

Syllabus of MCA III Semester 2021-22

Note :

1. Papers MCA 301, MCA 302, MCA 303, MCA 311 and MCA 312 are compulsory(CCC) and Papers MCA 304, MCA 305, MCA 306 and MCA 313 are elective(ECC).
2. Continuous assessment(Internal) will be done by the concerned teacher on the basis of test papers, regularity in the class and performance of the student. Maximum marks in continuous assessment of each paper is 100.

MCA-301 : Cloud Computing

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 of Cloud Computing: Nutshell of cloud computing, Enabling Technology, Vision, feature Characteristics and components of Cloud Computing. Challenges, Risks and Approaches of Migration into Cloud. , Layer and Types of Clouds, Services models, Cloud Reference Model.

Unit-II

Cloud Computing Architecture: Data center Design and interconnection Network, Architectural design of Compute and Storage Clouds. Cloud Programming and Software: Features of cloud programming, Parallel and distributed programming paradigms-MapReduce, Hadoop , High level Language for Cloud. Service Oriented Architecture – REST and Systems of Systems – Web Services – Publish Subscribe Model

Unit-III

Virtualization Technology: Definition, Understanding and Benefits of Virtualization. Implementation Level of Virtualization, Virtualization Structure/Tools and Mechanisms, Hypervisor VMware, KVM, Xen. Virtualization: of CPU, Memory, I/O Devices, Virtual Cluster and Resources Management, Virtualization of Server , Desktop, Network, and Virtualization of data-center.

Unit-IV

Securing the Cloud: Cloud Information security fundamentals, Cloud security services, Design principles, Policy Implementation, Cloud Computing Security Challenges, Cloud Computing Security Architecture. Legal issues in cloud Computing. Data Security in Cloud: Risk Mitigation , Understanding and Identification of Threats in Cloud, SLA-Service Level Agreements, Trust Management

Cloud Platforms in Industry: Amazon web services, Google AppEngine, Microsoft Azure Design, Aneka: Cloud Application Platform -Integration of Private and Public Clouds Cloud applications:

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Protein structure prediction, Data Analysis, Satellite Image Processing, CRM and ERP, Social networking. Cloud Application- Scientific Application, Business Application.

Recommended Text / Reference Books:

1. Cloud Computing ,Principle and Paradigms, Edited By RajkumarBuyya, JamesBroberg, A. Goscinski, Pub.- Wiley-2016
2. Kumar Saurabh, "Cloud Computing" , Wiley Pub 2016
3. Distributed and Cloud Computing, Kai Hawang , GeoffreyC.Fox, Jack J. Dongarra Pub: Elsevier, 2013
4. Krutz , Vines, "Cloud Security " , Wiley Pub,2010
5. Velte, "Cloud Computing- A Practical Approach" ,TMH Pub,2009
6. Katarina Stanoevska-Slabeva, Thomas Wozniak, SantiRistol, "Grid and Cloud Computing – A Business Perspective on Technology and Applications", Springer,2010

MCA-302 : .NET Frame Work and ASP.NET

Theory & Tutorial: 4 hours per week (4 Credits)

Examination: Theory Paper – 3 hours; Max. Marks – 100

Note:

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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 .Net framework: Advantages and Components of .NET Framework, Features of .NET Framework, Managed Code and the CLR, Intermediate Language, Metadata and JIT Compilation, Automatic Memory Management.

Language Concepts and the CLR: Visual Studios .Net, Using the .Net Framework, The Framework Class Library: .Net objects- ASP.NET, .NET web services, Windows Forms. Elements, Data types, Control and Looping structures.

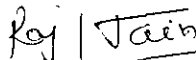
Unit-II

Windows Programming: Creating windows forms, windows controls, Mouse Events, Menus and Dialog Boxes.

Working with Data Controls : Basics of ADO.NET, Architecture of ADO.NET, ADO.NET providers, Connection, Command, Data Adapter, Dataset, Connecting to Data Source, Accessing Data with Data set and Data reader, Create an ADO.NET application, Using Stored Procedures.

Unit-III

ASP.NET Framework : Client and server architecture, All standard Controls, Validation Controls. Rich Web Controls, Creating and Implementing User and Custom Controls, Designing Website wwith Master Pages.


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ASP.NET Configuration : Session and Application Management, of States and Structure; Change the Home Directory in IIS, Caching, Security-Authentication and Authorization, Localization and Globalization, Exception handling using AJAX Control toolkit.

