

**Revised
SCHEME OF EXAMINATION**

**FOR
MASTER OF COMPUTER APPLICATIONS
[MCA]
REGULAR PROGRAMME**

Offered by



Indira Gandhi Delhi Technical University for Women
(Established by Govt. of Delhi vide Act 09 of 2012)
(Formerly Indira Gandhi Institute of Technology)
Kashmere Gate Delhi-110006

MASTER OF COMPUTER APPLICATIONS

FIRST SEMESTER

Paper Code	Paper Title	L	P	Credit
THEORY				
MCA-101	Fundamentals of IT	4	0	4
MCA-103	Problem solving using C Programming	4	0	4
MCA-105	Discrete Mathematics	4	0	4
MCA-107	Computer Organization	4	0	4
MCA-109	Soft Skills	4	0	4
PRACTICALS				
MCA-151	Fundamentals of IT Lab.	0	2	1
MCA-153	Problem solving using C Programming Lab	0	4	2
MCA-155	Computer Organization Lab.	0	2	1
MCA-157	Linux Programming Lab	0	2	1
	TOTAL	20	10	25

SECOND SEMESTER

Paper Code	Paper Title	L	P	Credit
THEORY				
MCA-102	Data and File Structures	4	0	4
MCA-104	Object Oriented Programming in C++	4	0	4
MCA-106	Operating Systems	4	0	4
MCA-108	Web Technology	4	0	4
MCA-110	System Analysis and Design	4	0	4
PRACTICALS				
MCA-152	Data and File Structures Lab	0	2	1
MCA-154	Object Oriented Programming in C++ Lab	0	2	1
MCA-156	Web Technology Lab	0	2	1
MCA-158	System Analysis and Design lab	0	2	1
MCA-162	Technical Report Writing*	0	2	1
	TOTAL	20	10	25

* Non-University Examination System (NUES)

THIRD SEMESTER

Paper Code	Paper Title	L	P	Credit
THEORY				
MCA-201	Software Engineering	4	0	4
MCA-203	Database Management Systems	4	0	4
MCA-205	Java Programming	4	0	4
MCA-207	Data Communications and Networking	4	0	4
MCA-209	Design and Analysis of Algorithms	4	0	4
PRACTICALS				
MCA-251	Software Engineering Lab	0	2	1
MCA-253	Database Management Systems Lab	0	2	1
MCA-255	Java Programming Lab	0	2	1
MCA-257	Design and Analysis of Algorithms Lab	0	2	1
MCA-261	Human Values and Professional Ethics*	0	2	1
	TOTAL	20	10	25

* Non-University Examination System (NUES)

FOURTH SEMESTER

Paper Code	Paper Title	L	P	Credit
THEORY				
MCA-202	Computer Graphics and Multimedia Technologies	4	0	4
MCA-204	Network Security	4	0	4
MCA-206	Theory of Computation	4	0	4
MCA-208	Cloud Computing	4	0	4
MCA-210	Business Intelligence	4	0	4
PRACTICALS				
MCA-252	Computer Graphics and Multimedia Technologies Lab	0	4	2
MCA-254	Network Security Lab	0	2	1
MCA-256	Business Intelligence	0	2	1
MCA-258	Cloud Computing Lab	0	2	1
	TOTAL	20	10	25

FIFTH SEMESTER

Paper Code	Paper Title	L	P	Credit
THEORY				
MCA-301	Advanced Database Management Systems	4	0	4
MCA-303	Software Testing & Quality Management	4	0	4
MCA-305	Big Data & Business Analysis	4	0	4
Elective - I (Choose any One)				
MCA-307	Numerical and Scientific Computing	4	0	4
MCA-309	Mobile Computing			
MCA-311	Artificial Intelligence			
MCA-313	Microprocessors			
MCA-315	Compiler Design			
MTIT-713	E-Commerce and M-Commerce			
MCA-317	Software Project Management			
Elective - II (Choose any One)				
MCA-319	Distributed Systems and Parallel Processing	4	0	4
MCA-321	Organizational Behavior			
MCA-323	Advanced Computer Architecture			
MCA-325	Digital Signal Processing			
MCA-327	Soft Computing			
MTCS-601	Mobile Architecture and Programming			
MCA-329	Emerging Trends			
PRACTICALS				
MCA-351	Advanced Database Management Systems Lab	0	2	1
MCA-353	Software Testing & Quality Management Lab	0	2	1
MCA-355	Big Data & Business Analysis Lab	0	2	1
MCA-357	Lab based on Elective – I & II	0	2	1
MCA-361	Term Paper*	-	2	1
	TOTAL	20	10	25

