hashing, tree structures representation of scope information. Block structures and non block structure storage allocation: static, Runtime stack and heap storage allocation, storage allocation for arrays, strings and records

**Unit – IV**

**Code optimization & Generation** : Consideration for Optimization, Scope of Optimization, local optimization, loop optimization, frequency reduction, folding, DAG representation. Flow graph, data flow equation, global optimization, redundant sub expression elimination, Induction variable elements, Live variable analysis, Copy propagation. Object code forms, machine dependent code optimization, register allocation and assignment generic code generation algorithms, DAG for register allocation.

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**Recommended reference/text books:**

1. Principles of compiler design -A.V. Aho . J.D.Ullman; Pearson Education.
2. Holub, Compiler Design in C, PHI.
3. Engineering a Compiler-Cooper & Linda, Elsevier.

**MCA 406 B04 : Multimedia Systems**

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 consist 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**

**Multimedia System Basics :** Multimedia System Elements; Multimedia System Architecture; Multimedia technologies; Video/Audio Fundamentals, Multimedia Authoring and Tools Graphics and Image Data Representations, Color in Image and Video, Fundamental Concepts in Video, Basics of Digital Audio. Multimedia I/O Technologies- Key Technology Issues, Standard Multimedia Devices, Multimedia Output Devices.

**Unit – II**

**Compression and Decompression :** Type of Compressions, Binary Image Compression Schemes, Image Compression, Video Image Compression, Audio Compression, Lossless Compression Algorithms, Lossy Compression Algorithms, Image Compression Standards, Basic Video Compression Techniques, MPEG Video Coding I - MPEG-1 and 2, MPEG Video Coding II - MPEG-4, DVI and Beyond.

**Unit – III**

**Audio Compression :** Audio Compression Techniques, MIDI, MPEG Audio Compression, Speech Reorganization and Generation, Video Images and Animation.

File Formats and Standards – Rich Text, TIFF, RIFF, MIDI, JPEG, AVI, MPEG, TWAIN formats and its uses.

**Multimedia Communication :** Multimedia Communication and Retrieval, Multimedia Network Fundamentals, Multimedia Protocols for the Internet, Multimedia Network Communications and Applications, Multimedia Networking Services, Multimedia OS design and Implementation.

**Unit – IV**

**Trends in Multimedia –** Multimedia in Wireless Networks; Content-Based Retrieval in Digital Libraries; Multimedia Storage Systems, User Interface; Multimedia Synchronization, Multimedia Presentation and Web Technologies(Documents, Hypertext, MHEG), Multimedia Databases, P2P Multimedia Systems.

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**Multimedia Applications** : Media Preparation, Media Composition, Image Processing & Image Reorganization, Animation, Media Integration, Media Communication, Media Consumption; Education & Training, Media Entertainment and Full Motion Digital Video Applications

**Reference/Text Books :**

1. Prabhat K. Adrleigh, Kiran Thakrar; Multimedia System Design; PHI
2. Ralf Steinmetz, Klara Nahrstedt; Multimedia : Computing, Communication & Applications; Pearson Education;
3. Fundamentals of Multimedia, Ze-Nian Li, and Mark S. Drew, Pearson Prentice Hall, October 2003.
4. Multimedia Communication Systems, K. Rammohanarao, Z. S. Bolzkovic, D. A. Milanovic, 1st edition, Prentice Hall, May 2002.
5. Video Processing and Communications, Yao Wang, Joem Ostermann, and YaQin Zhang, Prentice Hall, 2002.
6. Web Caching and Replication, Michael Rabinovich and Oliver Spatscheck, Addison-Wesley, 2002.
7. Multimedia Communications: Applications, Networks, Protocols and Standards, Fred Halsall, Addison-Wesley, 2001.