Creating Web Controls: Web Controls, HTML Controls, Using Internet Control, Using Input Validation Controls, Selecting Controls for Applications, Data Controls and Adding web controls to a page. Creating Web Forms: Server Controls, Types of Server Controls, Adding ASP.NET Code to a page.

Unit-IV

Overview of XML : XML Serialization in the .NET Framework-SOAP Fundamental-Using SOAP with the .NET Framework.

Web Services and WCF : Web Services protocol and standards – WSDL Documents-Overview of UDDI – Calling a Web Service from a Browser-Calling a Web Service by Using a proxy – Creating a simple web service – Creating and Calling a Web Service by Using Visual Studio.NET Architecture of WCF, WCF Client.

Recommended Books :

1. Mathew Mac Donald: Beginning ASP.NET 4.0 in C# 2010, 3rd Edition, A Pres.
2. Bill Evjen Scott Hanselman, Devin Rader: Professional ASP.NET4, 2010, Willey.
3. George Shepherd: Microsoft ASP.NET Step by step, 2010 Microsoft Press.
4. Imar Spaanjaars: Beginning ASP.NET 4: in C# and VB (Wrox Programming to Programmer) , 2010 Wiely Publishing.
5. Steven Holzner; ASP.NET 4.0 (Cover C# & VB) Black Book; Dreamtech Press.
6. Steven Holzner; .NET Programming Black Book; Dreamtech Press.

MCA-303 : Mobile Application Development

Theory & Tutorial: 4 hours per week (4 Credits)

Examination: Theory Paper – 3 hours; Max. Marks – 100

Note:

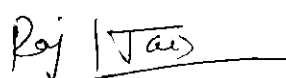
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3. Question No. 2 to 5, each of 20 marks, will be framed by taking one question from each unit. There will be an internal choice within the unit.

Unit-I

INTRODUCTION: Introduction to mobile applications – Market and business drivers for mobile applications – Difficulties in Mobile Development- Mobile Myths- When to Create an App– Types of Mobile App. Design Constraints for mobile applications both HW and SW related, Architecting mobile applications, user interfaces for mobile applications, touch events and gestures.

Unit-II

ADVANCED DESIGN: Designing applications with multimedia and web access capabilities Integration with GPS and social media networking applications – Accessing applications hosted in a cloud computing environment – Design patterns for mobile applications – Understanding Application users, Information Design, Achieving quality constraints-Performance, Usability, Security, Availability and modifiability.


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Unit-III

TECHNOLOGY I ANDROID: Establishing the development environment Android architecture Android Application Structure, Emulator- Android virtual device, UI design, Fragments, Activity, Services, broadcast receiver, Intents/Filters, Content provider-SQLite Programming, SQLITE open, Helper, SQLite Database, Interaction with server side application

Unit-IV

Advanced Android: Using Google Maps, GPS and Wi-Fi Integration, Android Notification, Audio Manager, Bluetooth, Camera and Sensor Integration, Sending SMS, Phone Calls, Publishing Android Application.

Recommended Text / Reference Books:

1. Jeff McWherter and Scott Gowell, "Professional Mobile Application Development", Wrox, 2012
2. Charlie Collins, Michael Galpin and Matthias Kappler, "Android in Practice", DreamTech, 2012
3. David Mark, Jack Nutting, Jeff LaMarche and Frederic Olsson, "Beginning iOS 6 Development: Exploring the iOS SDK", Apress, 2013.
4. James Dovey and Ash Furrow, "Beginning Objective C", Apress, 2012
5. Paul Deitel, Harvey Deitel, Abbey Deitel and Michel Morgano, "Android for Programmers an App-Driven Approach", Pearson, 2012
6. Neil Smyth "Android studio 2.2 Development Essentials 7th Edition" Payload Media 2017
7. Jerome Dimarzio "Beginning Android Programming with Android Studio" Wiley Publication

MCA-304 : Artificial Intelligence

Theory & Tutorial: 4 hours per week (4 Credits)

Examination: Theory Paper – 3 hours; Max. Marks – 100

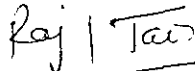
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Unit-I

General Issues and overview of AI : The AI problems: what is an AI technique, Characteristics of AI applications Problem Solving, Search and Control Strategies General Problem solving, Production systems, Control strategies, forward and backward chaining Exhaustive searches: Depth first, Breadth first search.