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SIXTH SEMESTER

Paper Code	Paper Title	L	P	Credit
MCA-302	Dissertation	-	-	26
MCA-362	Seminar and Progress Report*	-	-	4
	TOTAL	-	-	30

* Non-University Examination System (NUES)

1. The total number of credits of the MCA Programme. = 155.
2. Each student shall be required to appear for examination in all courses. However, for the award of the degree a student shall be required to earn a minimum of 150.

Paper Code: MCA-201

L T C

Paper: Software Engineering

4 0 4

INSTRUCTIONS TO PAPER SETTERS:

Max. Marks: 60

- 1** Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.
- 2** Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks

UNIT - I

Introduction: Software Crisis, Software Processes & Characteristics, Software life cycle models, Waterfall, Prototype, Evolutionary and Spiral Models.

Software Requirements analysis & specifications: Requirement engineering, requirement elicitation techniques like FAST, QFD & Use case approach, requirements analysis using DFD, Data dictionaries & ER Diagrams, Requirements documentation, Nature of SRS, Characteristics & organization of SRS, Requirement Management, IEEE Std. for SRS. **[10 Hrs]**

UNIT - II

Software Project Planning: Size Estimation like lines of Code & Function Count, Cost Estimation Models, COCOMO, Putnam resource allocation model, Validating Software Estimates, Risk Management.

Software Design: Cohesion & Coupling, Classification of Cohesiveness & Coupling, Function Oriented Design, Object Oriented Design. **[10 Hrs]**

UNIT - III

Software Metrics: Software measurements: What & Why, Token Count, Halstead Software Science Measures, Data Structure Metrics, Information Flow Metrics.

Software Reliability: Importance, Hardware Reliability & Software Reliability, Failure and Faults, Reliability Models- Basic Model, Logarithmic Poisson Model, Software Quality Models, CMM & ISO 9001. **[10 Hrs]**

UNIT - IV

Software Testing: Testing process, Design of test cases, Introduction to functional testing & Structural testing, Unit Testing, Integration and System Testing, Debugging, Alpha & Beta Testing.

Software Maintenance: Management of Maintenance, Maintenance Process, Maintenance Models, Regression Testing, Reverse Engineering, Software Re-engineering, Configuration Management, Documentation. **[10 Hrs]**

TEXT BOOKS:

1. K. K. Aggarwal and Yogesh Singh, “Software Engineering”, New Age International, 3rd Ed., 2005.
2. R. S. Pressman, “Software Engineering – A Practitioner’s Approach”, McGraw Hill Int., 5th Ed., 2001.
3. Pankaj Jalote, “An Integrated Approach to Software Engineering”, Narosa, 3rd Ed., 2005.

REFERENCE BOOKS:

1. Stephen R. Schach, “Classical & Object Oriented Software Engineering”, IRWIN, 1996.
2. I. Sommerville, “Software Engineering”, Addison Wesley, 8th Ed., 2009.
3. Frank Tsui and Orlando Karan, “Essentials of Software Engineering”, Joes and Bartlett, 2nd Ed., 2010.
4. Kassem A. Saleh, “Software Engineering”, Cengage Learning, 2009.
5. Rajib Mall, “Fundamental of Software Engineering”, PHI, 3rd Ed., 2009.
6. Carol L. Hoover, Mel Rosso-Llopart and Gil Taran, “Evaluating Project Decision Case Studies in Software Engineering”, Pearson, 2010.

