

ST. XAVIER'S COLLEGE [AUTONOMOUS], KOLKATA
M. SC (COMPUTER SCIENCE) SYLLABUS W.E.F. THE SESSION 2013-15

SEM	PAPER CODE	MARKS	CREDITS	TOPIC
1	CMSM4121	100	4	Data Structure and Analysis of Algorithms
	CMSM4122	100	4	Advanced Database Management System
	CMSM4123	100	4	Computer Architecture
	CMSM4124	100	4	Distributed Operating System
	CMSM4156	100	3	Laboratory 1: PL/SQL and OS Programming Lab
	CMSM4157	100	3	Laboratory 2: Object Oriented Programming Lab
2	CMSM4221	100	4	Software Engineering
	CMSM4222	100	4	Computer Networking and Internet Technologies
	CMSM4223	100	4	Microprocessors and Micro controllers
	CMSM4224	100	4	Computer Graphics and Multimedia
	CMSM4256	100	3	Laboratory 3: Socket Programming, Microprocessor and Microcontroller Lab
	CMSM4257	100	3	Laboratory 4: Internet Technologies I Lab
3	CMSM4321	100	4	Compiler Design
	CMSM4322	100	4	Artificial Intelligence
	CMSM4323	100	4	VLSI Design
	CMSM4324	100	4	Cryptography and Network Security
	CMSM4356	100	3	Laboratory 5: Internet Technologies II and Artificial Intelligence Lab
	CMSM4357	50	2	Term Paper
	CMSM4358	50	2	Project 1
4	CMSM4421	100	4	Image Processing and Pattern Recognition
	CMSM4431	100	4	Mobile Communications (Elective)
	CMSM4432	100	4	Data Mining and Data Warehousing (Elective)
	CMSM4433	100	4	Object Oriented Technology (Elective)
	CMSM4456	200	8	Project 2
	CMSM4457	100	3	Seminar
	CMSM4458	100	4	Grand Viva

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CMSM4121	Marks: 100	Data Structure and Analysis of Algorithms
<p>Review of basic algorithmic analysis: Asymptotic analysis of upper and average complexity bounds; best, average, and worst case behaviors; big-Oh, big-Omega and big-Theta; standard complexity classes; empirical measurements of performance; time and space tradeoffs in algorithms; recurrence relations</p> <p>Divide and Conquer: Merge Sort. Quick Sort, Selection Problem, Median and Order Statistics, Strassen's Matrix Multiplication, Convex Hull Algorithms.</p> <p>Greedy Algorithm: Knapsack algorithm, Huffman Codes, Task Scheduling</p> <p>Dynamic Programming: Chained matrix multiplication</p> <p>Backtracking Algorithms: 8 queens problem</p> <p>Branch and Bound: Travelling Salesperson problem.</p> <p>Graph and Tree Algorithms : BFS, DFS, Topological Sort, Minimum Spanning Tree(Prim's and Kruskal's Algorithm), Dijkstra's Algorithm, Bellman Ford Algorithm, Bipartite Graphs, Binary Search Tree, AVL tree, 2-3 Tree, Red Black Tree, Splay Tree – Amortised analysis.</p> <p>Complexity Theory: Tractable and intractable problems, Concepts of computable functions; Polynomial reducibility: P and NP: Definition of the classes P and NP, NP-completeness (Cook's theorem), Standard NP complete problems,</p> <p>Books and References:</p> <ol style="list-style-type: none"> 1. T.H.Cormen et al -Introduction to Algorithms , PHI 2. E.Horowitz, S.Sahani-Fundamentals of Computer Algorithms –Galgotia 3. Bratley et al - Fundamentals of Algorithms-PHI 		

CMSM4122	Marks: 100	Advanced Database Management System
<p>Transaction Management and Concurrency Control: States of Transaction, ACID properties, consistency model, storage model, cascading rollback, recoverable schedules</p> <p>Concurrency: Schedules, testing for serializability, Lock-based protocols-Two-phase locking protocol, Timestamp based protocol, optimistic techniques, deadlock handling.</p> <p>Recovery: Failure classification, storage hierarchy, log-based recovery, shadow paging</p> <p>Query processing and optimization: Steps of query processing, query interpretation, equivalence of expression, estimation of cost, join strategies</p> <p>Concepts of Normalisation: 4NF, 5NF.</p> <p>Distributed Database: Principles of distributed database, DDBMS, levels of distribution transparency, data fragmentation, replication and allocation techniques.</p> <p>Books and References:</p> <ol style="list-style-type: none"> 1. Elmasri,Navathe,Fundamentals of Database System,3/e,Pearson Education. 2. Korth, Silberschatz :Database System Concepts, McGrawHill , 3. Ozsu,Principals of Distributed Database System,Pearson Education. 4. Ceri and Pelagatti, Distributed Databases: Principles and System: McGrawHill 		