Heuristic Search Techniques : Hill climbing, Branch and Bound technique, Best first search and A* algorithm, AND/OR Graphs, Problem reduction and AO* algorithm, Constraint Satisfaction problems Game Playing Min Max Search procedure, Alpha-Beta cutoff, Additional Refinements.


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Unit-II

Knowledge Representation : First Order Predicate Calculus, Resolution Principle and Unification, Inference Mechanisms Horn's Clauses, Semantic Networks, Frame Systems and Value Inheritance, Scripts, Conceptual Dependency AI Programming Language- Introduction to PROLOG.

Unit-III

Natural Language Processing: Origins and challenges of NLP, overview of Linguistics, Syntactic analysis: Context-Free Grammars, Grammar rules for English, Normal Forms for grammar – Dependency Grammar, Syntactic Parsing, transition networks, Semantics analysis and representation structures -Requirements for representation, Syntax-Driven Semantic analysis, Semantic attachment- Word Senses, Relations between Senses, Natural Language Generation

Unit-IV

Probability and Expert Systems: Probabilistic Reasoning and Uncertainty, Probability theory, Bayes Theorem and Bayesian networks, Certainty Factor.

Introduction to Expert Systems: Architecture of Expert Systems, Expert System Shells, Knowledge Acquisition, Case Studies, MYCIN, Learning, Rote Learning, Learning by Induction, explanation based learning.

Recommended Text / Reference Books:


1. Elaine Rich and Kevin Knight, "Artificial Intelligence", Tata McGraw Hill, 3rd edition, 2009.
2. Dan W. Patterson, "Introduction to Artificial Intelligence and Expert Systems", Prentice Hall of India, 1st edition, 1997.
3. Winston, Patrick, Henry, "Artificial Intelligence", Pearson Education, 3rd edition, 2004
4. SubhasreeBhattacharjee, "Artificial Intelligence for Student" Shroff Publishers and Distributors Pvt.LTD., 1st Edition, 2016
5. Daniel Jurafsky, James H. MartinSpeech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech, Pearson Publication, 2014.
6. Steven Bird, Ewan Klein and Edward Loper, Natural Language Processing with Python11, First Edition, OReilly Media, 2009.
7. Nils J. Nilsson, "Principles of Artificial Intelligence (Symbolic Computation / Artificial Intelligence)", reprint edition, 2014.
8. Stuart Russell, Peter Norving, "Artificial Intelligence: A Modern Approach", Pearson Education, 3rd edition, 2010.

Practical Examination

Each practical paper shall be of 3 hours duration on one day and carry 100 marks for the practical examination. The practical examination will involve 3 exercises, each of 20 marks, practical record of 15 marks and viva-voce examination of 25 marks.

MCA 311 : .NET Lab

Practical Lab : Examination : Practica
I Examination
Lab Exercise based on Theory Paper MCA 302.


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MCA 312 : Mobile Application Development Lab

Practical Lab : Examination : Practical Examination
Lab Exercise based on Theory Paper MCA 303.

1. Introduction to Android Studio and setting Emulator

- Setting up development environment
- Launching emulator, Editing emulator settings, Emulator shortcuts
- Logcat usage

2. Application Structure

- Look at Basic Building blocks – Activities, Services, Broadcast, Receivers & Content, UI Components- Views & notifications
- AndroidManifest.xml, Uses-permission & uses-sdk, Android API levels (versions & version names), Providers, Components for communication -Intents & Intent Filters
- Activity/services/receiver declarations, Resources & R.java, Assets, Layouts & Drawable Resources. Activities and Activity lifecycle.
- Introduction to DDMS, File explorer, Explicit Intents.

3. Basic UI design, Styles & Themes

- Form widgets, Text Fields, Layouts, styles.xml,
- drawable resources for shapes, gradients(selectors), style attribute in layout file, Applying themes via code and manifest file

4. Dialog boxes

- Alert Dialogs,
- Toast, Time and Date

5. Images and media, Composite

- ListView and ListActivity, Custom listview
- GridView using adapters,
- Gallery using adapters.