Paper Code: MCA-203

L T C

Paper Title: Database Management System

4 0 4

INSTRUCTIONS TO PAPER SETTERS:

Max. Marks: 60

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UNIT – I

Basic concepts: database & database users, characteristics of the database, database systems, concepts and architecture, data models, schemas & instances, DBMS architecture & data independence, database languages & interfaces, data modeling using the entity-relationship model-extended E-R features. Overview of hierarchical, Network & Relational Data Base Management Systems. **[10Hrs]**

UNIT – II

Relational model, languages & systems: relational data model, relational algebra: translating E-R model into relational model, relational model concepts, relational model constraints, relational algebra. Relational calculus (tuple calculus)

SQL- a relational database language: data definition in SQL (DDL, DML & DCL), view and queries in SQL, specifying constraints and indexes in sql, practicing SQL commands using ORACLE. **[10Hrs]**

UNIT – III

Oracle Architecture, Logical Data Structures Physical Data Structure, Instances, Table Spaces, Types of Tablespace, Internal Memory Structure, Background Processes, Data Types, Roles & Privileges, Stored Procedures, User Defined Functions, Cursors, Error Handling, Triggers. **[10Hrs]**

UNIT – IV

Relational data base design: function dependencies & normalization for relational databases: functional dependencies, normal forms based on primary keys, (1NF, 2NF, 3NF & BCNF), lossless join and dependency preserving decomposition. Concurrency control & recovery techniques: concurrency control techniques, locking techniques, time stamp ordering, granularity of data items, recovery techniques: recovery concepts, database backup and recovery from catastrophic failures. Concepts of object oriented database management systems, Distributed Data Base Management Systems. **[10Hrs]**

TEXT BOOKS:

1. Elmsari and Navathe, "Fundamentals of Database Systems", Pearson Education, 5th Edition, 2006.
2. Korth, Silberschatz, "Fundamentals of Database System Concepts", TMH, 6th Edition, 2010.

REFERENCE BOOKS:

1. Desai, B., "An Introduction to Database Concepts", Galgotia Publications, 2002.
2. Sham Tickoo and Sunil Raina, "Oracle 11g with PL/SQL Approach", Pearson, 2010.

Paper Code: MCA-205

L T C

PaperTitle: Java Programming

4 0 4

INSTRUCTIONS TO PAPER SETTERS:

Max. Marks: 60

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UNIT - I

Overview and characteristics of Java, Java program Compilation and Execution Process Organization of the Java Virtual Machine, JVM as an interpreter and emulator, Instruction Set, class File Format, Verification, Class Area, Java Stack, Heap, Garbage Collection. Security Promises of the JVM, Security Architecture and Security Policy. Class loaders and security aspects, sandbox model

Introducing classes, objects and methods: defining a class, adding variables and methods, creating objects, constructors, class inheritance. Arrays and String: Creating an array, one and two dimensional arrays, string array and methods, Classes: String and String Buffer classes, Wrapper classes: Basics types, using super, Multilevel hierarchy abstract and final classes, Object class, Packages and interfaces, Access protection, Extending Interfaces, packages.

[10 Hrs]

UNIT - II

Exception Handling: Fundamentals exception types, uncaught exceptions, throw, throw, final, built in exception, creating your own exceptions,

Multithreaded Programming: Fundamentals, Java thread model: priorities, synchronization, messaging, thread classes, Runnable interface, inter thread Communication, suspending, resuming and stopping threads.

Input/Output Programming: Basics, Streams, Byte and Character Stream, predefined streams, Reading and writing from console and files.

Using Standard Java Packages (lang, util, io, net). Networking: Basics, networking classes and interfaces, using java.net package, doing TCP/IP and Data-gram Programming, RMI (Remote Method Invocation).

[10 Hrs]

UNIT - III

Event Handling: Different Mechanism, the Delegation Event Model, Event Classes, Event Listener Interfaces, Adapter and Inner Classes, Working with windows, Graphics and Text,

using AWT controls, Layout managers and menus, handling Image, animation, sound and video, Java Applet.

The Collection Framework: The Collection Interface, Collection Classes, Working with Maps & Sets

JDBC: Introduction to DBMS & RDBMS, JDBC API, JDBC Application Architecture, Obtaining a Connection, JDBC Models: Two Tier and Three Tier Model, ResultSet, Prepared Statement, Callable Statement.