**MCA 411 Advanced Java Lab**

Practical Lab : 6 Hours per Week (4 Credits)

Examination : Practical Examination – 4 Hours

Max. Marks- 100

Lab Exercises based on Theory Paper MCA 402

**MCA 412 Advanced DBMS Lab**

Practical Lab : 6 Hours per Week (4 Credits)

Examination : Practical Examination – 4 Hours

Max. Marks- 100

Lab Exercises based on Theory Paper MCA 403

**MCA 423 Mini Project**

Practical Lab : 6 Hours per Week (4 Credits)

Examination : Practical Examination – 4 Hours

Max. Marks- 100

Technology : Use .NET /Java/Web Technology.

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### Course Contents in Detail – MCA V Semester 2013

**Note:**

1. Paper I to IV are compulsory core courses and paper V and VI are elective core courses. Elective core course will be chosen out of four elective core courses.
2. Internal Assessment will be done by teacher concerned on the basis of test papers, regularity in the class and performance of the candidate. Maximum marks in Internal Assessment of each paper is 100.

### MCA 501: Information Security And Cryptography

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 Computer Security and Cryptography, Security Attacks, Security Services and Mechanism.

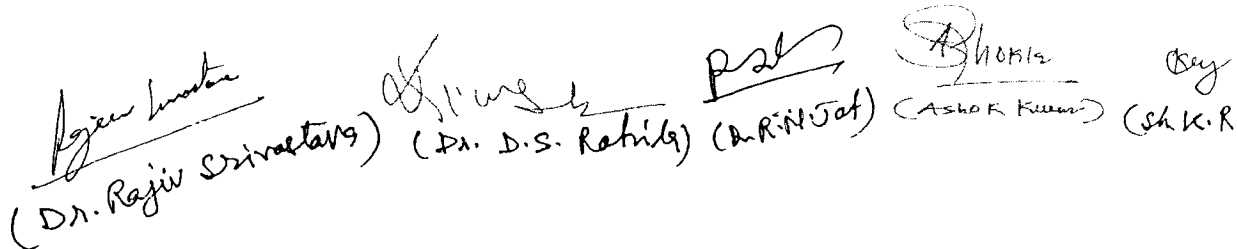
**Classical Encryption Techniques :** Classical Techniques, Conventional Encryption Model, Classical Encryption Techniques.

**Modern Techniques:** Simplified DES, Block Ciphers Principles, DES Standards, DES Strength, Differential & Linear Cryptanalysis, Block Cipher Design Principles, Block cipher Modes of Operation.

#### Unit II

**Conventional Encryption Algorithms:** Triples DES, International Data Encryption Algorithm, RC5, RC2 placement & Encryption Function, Key Distribution, Random Number generation, Placement of Encryption Function.

**Public Key Encryption:** Public Key Cryptography: Principle of public key Cryptosystems, RSA algorithm, Key Management, Fermat's Theorem & Euler's Theorem, The Chinese remainder theorem.


  
 (Dr. Rajiv Srivastava) (Dr. D.S. Rahib) (Anil Jot) (Ashok Kumar) (Sh. K.R)



Unit III

**Hash Functions:** Message Authentication & Hash Function: Authentication Requirements, Authentication Function, Message Authentication Codes, Hash Function, Birthday Attacks, Security of Hash Function & MAC's, MD5 Message Digest algorithm, Secure Hash Algorithm(SHA).

**Digital Signatures:** Digital Signature, Authentication Protocol, Digital Signature Standard(DSS), proof of digital signature algorithm.

Unit IV

**Network and System Security:** Authentication Application- Kerberos x.509, Dictionary Authentication Services, Electronic Mail Security, Pretty Good Privacy (PGP), S/mime. Security: Architecture, Authentication Header, Encapsulation security payloads, combining security association, Key Management. **Web Security:** Secure socket layer & Transport layer security, Secure electronic transaction (SET). System Security: Intruders, viruses, firewall Design principle, Trusted Systems.

Reference Books:

1. William Stallings; Cryptography and Network Security, Fifth Edn, Pearson.;
2. Atul Kahate; Cryptography and network Security; Tata McgrawHill.
3. V.K. Pachghare; Cryptography and Information Security; PHI.
4. Matt Bishop, Sathyanarayana; Introduction to Computer Security; Pearson.