6. Menu

- Option menu, Context menu,
- Sub menu, menu from xml,
- menu via code

7. Adapters


- ArrayAdapter
- BaseAdapters

8. Receivers and services

- Alarm Via services,
- Broadcast Receiver

9. Content Providers

- SQLiteDatabase and SQLiteOpenHelper
- DB programming using 2 and 3 tier architecture
- Reading and updating Contacts, Reading bookmarks


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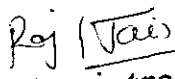
MCA 313 : Communication and Soft Skill Lab

Practical Lab : Examination : Practical Examination

Contents:

1. **Verbal & Non-verbal Communication** :Listening, Speaking, Reading and Writing. Verbal and Non-verbal Communication. Intra, inter-personal and group communication skills. Gestures, postures, Proxemics, Kinesics. Listening to Lectures, Discussions, Talk Shows, News Programs.
2. **Writing Skills** :Formal & Informal writings, report writing, creative writing. Composition, Resume Writing, Cover letters, Business Letter Writing, Persuasive Letters, Job Applications and Official Correspondence, E-Mail etiquette, Precise writing.
3. **Presentation Skills** :Elements of effective presentation, structure of presentation, external factors and content. Debates, Seminar, Speeches, Lectures, Interviews, Mock Interviews, Commonly asked questions in interviews.
4. **Group Discussion** : Structure of GD, Moderator led and other GDs, Strategies in GD, Team work body language, Mock GD, Problem solving, Reflective thinking, Critical thinking, Negotiation skills.
5. **Career Skills** : SWOT Analysis, IQ, EQ and SQ, Art of giving feedback, Decision making, Time Management, Team Management and Leadership Skills, 8 habits of successful people.

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Elective Theory Papers for Elective Group-1 of MCA III Sem

MCA A01 : Big Data Analytics

Theory & Tutorial: 4 hours per week (4 Credits)

Examination: Theory Paper – 3 hours; Max. Marks – 100

Note:

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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

Understanding Big Data : Introduction, Need, convergence of key trends, structured data Vs. unstructured data , industry examples of big data, web analytics – big data and marketing, fraud and big data, risk and big data, credit risk management, big data and algorithmic trading, big data and its applications in healthcare, medicine, advertising etc.

Mining Data Streams: - Introduction To Streams Concepts – Stream Data Model and Architecture - Stream Computing - Sampling Data in a Real Time Sentiment Analysis- Stock Market Predictions.

Unit-II

Big Data Technologies: Hadoop : Open source technologies, cloud and big data, Crowd Sourcing Analytics, inter and trans firewall analytics .

Introduction to Hadoop: Introduction, Data format, analyzing data with Hadoop, scaling out, Hadoop streaming, Hadoop pipes. Design of Hadoop distributed file system (HDFS), HDFS concepts – Java interface, data flow, Data Ingest with Flume and Sqoop. Hadoop I/O – data integrity, compression, serialization, Avro – file-based data structures.

Unit-III

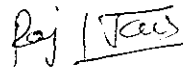
Hadoop Related Tools: Introduction to Hbase: The Dawn of Big Data, the Problem with Relational Database Systems. Introduction to Cassandra: Introduction to Pig, Hive – data types and file formats – HiveQL data definition – HiveQL data manipulation – HiveQL queries.

NOSQL Data Management: Introduction to NoSQL, aggregate data models, key-value and document data models, relationships, graph databases, schemaless databases, materialized views, distribution models, sharding, master-slave replication, peer-peer replication Consistency: relaxing consistency, version stamps.

Unit-IV

Predictive Analytics: Simple linear regression- Multiple linear regression- Interpretation 5 of regression coefficients. Visualizations - Visual data analysis techniques- interaction techniques - Systems and applications.

Map Reduce Applications: MapReduce workflows, unit tests with MRUnit, test data and local tests, anatomy of MapReduce job run, classic Map-reduce – YARN, failures in classic Map-reduce and

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YARN – job scheduling, shuffle and sort, task execution, MapReduce types – input formats – output formats, MapReduce – partitioning and combining, Composing MapReduce Calculations.

Recommended Text / Reference Books:

1. Big Data, Black Book, DT Editorial Services, Dreamtech Press 2015
2. Professional NOSQL, Shashank Tiwari, Wrox, September 2011
3. Hadoop in Practice, Alex Homes, Dreamtech Press, 2015
4. HBase: The Definitive Guide, Lars George, O'Reilley, 2011.
5. Cassandra: The Definitive Guide, Eben Hewitt, O'Reilley, 2010.
6. Programming Pig, Alan Gates, O'Reilley, 2011.
7. NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence, P. J. Sadalage and M. Fowler, Pearson Education, Inc. 2012.
8. Programming Hive, E. Capriolo, D. Wampler, and J. Rutherglen, O'Reilley, 2012
9. Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer, 2007.
10. Tom White "Hadoop: The Definitive Guide" Third Edition, O'reilly Media, 2012

MCA A02 : E-Commerce

Theory & Tutorial: 4 hours per week (4 Credits)

Examination: Theory Paper – 3 hours; Max. Marks – 100

Note:

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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

Business Environment : Organizational Structure and Design, Dependence on Technology, Integrating Technology with Business Environment, IT and Corporate Strategy, Sustaining a Competitive Edge through application of IT in Management Functions.