[10 Hrs]

UNIT - IV

RMI (Remote Method Invocation): Introduction, Steps in creating a Remote Object, Generating Stub & Skeleton, RMI Architecture, RMI packages.

Java Bean: Introduction, Bean Architecture, Using the Bean Development Kit, Creating simple bean-properties, methods and events, Packing beans- the manifest & the jar, Java bean package, Introduction to NetBean.

Swing: Introduction to JFC (Java Foundation Classes), Features of Swing and Comparison with AWT, Advanced Control in swing (JTree, JTable)

[10

Hrs]

TEXT BOOKS:

1. Patrick Naughton and Herbert Schildt, "Java-2: The Complete Reference", TMH, 2007.
2. Bill Vanners, "Inside Java Virtual Machine", TMH, 2nd Ed, 2000.
3. Rick Dranell, "HTML 4 unleashed", Techmedia Publication, 2000.
4. Paul Dietel and Harvey Deitel, "Java How to Program", PHI, 8th Ed., 2010.

REFERENCE BOOKS:

1. E. Balaguruswamy, "Programming with Java: A Primer", TMH, 4th edition 1998.
2. N.P Gopalan and J. Akilandeswari, "Web Technology- A Developer's Perspective", PHI, 2007.
3. Eric Jendrock, Jennifer Ball and Debbie Carson, "The Java #EE5 Tutorial", Pearson, 3rd Ed., 2007.
4. Daniel Liang, "Introduction to Java Programming", Pearson, 7th Ed., 2010.

Paper Code: MCA-207

L P C

Paper Title: Data Communications & Networking

4 0 4

INSTRUCTIONS TO PAPER SETTERS:

Max. Marks: 60

- 3 Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.**
- 4 Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks**

UNIT – I

Introduction: Goals and Applications of Networks, Layering Concept, OSI Reference Model vs TCP/IP Protocol Suite, Networks Topology.

Physical Layer: Signals, Digital Transmission – Analog to Digital & Digital to Digital, Analog Transmission – Digital to Analog & Analog to Analog, Multiplexing – FDM & TDM, Media – Guided and Unguided, Switching – Packet based & Circuit based. Hub & Repeater.

Network Traffic Capturing: Wireshark (windows) and tcpdump (linux). **[10Hrs]**

UNIT – II

Data Link Layer: Addressing; Error Detection & Correction – General concepts, Checksum & CRC; Medium Access – Aloha, CSMA, CSMA/CD & CA; Protocols – Ethernet, ARP & RARP; Switch – Learning & Filtering Mechanism.

Network Layer: IP Addressing & Subnets; Basic Routing (or Forwarding) Mechanism; IPv4 frame format and functions; Routing protocols – RIP, OSPF & BGP and algorithms – Distance Vector & Link State.

Linux Network Commands: arp, route, ifconfig, netstat, traceroute, ping. **[10Hrs]**

UNIT – III

Transport Layer: Port Addresses; Protocols - Simple, Stop n Wait, Go Back N & Selective Repeat; UDP – Services & Applications; TCP – header format, connection setup & termination, state transition diagram, flow control, error control, congestion control & timers.

Socket Programming: Socket definition, TCP client & server socket, UDP client & server socket, Problems related to Socket Programming. **[10Hrs]**

UNIT – IV

Application Layer: Web & HTTP, FTP, Email, Telnet, SSH, DNS.

Advanced Protocols: SNMP, RTP, SIP, BitTorrent.

[10Hrs]

TEXT BOOKS:

1. Forouzan, “Data Communication and Networking”, TMH, 5th Edition, 2013.
2. A.S. Tanenbaum, “Computer Networks”, PHI, 4th Edition, 2002.
3. W. Stallings, “Data and Computer Communication”, Macmillan Press, 2013.
4. Comer, “Computer Networks and Internet”, PHI, 2008
5. Comer, “Internetworking with TCP/IP”, PHI, 2008.