MCA 502: Wireless Technology

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

*Deven Kishore*

*Shruti*

*PSD*

*Ashok Kumar*  
(Ashok Kumar)

*Shy*

**Introduction of wireless communication:** Overview, Frequencies for Radio transmission, Evolution of Cellular System, Cellular System Architecture & Operation, Performance criteria, Multiple access schemes for wireless communication- TDMA, FDMA, CDMA, CSMA, SDMA.

**Unit II**

**Wireless Network Planning And Operation:** Frequencies Management, Channel assignments, Frequency reuse, System Capacity & its improvement, Handoffs & its types, roaming, Co-Channel & Adjacent Channel Interference.

**Digital Cellular Networks:** GSM Architecture & Interfaces, Signal Processing in GSM, Frame Structure of GSM, Channels used in GSM.

**Unit III**

**Wireless LAN Technology:** Overview, WLAN Technologies, Infrared LANs, Spread Spectrum LANs Narrowband, Microwave LANs IEEE 802.11- Architecture, Protocols, MAC layer, MAC frame, MAC Management.

**Bluetooth :** Overview, Architecture of Bluetooth Systems, Radio Specifications, Base Band Specification, Link Manager specification, Logical Link Control & Adaptation Protocol.

**Unit IV**

**Mobile Data Networks:** Introduction, Data oriented CDPD Networks, GPRS.

**Wireless Access Protocol:** WAP Architecture, Wireless Datagram, Wireless Transport Layer Security, Wireless Transaction, Wireless Session, Wireless Application Environment, WML.

**Text/ Reference Books:**

1. Mobile communication Engg- Lee W.C.Y
2. Wireless Communication, Principles & Practice-T.S.Rappaport
3. Mobile Communication, Pearson Education- Schiller
4. Wireless Communication & Networking-William Stalling
5. Mobile communication -Rampantly
6. Wireless digital communication", PHI, KamiloFeher
7. Principles of Wireless Networks-Kaveshpahlavan&P.Krishna Murthy

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### MCA 503: Analysis and Design of Algorithms

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:** Algorithm Definition and Specifications, Design of Algorithms and Complexity of Algorithms, Asymptotic Notations, Growth function, Recurrences and Performance Analysis.

**Divide and Conquer Algorithms:** General method, Binary search, Merge sort, Quick Sort.

#### Unit II

**Greedy Methods:** General method, Knapsack Problem, Activity Selection problem, A task scheduling problem ,Minimum Cost Spanning Tree, Single Source Shortest Path.

**Dynamic Programming:** General method, Multistage graphs, All Pair Shortest Path, Optimal Binary Search trees, 0/1 Knapsack, Travel Salesman Problem, Flow Shop Scheduling.

#### Unit III

**Advanced data structure:** B-trees, Fibonacci Heaps, Data Structure for Disjoint Sets.

**Backtracking:** General method, 8 Queens Problem, Sum of Subsets, Graph Colouring, Hamiltonian Cycles, Knapsack Problem.

#### Unit IV

**Branch and Bound:** 0/1 Knapsack Problem, Travel Salesman Problem.

**Parallel Models:** Basic concepts, Performance measures, Parallel algorithms, Parallel Complexity, Analysis of Parallel Addition, Multiplications and Divisions, Parallel Evaluation of Arithmetic Expressions.

#### Reference Books:

1. Thomas H Cormen, C.E. Leiserson, R.L. Rivest, C. Stein; Introduction to Algorithms, third edition; PHI.
2. E. Horowitz, S. Sahni, S. Raja Sekaran ; Fundamentals of computer Algorithms;

### MCA 504 : SIMULATION & MODELLING

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

System Models: Concept, Environment, Continues and Discrete systems, Types of Models: Subsystems, System Analysis, System design; System Simulation Technique, Monte Carlo method, Types of System Simulation.

#### Unit II

Continuous System Simulation – Continuous System Models, Methods, Digital-Analog Simulators and Feedback systems.

Dynamic System – Concepts, Elements of System Dynamic Modeling; Exponential Growth, Decay & Modified models; Generalization of Growth models. System Dynamic Diagrams. Multi-Segment Models; Feedback in Socio-Economic System; Dynamo Language.