E-Commerce : Definition, Objectives, Components, Advantages and disadvantages, Scope, E-Commerce Opportunities for Industries, Growth of E-Commerce, e-Commerce Applications- E-Marketing, E-Customer Relationship Management, E-Supply Chain Management, E-Governance, E-Buying, E-Selling, E-Banking, E-Retailing.

Unit-II

E-Commerce Models: Business to consumer, Business to Business, Consumer to Consumer, Government to Citizen, Features and Benefits, Portal Vs. Website.

Other Models: Brokerage Model, Aggregator Model, Info-Mediary Model, Community Model and value chain Model. Mobile-commerce,

Unit-III

E-Payments : Introductions, Special features, Types of E-Payment Systems (EFT, E-Cash, E-Cheque, Credit/Debit Card, Smart Card, Digital Tokens and Electronic Purses/ Wallets).

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Security issues in E-Commerce : Security risk of E-Commerce, Types of threats, Security Tools, Cyber Laws, Business Ethics, EDI Architecture, EDI Standards, EDI Application in business.

Unit-IV

ERP : Introduction, Needs and Evolution of ERP Systems, ERP Domain, ERP Benefits, ERP and Related Technologies, Relevance to Data Warehousing and Data Mining, ERP Drivers, Evaluation Criterion for ERP product, ERP Life Cycle: Adoption decision, Acquisition, Implementation, Use & Maintenance, Evolution and Retirement Phases, ERP Modules, ERP Success & Failure Factors.

Recommended Books :

1. Ravi Kalakota, "Electronic Commerce: A Manager's Guide", Addison-Wesley Professional, Edition 2012.
2. Ian Daniel, "E-Commerce get it Right", Neuro Digital Publication, 2011.
3. Dr. K Abirami Devi & Dr. M Alagammai, "E-Commerce Essentials", Margham Publication, 2012.
4. Kenneth C. Laudon, Karol Traver, "E-Commerce 2014", Prentice Hall Publication, 2013.
5. Lexis Leon; Enterprise Resource Planning; TMH
6. Brady, Manu, Wegner; Enterprise Resource Planning; TMH
7. N. K. Venkitakrishnan, Vinod Kumar Garg; Enterprise Resource Planning : Concepts and Practice; PHI Learning.
8. Dimpri Srivastava, Arti batra; ERP Systems; I K International Publishing House
9. Enterprise Resource Planning Systems System, Lifecycle, Electronic Commerce and Risk by Daniel E.O. Leary, 2011
10. Henry C. Lucas, Information Technology for Management, McGraw Hill, International Edition, July 2001.

MCA A03 : Computer Graphics

Theory & Tutorial: 4 hours per week (4 Credits)

Examination: Theory Paper – 3 hours; Max. Marks – 100

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Unit-I


Introduction: Elements of graphics workstation , Video Display Devices. Raster Scan Systems. Random Scan systems. Input devices, Graphics Software Coordinate Representations.

Algorithms: Line drawing algorithms- DDA Algorithm. Bresenham's Line Algorithm. Frame buffers. Midpoint Circle Algorithm. Midpoint Elipse Algorithm, Sean-Line polygon fill algorithm. Inside-Outside tests Scan-Line fill of curved Boundary Areas. Boundary fill algorithms. Flood fill Algorithm.

Unit-II

Graphics Primitives: Primitive Operations, The display file interpreter, Normalized Device Coordinates. Attributes of output primitives: Line attributes, Color and gray scale levels. Colortables. Gray scale. Area-Fill Attributes, Fill styles. Pattern fill. Soft fill. Character Attributes.

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Geometric Transformations: Matrices. Scaling Transformations. Sin and Cos Rotation. Homogeneous Co-ordinates and Translation. Co-ordinate Translations. Rotation about an arbitrary point. Inverse Transformations, Scaling Transformation, Reflection and Shear transformations, Transformations Routines.