REFERENCE BOOKS:

1. W. Stallings, “Data and Computer Communication”, McMillan, 2010
2. J. Martin, “Computer Network and Distributed Data Processing”, PHI, 2008.
3. W. Stallings, “Local Networks”, McMillan, 2013.
4. M. Schwartz, “Computer Communication Network Design and Analysis”, PHI, 1977.
5. S. Keshav, “An Engineering Approach to Computer Networking, Pearson”, 2001.

Paper Code: MCA-209

L T C

Paper Title: Design and Analysis of Algorithms

4 0 4

INSTRUCTIONS TO PAPER SETTERS:

Max. Marks: 60

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.
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UNIT - I

Introduction to Algorithms: Need for algorithm, Growth of Functions, Exercises based on Asymptotic Notations, Solving Recurrence Relations – Iterative method, Substitution method & Master method. Space vs Time Complexity Tradeoff.

Divide and Conquer Technique: Merge Sort, Quick Sort, Median and Order Statistics, Maximum-subarray Problem, Strassen's Matrix Multiplication. **[10 Hrs]**

UNIT - II

Dynamic Programming: Elements of Dynamic Programming, Matrix Chain Multiplication, Longest Common Subsequence, 0/1 Knapsack and Optimal Binary Search Tree problems.

Greedy Algorithms: Elements of Greedy strategy, Activity Selection problem, Huffman Codes, 0/1 Fractional Knapsack, Task Scheduling problem. **[10 Hrs]**

UNIT - III

Graph Algorithms: Representation of Graphs, Breadth First Search, Depth First Search, Topological Sort, Strongly Connected Components, Algorithm for Kruskal's and Prim's for finding Minimum cost Spanning Trees, Dijkstra's and Bellman Fort Algorithm for finding Single source shortest paths. All pair shortest paths and matrix multiplication, Floyd – Warshall algorithm for all pair shortest paths. **[10 Hrs]**

UNIT - IV

String Matching: The naïve String Matching algorithm, The Rabin-Karp Algorithm, String Matching with finite automata, The Knuth-Morris Pratt algorithm.

NP-Completeness: Polynomial-time verification, NP-Completeness and Reducibility, NP-Completeness Proof, NP-Complete problems. **[10 Hrs]**

TEXT BOOKS:

1. T.H. Cormen, C.E. Leiserson, R.L. Rivest and C. Stein, "Introduction to Algorithms" PHI, 3rd Ed., 2009.

2. Jon Kleinberg and Eva Tardos, “Algorithm Design”, Pearson Edition, 2006.

REFERENCE BOOKS:

1. Johnsonbaugh, “Algorithms”, Pearson, 2004.
2. Anany Levitin, “Introduction to the Design and Analysis of Algorithm”, Pearson Education, 2003.
3. Sara Baase and Allen Van Gelder, “Computer Algorithms - Introduction to Design and Analysis”, Pearson Education, 2003.
4. A.V. Aho, J. E. Hopcroft and J.D.Ullman, “The Design and Analysis of Computer Algorithms”, Pearson Education, 2003.
5. R. S. Salaria, Khanna, “Data Structure & Algorithms”, Book Publishing Co. (P) Ltd., 2002.
6. R. Panneerselvam, “Design and Analysis of Algorithm”, PHI, 2007.
7. Steven S. Skiena, “Algorithm Design Manual”, Springer, 1998.
8. Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, “Fundamental of Computer Algorithms”, Orient Longman, 2006.

Paper Code: MCA-202

L P C

Paper Title: Computer Graphics and Multimedia Technologies

4 0 4

INSTRUCTIONS TO PAPER SETTERS:

Max. Marks: 60

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UNIT - I

Scan Conversion Algorithms: Scan Converting Lines (DDA, Bresenham), Scan Converting Circles (Mid-point, Bresenham), Scan Converting Ellipses (Midpoint).

Clipping: Two-Dimensional Clipping, Sutherland-Cohen Subdivision Line-Clipping Algorithm

2D- Transformation: Representation of Points, Transformations and Matrix, Transformation of Straight Line, 2-D - Rotation, Reflection, Scaling, Combined Transformations, Translation and Homogeneous Coordinates, Translation, Rotation about an Arbitrary Point, Reflection through an Arbitrary Line, window-to-viewport transformation **[10Hrs]**

UNIT - II

3D-Transformation: Representation of Points, 3D- Scaling, 3D- Shearing, 3D- Rotation, Three Dimensional Translation, 3D- Reflection, Multiple Transformations, Rotation about an Axis Parallel to a Coordinate Axis, Rotation about an Arbitrary Axis in Space.