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CMSM4123	Marks: 100	Computer Architecture
<p>Introduction to Parallel Processing: Parallel Computer Structures, Architectural Classification Parallel Processing Applications</p> <p>Memory and I/O sub-systems: Hierarchical Memory Structures, Cache Memories and Management, I/O sub-systems</p> <p>Principles of Pipelining and Vector Processing: Pipelining, Instruction and Arithmetic Pipelines, Principles of designing pipelined processors, vector processing requirements</p> <p>Structures and Algorithms of Array Processors (SIMD Computers): SIMD Array Processors, SIMD Interconnection networks, Parallel Algorithms for Array Processors</p> <p>Algorithm examples – matrix multiplication, sorting</p> <p>Multiprocessor Architecture and Programming: Functional Structures, Interconnection Networks, A few example multistage INs, Parallel Memory Organisations</p> <p>Books and References:</p> <ol style="list-style-type: none"> 1. Kai Hwang, Advanced Computer Architecture, Tata Mc Graw Hills 2. Kai Hwang and F. A. Briggs, Computer Architecture and Parallel Processing, Tata Mc Graw Hills 3. Hennessy Patterson, Computer Architecture, A quantitative Approach , 5th ed, Elsevier. 4. Dongarra, Foster, Fox & others, Source Book of parallel Computing, Elsevier. 5. M.J Quinn, Designing Efficient Algorithms for Parallel Computers, Mc Graw Hill 		

CMSM4124	Marks: 100	Distributed Operating System
<p>Role and basic functionality, concurrent processing, scheduling, memory management, Device management, File Systems Management. Case Study –Unix/Linux (Architecture, study of system calls)</p> <p>Distributed Operating System: Architectures of distributed system , Issues in designing a distributed operating system. Centralised Vs Distributed OS, Message Passing , Remote procedure call. Synchronization mechanisms in distributed operating system Distributed scheduling. Distributed Shared Memory. Distributed File Systems. Basic idea of Recovery , Fault tolerance and Security</p> <p>Books and References:</p> <ol style="list-style-type: none"> 1. Tanenbum, A.S., Distributed Operating Systems , Pearson Education. 2. Singhal, Shivaratri, Advanced Concepts in Operating Systems, TMH. 3. P.K. Sinha, Distributed Operating Systems, PHI 		

CMSM4156	Marks: 100	Laboratory 1: PL/SQL and OS Programming Lab
<p>Group A: PL/SQL Lab</p> <p>Group B: OS Programming Lab (Special reference to OS as a concurrent program)</p>		

CMSM4157	Marks: 100	Laboratory 2: Object Oriented Programming Lab
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CMSM4221	Marks: 100	Software Engineering
<p>Software Engineering Fundamentals: Software Process, Software Life Cycle Standards, Software Requirements Analysis & Specification, Software Design.</p> <p>Testing: Testing Fundamentals, System Testing, Integration Testing, Black Box Testing, White Box Testing, Testing Process, Software Maintenance</p> <p>Project management: Process, software configuration process models, requirements change management process, Process management process</p> <p>Effort Estimation: Function Points, COCOMO, Project scheduling and staffing, Risk Management</p> <p>Software metrics and Reliability</p> <p>Books and References:</p> <ol style="list-style-type: none"> 1. Roger S. Pressman, Software Engineering - A Practitioner's Approach, McGraw- Hill 2. Somerville, Software Engineering, Pearson Education 3. Jalote, Software Engineering, Narossa Publication 		