#### Unit III

Probability concepts in simulation: Stochastic variables and probability functions; Discrete system simulation; fixed time step v/s event-to-event model. Generation of Random numbers. Monte Carlo Computation V/S Stochastic simulation.

Simulation of Queuing system, Simulation of single and two server queuc, Network Model of a project.

#### Unit IV

Introduction to GPSS- Elements, Events; Control Statements , Programs.

Case study: Simulation of an autopilot, Telephone system, Inventory system & Supermarket.

*Rejeer Simstana*

*Shivendra*

*Prashant*

*Ashok Kumar*  
(Ashok Kumar)

**References:**

1. G.Gordon "System Simulation" PHI.
2. Narsingh Deo "System Simulation with Digital Computers" PHI.
3. Mahapatra P.K.J, Mandal P, Bora M.C.; Introduction to System Dynamics Modeling; Univ. Press.

**MCA 505 C01: Bio-Informatics**

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 Bioinformatics:** Definition and History of Bioinformatics. Internet and Bio-Informatics, Introduction to Data Mining, Applications of Data Mining to Bio-informatics, Problems and Applications of Bio-informatics.

**Unit II**

**Bioinformatics Resource and Software's:** Introduction to Primary Sequence Databases & Secondary Composite Databases. Genome Information Resource-DNA Sequence database & Analysis, CDNA Libraries and ESTs.  
**Bio-Informatic S/W-**Clustal V, Clustal W 1.7, RasMol, Oligo, Molscrip, Treeview, Alscript, Genetic Analysis Software, Phylip.

**Unit III**

**Biocomputing:** Introduction to String Matching Algorithms, Database Search Techniques, Sequence Comparison and Alignment Techniques, Use of Biochemical Scoring Matrices, Introduction to Graph Matching Algorithms, Automated Genome Comparison and its Implication, Automated Gene Prediction, Automated Identification of Bacterial Operons and Pathways; Introduction to Signaling Pathways and Pathway Regulation. Gene Arrays, Analysis of Gene Arrays

*Rajeev Surostane*      *A. K. S. S.*      *psd*      *Ashwin*      *Cheng*  
 (Ashwin, Kumar)

Unit IV

Markov chains and applications: Machine Learning Methods, Hidden Markov models, Applications of HMM in gene identification and Profiles HMMs, Neural Networks and Support Vector machines

Text /Reference Books :

1. Lesk, A.M. 2002 Introduction to Bioinformatics. Oxford University Press.
2. Claverie, J.M. and Notredame C. 2003 Bioinformatics for Dummies. Wiley Editor.
3. Mont, D.W., Bioinformatics: Sequence and Genome Analysis.
4. Pierre Baldi and Soren Brunak, Bioinformatics: The Machine Learning Approach.
5. Letovsky, S.I. 1999 Bioinformatics. Kluwer Academic Publishers.
6. Baldi, P. and Brunak, S. 1998 Bioinformatics. The MIT Press.
7. Rastogi, S.C., Mendiratta, N. and Rastogi, P. 2004 Bioinformatics: Concepts, Skills & Applications. CBS Publishers & Distributors, New Delhi.
8. Vyas, S.P. and Kohli, D.V., Methods in Biotechnology and Bioengineering.
9. Fogel, G.B. and Corne, D.W., Evolutionary Computation in Bioinformatics.
10. Genetic Library Construction and Screening: Advanced Techniques and Applications Lab Manual
11. Patterson, B.K., Techniques in Quantification and Localization of Gene Expression.
12. Evens, W.J. and Grant, G.R., Statistical Methods in Bioinformatics: An Introduction.
13. Jae K. Lee, Statistical Bioinformatics, John Wiley & Sons Inc



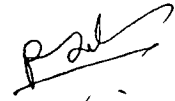
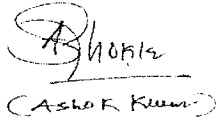
MCA 505 C02 : Geo-Informatics

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 carry 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

Basic concepts about Special information, Definition, Historical evaluation and need for spatially based resource information system. objectives of GIS-Manual v/s automated GIS. Geo-informatics technologies and the technologies used in Geographical Studies. Geoinformatics-Spatial and Non -Spatial data Management.