The Dimensional Perspective Geometry: Geometric Projection, Orthographic Projections, Oblique Projections, Perspective Transformations, Single-Point Perspective Transformation, Two-Point Perspective Transformation, Three-Point Perspective Transformation.

Solid Modeling: Representing Solids, Regularized Boolean Set Operation primitive Instancing Sweep Representations, Boundary Representations, Spatial Partitioning Representations, Constructive Solid Geometry, Comparison of Representations. **[10Hrs]**

UNIT - III

Representing Curves & Surfaces: Polygon meshes, parametric, Cubic Curves, geometric and parametric continuities, Hermite, Bezier (4-point, 5-point, general), B-Spline, Quadric Surface

Illumination and Shading: Modeling light intensities, ambient light, diffused light, specular reflection, attenuation factor, Reflection vector, Shading Models: constant shading, flat shading, gouraud shading, phong shading.

Hidden-Surface Removal: Hidden Surfaces and Lines, Back-Face Detection, A-buffer, Z-Buffers Algorithm, Scan-line Algorithm, The Painter's Algorithm, Area subdivision

Introduction to Multimedia: Multimedia, Multimedia Terms, Introduction to making multimedia – The Stages of project, the requirements to make good multimedia, Multimedia Applications. **[10Hrs]**

UNIT - IV

Multimedia – making it work – Multimedia Hardware, Software and Authoring Tools, Graphics File Formats: TIFF, MIDI, JPEG, MPEG, RTF.

Multimedia building blocks – Text, Sound, Images, Animation and Video, Digitization of Audio and Video objects, Data Compression: Different Compression algorithms concern to text, audio, video and images etc. **[10Hrs]**

TEXT BOOKS:

1. Foley, Van Dam, Feiner, Hughes, “Computer Graphics Principles & Practice”, 2000
2. D.Hearn & Baker: Computer Graphics, Prentice Hall of India, 1986
3. Tay Vaughan, “Multimedia: Making it Work”, TMH, 2000.
4. K. Andleigh and K. Thakkar, “Multimedia System Design”, PHI, PTR, 2000

REFERENCE BOOKSS:

1. Rogers & Adams, “Mathematical Elements for Computer Graphics”, McGraw Hill, 1989.
2. Rogers, “Procedural Element of Computer Graphics”, McGraw Hill, 1998.
3. R. Plastock and G Kalley, “Theory and Problems of Computer Graphics”, Schaum’s Series, Mc Graw Hill, 1986.
4. Steve Heath, “Multimedia & Communication Systems”, Focal Press, UK, 1999.

Paper Code: MCA-210

L T C

Paper: Network Security

4 0 4

INSTRUCTIONS TO PAPER SETTERS:

Max. Marks: 60

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UNIT – I

Introduction: Codes and Ciphers – Some Classical systems – Statistical theory of cipher systems – Complexity theory of Crypto systems – Stream ciphers, Block ciphers.

Stream Ciphers: Rotor based system – shift register based systems – Design considerations for stream ciphers – Cryptanalysis of stream ciphers – Combined encryption and encoding.

Block Ciphers – DES and variant, modes of use of DES.

[10Hrs]

UNIT – II

Public Key systems – Knapsack systems – RSK – Diffie Hellman Exchange 0 Authentication and Digital signatures, Elliptic curve based systems.

System Identification and clustering

Cryptology of speech signals – narrow band and wide band systems – analogue & digital systems of speech encryption.

[10 Hrs]

UNIT – III

Network Security: Hash function – Authentication:

Protocols – Digital Signature standards.

Electronics Mail Security – PGP (Pretty Good Privacy) MIME, Data Compression technique.

IP Security: Architecture, Authentication Header, Encapsulating security Payload – Key management.

Web Security: Secure Socket Layer & Transport Layer security, Secure electronic transactions.