Unit-III

2-D Viewing – The viewing pipeline, Viewing co-ordinate, Reference Frame. Windows to view ports. Co-ordinate transformation 2-D Viewing functions. Clipping operations point clipping. Line clipping. Cohen-Sutherland. Line Clipping. Polygon clipping. Sutherland Hodge man clipping.

3-D concepts: Three dimensional Display Methods, Parallel projection. Perspective projection. Visible line and surface identification. Surface rendering. Three Dimensional Object representations. Bezier curves and surfaces. B-Spline curves and surfaces. Visibility, Image and Object Precision Z-buffer algorithm.

Unit-IV

Computer Animation: Design of Animation Sequence, General computer Animation Function-Raster animations, Key Frame system, Morphing, Simulating Accelerations, Motion Specifications, Kinematics and Dynamics.

Recommended Text / Reference Books:

1. Hearn D., Baker P.D.: Computer Graphics; 2nd editions; Pearson.2003.
2. Foley J.D.; Van D.A. : Fundamentals of Interactive Computer Graphics; 2nd Edition; Addison-Wiley,2000
3. Ronger D.F. ; Elements of Computer Graphics;
4. Giloi W.K. ; Interactive Computer Graphics; PHI
5. Mewman W, Sproul R.F. ; Principles of Interactive Computer Graphics; Mc Graw Hill.

MCA403 : Computer Oriented Numerical Methods

Theory & Tutorial: 4 hours per week (4 Credits)

Examination: Theory Paper – 3 hours; Max. Marks – 100

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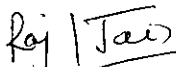
Unit-I

Floating Point Arithmetic-Representation, Operation, Normalization, Pitfalls of Floating – point Representation, Errors in Numerical computation, Measures of Accuracy.

Locating Roots of Equations: Bisection Method, Newton's Method, Secant Method, Muller's Method.

Unit-II

Interpolation and Numerical differentiation: Newton's Forward Difference Interpolation, Newton's Backward Difference Interpolation, Langrange's Interpolation Formula.


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Numerical Integration Definite Integral, Trapezoid Rule, Simpson's Rule, Romberg Algorithm, Adaptive Simpson's Scheme, Gaussian Quadrature Formulas.

Unit-III

Solution of Linear Equations: Gaussian Elimination, Gaussian Elimination with Scaled Partial Pivoting, Iterative Solution of Linear Systems, Gauss-Seidel Iteration Method, Power Methods, Eigenvalues and Eigenvectors.

Ordinary differential Equations Initial-Value Problem: Analytical vs. Numerical Solution, Taylor Series Methods, Runge-Kutta Methods, Euler method.

Unit-IV

Smoothing of Data and the Method of Least squares, Least Squares curve fitting, Straight line and non Linear curve fitting, Cubic splines, Chebyshev polynomials.

Random Numbers, Estimation of Areas and Volumes by Monte Carlo Techniques.

Recommended Books;

1. Rajaraman V : Computer Oriented Numerical Methods, 3rd Edition; PHI,2005.
2. R.S. Salaria; Computer Oriented Numerical Methods; 4th Edition; Khanna Pub.
3. Balagurusamy E; Numerical Methods; 1 Edition; Mc Graw Hill.,2010
4. Sastri; Introductory methods of Numerical Analysis; 3rd Edition; PHI,2001.
5. K. Sankara Rao, Numerical Methods for scientists and Engineers, Prentice Hall India.
6. Cheney and David Kincaid, Numerical Methods and Computing, Brooks/Ie, 2004
7. Krishnamurthy E. V., Sen S.K. Computer Based Numerical Algorithms, East-West Press

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Elective Theory Papers for Elective Group-2 of MCA III Sem

MCA B01 : Theory of Computation

Theory & Tutorial: 4 hours per week (4 Credits)

Examination: Theory Paper – 3 hours; Max. Marks – 100

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UNIT-I

Automata : Introduction of automata, computability, and complexity; mathematical notations and terminology; finding proofs and types of proofs.

Automata and Languages: Regular languages, finite automata, formal definition of a finite automaton, formal definition of computation, designing finite automata.

UNIT-II

Non-deterministic finite automata: Equivalence of NFAs and DFAs, closure under the regular operations, Regular Expressions: formal definition of a regular expression, equivalence with finite automata, nonregular languages: pumping lemma for regular languages.