**Unit II**

Data structure types of data structure, Raster and Vector formats, advantages and disadvantage of various data structures and data formats. Geo Spatial DBMS. Data input: Data Pre-processing, methods of data capture, digitization and scanning methods, commonly used map projections and ellipsoids.

**Unit III**

The format of GIS- Handling digital Geographical Information Data- Analysis of single data planes in Raster format- Analysis of multiple data planes in Rater format- Uses of topographic data in Raster format- Data structures for thematic maps.

**Unit IV**

Digital Elevation Model (DEM): need, methods, data sources and products of DEM- Digital Terrain Modeling (DTM)- Input verification, storage and methods of data analysis for Spatial modeling-Methods of GIS and Spatial interpolation. Web GIS Technology and Geo-informatics-MISDBMS. Applications of Geo-Informatics System.

**Text /Reference Books :**

1. Goodchild M.F. and Kemp K - 'Developing a curriculum in GIS: The NCGIA Core Curriculum Project', University of California, Santa, Barbara.
2. Ivan Haywood Cornelius and Steve Carver - An introduction to GIS. Longman, New York.
3. Misra HC - A Handbook on GIS, GIS India, Hyderabad.
4. Smith T.R. and Piquet, GIS, London Press, London.
5. Taylor DRF - GIS: The Micro computer and Modern Cartography. Pergamon Press, Oxford.
6. Heywood I, et al, An Introduction to Geographical Information System. Longman, New Delhi.
7. Lo CP & Young AKW, Concepts & Techniques of Geographical Information System, Prentice Hall of India, New Delhi - 2003.

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### MCA 505 C03 : ERP Systems

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:** Enterprise wide information system, Custom built and packaged approaches. Needs and Evolution of ERP System, Common myths and evolving realities.

**ERP Technologies :**ERP and Related Technologies, Business Process Reengineering and Information Technology, Supply Chain Management, Relevance to Data Warehousing, Data Mining and OLAP, ERP Drivers, Decision support system.

#### Unit II

**ERP System :** ERP Domain, ERP Benefits classification, Present global and Indian market scenario, milestones and pitfalls, Forecast, Market players and profiles, Evaluation criterion for ERP products.

**ERP Life Cycle:** Adoption decision, Acquisition, Implementation, Use & Maintenance. Evaluation and Retirement phases, ERP Modules.

#### Unit III

**ERP Framework :** Framework for evaluating ERP. Analytical Hierarchy Processes (AHP), Applications of AHP in evaluating ERP, Selection of Weights, Role of consultants, vendors and users in ERP implementation; Implementation strategies, ERP Customization, ERP-A manufacturing Perspective.

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**Evaluation of ERP System** :Critical success and failure factors for implementation, Model for improving ERP effectiveness. ROI of ERP implementation, Hidden costs ERP success inhibitors and accelerators, Management concern for ERP success, Strategic Grid- Useful guidelines for ERP Implementations.

**Unit IV**

**Analysis of ERP Implementations:** Technologies in ERP System and Extended ERP, Case Studies Development and Analysis of ERP Implementations in focusing the various issues discussed in above units through Soft System approaches or qualitative Analysis tools, Learning and Emerging Issues, ERP and E-Commerce.

**Concept of E-governance** : Concept, E-Governance frame work, area of application like public sector, service industry.

**Reference Books :**

1. Lexis Leon; Enterprise Resource Planning;TMH
2. Brady, Manu. Wegner; Enterprise Resource Planning; TMH
3. N. K. Venkitakrishnan, Vinod Kumar Garg; Enterprise Resource Planning : Concepts and Practice; PHI Learning.
4. Dimpi Srivastava, Arti batra; ERP Systems; I K International Publishing House

**MCA 505 C04 : Embedded Systems**

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** : An Overview of Embedded system, Requirement, Challenges issues, and trends software development.