Firewalls Design principle, established systems.

[10 Hrs]

UNIT – IV

Telecommunication Network architecture, TMN management layers, Management information Model, Management servicing and functions, Structure of management information and TMN information model.

[10 Hrs]

TEXT BOOKS:

1. William Stallings, “Network Security Essentials, 2nd Edition, 2002.
2. William Stallings, “Cryptography & Network Security”, 3rd Edition, 1999.

REFERENCE BOOKS:

1. John E. Canavan, " The Fundamentals of Network Security," Artech House, 2001.
2. Merike Kaeo, " Designing Network Security," Cisco Press, 1999.

INSTRUCTIONS TO PAPER SETTERS:

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UNIT – I

Automata and Language Theory: A brief history of computing, Need of Automata, Overview of Theoretical Computer Science and its application including various phases / Modules in the design of a typical compiler, Chomsky Classification, Introduction to JFLAP Simulation

Finite Automata : Deterministic Finite Automata (DFA), Non-Deterministic Finite Automata (NFA), Proof of Kleen's Theorem, Arden's Theorem, Myhill Nerode Theorem, Regular Expressions, Transition Graphs, Minimized DFA, Mealy and Moore machines, Equivalence of DFAs, NFAs and Regular Expressions, Closure and Decision properties of Regular Language, Non-Regular Languages, Pumping Lemma., Applications of FA: Text search, Design of lexical analyzer, Finding patterns [10Hrs]

UNIT – II

Context Free Grammar and parsers: CFG, Derivations and Parse trees, Ambiguous Grammar and techniques of removing ambiguity, Chomsky Normal Form, Greibach Normal Form, Closure properties of context free language, Decision problems involving CFLs, Application of CFG: Types of parsers (CYK, Tomita's, LL, LR, SLR), YACC, Mark Up languages

PushDown Automata : Deterministic and Non Deterministic, Equivalence of DPDA, NPDA, CFG and conversion, Language accepted by PDA, Pumping lemma for CFG, Ogden's Lemma [10Hrs]

UNIT – III

Linear Bounded Automata: Power of Linear Bounded Automata, Context Sensitive language, Closure and decision properties

Turing Machines: Definition, General model of computation, TM as language acceptor, enumerator, computing partial functions, Variants and Extension of Turing machine (One tape, multi tape, Non deterministic, move-in state, stay option etc.), construction of Turing machine, , Church Turing Thesis, Rice's Theorem, halting problem, Hilbert's problem, recursively enumerable language, encoding of Turing machine, L-System. [10Hrs]

UNIT – IV

Advanced Topics: Decidability, Reducibility, Computability, Computable functions , recursive, primitive recursive, μ -recursive functions, recursion theorem, post machines, Post Correspondence problem

Time and Space complexity : P, NP, NP- complete, PSAPCE, NPSAPCE, L, NL, EXSPACE, NL-complete, Heirarchy Theorems, Probablistic Computation, randomness and compressibilty (including BPP, ZPP, RP), Zero-Knowledge proof. **[10Hrs]**

TEXT BOOKS:

1. J. C. Martin, “Introduction to Languages and the Theory of Computation”, TMH, 3rd Ed., 2007.
2. M. Sipser, “Introduction to the Theory of Computation”, Cengage Publication, 2006.
3. J. Hopcroft, R. Motwani, and J. Ullman, “Introduction to Automata Theory, Language and Computation”, Pearson, 2nd Ed., 2006.

REFERENCE BOOKS:

1. Susan H. Rodger, “JFLAP: An interactive Formal Languages and Automata Package”, Jones & Bartlett, 2009.
2. H. R. Lewis and C. H. Papadimi Triou, “Elements of the Theory of Computation”, Pearson, 2nd Ed., 1997.
3. Peter Linz, “Introduction to Formal Languages and Automata”, Narosa Publishing, 4th ed. 2006.