UNIT-III

Push down Automata and Context free languages: Context free grammars, designing context free grammar, ambiguity in CFG and its removal, Chomsky normal form push down automata: formal definition, graphical notations, Languages accepted by PDA, Equivalence of PDA and CFG, Non-context free languages.

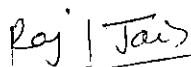
UNIT-IV

Turing Machines and Computability: Formal definition of turing machines with examples, graphical notations, variants of turing machines, church-turing thesis, Hubert's problem.

Decidability, undecidability and reducibility: Decidable languages; decidable problems concerning regular languages and context free languages, the halting problem, undecidable problems, mapping reducibility, decidability of logical theories, turing reducibility.

Recommended Books:

1. Michael Sipser, "Introduction to the Theory of Computation", Second Edition, 2007, CENGAGE learning India Pvt. Ltd., New Delhi.
2. John E. Hopcroft, Rajeev Motwani & Jeffrey D. Ullman, "Introduction to Automata Theory, Languages, and Computation", Third Edition, 2007, Pearson Education Inc
3. K.L.P Mishra & N.Chandrasekaran, "Theory of Computer Science", PHI Learning
4. Michael Sipsev, "Theory of Computation", Cenage Learning
5. John C Martin, "Introduction to languages and theory of computation", McGraw Hill
6. Daniel I.A. Cohen, "Introduction to Computer Theory", Wiley India.
7. Kohavi, "Switching & Finite Automata Theory", TMH


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MCA B02 : Soft Computing

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 Soft Computing : Introduction of Hard and Soft Computing, Unique features of Soft computing, Components of Soft computing, Fuzzy Computing, Evolutionary Computation, Genetic Algorithm, Swarm Intelligence, Ant Colony Optimizations, Neural Network, Machine Learning , Associative Memory, Adaptive Resonance Theory, Introduction to Deep Learning.

UNIT-II

Fuzzy Logic : Basic concepts of fuzzy logic, Fuzzy sets and Crisp sets, Fuzzy set theory and operations, Properties of fuzzy sets, Fuzzy and Crisp relations, Fuzzy to Crisp conversion, Membership functions, interference in fuzzy logic, fuzzy if-then rules, Fuzzy implications and Fuzzy algorithms, Fuzzyfication & Defuzzification, Fuzzy Inference Systems, Mamdani Fuzzy Model, Sugeno Fuzzy Model, Fuzzy Controller, applications.

UNIT-III

Neural Networks : Introduction and Architecture: Neuron, Nerve structure and synapse, Artificial Neuron and its model, Neural network architecture: single layer and multilayer feed forward networks, recurrent networks. Back propagation networks architecture: perceptron model, solution, single layer artificial neural network, multilayer perceptron model; back propagation learning methods, back propagation algorithm, applications.

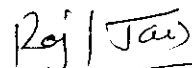
UNIT-IV

Genetic Algorithms : Basic concepts of GA, working principle, procedures of GA, flow chart of GA, Genetic representations, (encoding) Initialization and selection, Genetic operators, Mutation, Generational Cycle, applications.

Hybrid Systems : Integration of neural networks, fuzzy logic and genetic algorithms. GA Based Back Propagation Networks, Fuzzy Back Propagation Networks, Fuzzy Associative Memories, Simplified Fuzzy ARTMAP.

Recommended Text / Reference Books:

1. S. Rajasekaran and G.A.Vijayalakshmi Pai, "Neural Networks Fuzzy Logic, and Genetic Algorithms", Prentice Hall of India 2004.
2. K.H.Lee. First Course on Fuzzy Theory and Applications, Springer-Verlag.


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MCA B03 : 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 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

Linear Programming Problems (LPP): formulation of an LPP, Solution of an LPP using graphics 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 Problem: Definition, methods for finding initial basic feasible solutions – North West corner rule, least cost cell entry method, Vogel's approximation method, methods for finding optional 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).

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, queering problem, transient & steady states, traffic intensity, distribution of queuing system (Birth & Death Process), Queuing Models – I,II & III.

Recommended Text / Reference Books:

1. Gillette B.E.: Introduction to Operations Research – A Computer Oriented Algorithmic approach, Tat 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 system Analysis, 3rd Edn. New age international Publishers, New Delhi.


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4. Hiller, F.S. & Lirrman, 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 B04 : Cryptography & Network Security

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 Security Attacks : 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.

Unit III

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.

Recommended Text / Reference Books:

1. Willium Stalling; 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.


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