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- 2 Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks

UNIT - I

Introduction : Introduction of cloud computing, History of cloud computing, NIST definition, properties and characteristics, Cloud as green and smart, Cloud as IaaS, PaaS, SaaS, BPaaS, HaaS, Public, Private, Hybrid and community cloud, Benefits and Challenges, Application availability, performance, security and disaster recovery; next generation Cloud Applications, Technology providers vs. Cloud providers vs. Cloud vendors **[10 Hrs]**

UNIT - II

Cloud Architecture: Virtualization concept, cloud building blocks, ROI Model, Service models, deployment models, storage models, security model.

Introduction to IaaS: Resource Virtualization, Server, Storage, Network

Introduction to PaaS: Cloud platform & Management, Computation, Storage

Introduction to SaaS: Web services, Web 2.0, Web OS.

Cloud Storage Infrastructure: Storage strategy and governance; security and regulations Storage Network Design: Architecture of storage, analysis and planning. Storage network design considerations, Cloud Optimized Storage, Designing backup/recovery solutions **[10 Hrs]**

UNIT - III

Cloud issues and challenges : Cloud provider Lock-in, Security challenges and approaches (Infrastructure security, Network level security, Host level security, Application level security, Data security and Storage, Data privacy and security Issues, Jurisdictional issues raised by Data location, Identity & Access Management, Access Control, Trust, Reputation, Risk Authentication in cloud computing, Client access in cloud, Cloud contracting Model, Commercial and business considerations. **[10 Hrs]**

UNIT - IV

Application Development: Service creation environments to develop cloud based applications, Development environments for service development; Amazon, Azure, Google App, Salesforce.com, IBM Cloud, Google MapReduce, Yahoo Hadoop, Eucalyptus, Nimbus, OpenStack. **[10 Hrs]**

TEXT BOOKS:

1. Barrie Sosinsky, “Cloud Computing Bible”, Wiley-India 1st edition, 2011
2. Gautam Shroff, “Enterprise Cloud Computing Technology Architecture Applications” Cambridge University Press 1st edition, 2010
5. Greg Schulz, “Cloud and Virtual Data Storage Networking”, Auerbach Publications, 1st edition, 2009

REFERENCE BOOKS:

1. Miller Michael, “Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online”, Pearson Education India ,1st edition, 2008,
2. Ronald L. Krutz, Russell Dean Vines, “Cloud Security: A Comprehensive Guide to Secure Cloud Computing”, Wiley-India 1st edition, 2010
3. Rajkumar Buyya, James Broberg, Andrzej M. Goscinski, “Cloud Computing: Principles and Paradigms”, Wiley-India , 2011

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Paper Title: Business Intelligence

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INSTRUCTIONS TO PAPER SETTERS:

- 1 Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 20 marks.**
- 2 Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks**

UNIT - I

Introduction: data mining, different types of learning process, building block with example.
Data Exploration and Dimension Reduction: data summaries, data visualization, correlation analysis, Reducing the number of categories in categorical variables, principal component analysis of Breakfast Cereals. **[10 Hrs]**

UNIT - II

Evaluation Classification & Predictive Performance: Introduction, judging classification, accuracy measures, cutoff for classification , performance in unequal importance of classes, asymmetric misclassification costs, oversampling & asymmetric costs, classification using a triage strategy, evaluation predictive performance and some problems. **[10 Hrs]**

UNIT - III

Classification and Regression Trees: introduction, classification trees, recursive partitioning, complexity, evaluating the performance of a classification tree, avoiding over fitting: CHAID, pruning the Tree, classification rules from the trees, regression tree, advantages, weaknesses and extensions. **[10 Hrs]**

UNIT - IV

Association Rules: Introduction, transaction database, generates candidate rules, selection of the rules.

Cluster Analysis: example, Measuring the distance between two records, measuring distance between two clusters, hierarchical clustering, and nonhierarchical clustering.

CASE STUDIES.

[10 Hrs]

Text books:

1. Galit shmueli, nitin r. patel, peter c. bruce , “Data Mining for Business Intelligence”, Wiley India pvt. Ltd., 2007

Reference Books:

1. Han, J., and Kamber, M. “Data Mining: concepts and techniques. San diego, CA: ACADEMIC Press , 2001.
2. Hosmer, d. w., and Lemeshow, “Applied Logistic Regression”, New York: Wiley-Interscience, 2nd edition, 2000.