CMSM4222	Marks: 100	Computer Networking and Internet Technologies
<p>Network Architecture: Layered architecture and protocol hierarchy TCP/IP protocol suite, Services and important functions of each layer.</p> <p>Local Area Networks: Aloha and Carrier Sense Protocols, Ethernet, Token Ring, FDDI.</p> <p>Flow Control: Stop and wait ARQ, Sliding Window, Go Back N, Selective Repeat. 802.11: Access points: Distributed Coordination (DCF) and Point Coordination(PCF).</p> <p>Connecting Devices: Bridges, Backbone Networks, Virtual LAN.</p> <p>Internetworking: Virtual Circuits and datagrams, IP addressing, Subnetting, CIDR.</p> <p>Routing Algorithms: Shortest path Routing, Flooding, Distance Vector Routing, Link State Routing, Hierarchical Routing, Broadcast and Multicast Routing, Routing for mobile hosts.</p> <p>Routing Protocols: RIP, OSPF, BGP</p> <p>Process to Process Delivery: TCP and UDP.</p> <p>Congestion Control and Quality of Service: Congestion control Techniques, Congestion control in TCP. Techniques for improving the QoS.</p> <p>Application Layer: Sockets, DNS, WWW, SMTP, HTTP.</p> <p>WDMA: Description and implementation on fiber network.</p> <p>Books and References:</p> <ol style="list-style-type: none"> 1. B.Forouzan – Data Communication and Networking.TMH 2. A Tanenbaum – Computer Networks, PHI 		

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CMSM4223	Marks: 100	Microprocessors and Micro controllers
<p>80x86 - Architecture and Organization, Instruction Set, Assembly Language Programming, Memory Interfacing, Data Transfer Techniques, I/O Ports, Interfacing, Programmable Interrupt and DMA Controllers, Serial Mode Data Transfer, Programmable Timer/Counter, Designing Microprocessor Based Systems.</p> <p>8051 MICROCONTROLLER - Comparison of microprocessor and micro controller, architecture, pin function, CPU timings and machine cycle, internal memory organization, pc and stack, i/p-o/p ports, counters and timers, serial data i/p-o/p, interrupts. Instruction set, addressing modes, Programming 8051, programming timers, asynchronous serial data communication, timer and hardware interrupt, service routine.</p> <p>External memory and memory address decoding, memory mapped I/O, time delay subroutines, look-up tables implementation, interfacing matrix keyboard and seven segment display through scanning and interrupt driven programmes, interfacing A/D and D/A converters using handshake signals and waveform generation interfacing with 8255 i/p-o/p, parallel printer. Examples and overview of advanced microcontrollers like 80196</p> <p>Books and References:</p> <ol style="list-style-type: none"> 1. Ray, Bhurchandi ,Advanced Microprocessors and Peripherals, Tata Mc Graw Hill. 2. Mazidi, McKinlay, The 8051 Microcontroller and Embedded Systems, Pearson – Prentice Hall. 3. Barry Brey, The Intel Microprocessors: Mac Graw Hill. 		

CMSM4224	Marks: 100	Computer Graphics and Multimedia
<p>Introduction to computer graphics & graphics systems</p> <p>Scan conversion: Points & lines, Line drawing algorithms; DDA algorithm, Bresenham’s line algorithm, Circle generation algorithm; Ellipse generating algorithm; scan line polygon, fill algorithm, boundary fill algorithm, flood fill algorithm.</p> <p>Transformation & Clipping: Basic transformations; Matrix representations & homogeneous coordinates; Transformation of points, lines, parallel lines, intersecting lines; general parallel projection transformation; clipping: viewport clipping, point clipping, line clipping, clipping circles, polygons & ellipse.</p> <p>Curves: Curve representation, surfaces, Bezier curves, B-spline curves.</p> <p>Surfaces: Depth comparison, Z-buffer algorithm, Back face detection, BSP tree method scan-line algorithm; Hidden line elimination. Color & shading models; Light & color model; interpolative shading model; Texture.</p> <p>Multimedia: Introduction to Multimedia: Concepts, uses of multimedia, hypertext and hypermedia; Image, video and audio standards. Audio: digital audio, MIDI, processing sound, sampling, compression. Video: MPEG compression standards, compression through spatial and temporal redundancy, inter-frame and intraframe compression. Animation: types, techniques, key frame animation, utility, morphing. Virtual Reality concepts.</p> <p>Books and References:</p> <ol style="list-style-type: none"> 1. Hearn and Baker:Computer Graphics, Pearson Education 2. Van dam Foley: Computer Graphics, Addison-Wesley 3. Zhigang Xiang, Roy A Plastok: Schaum’s Outline of Computer Graphics,Tata Mc Graw Hill 		

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CMSM4256	Marks: 100	Laboratory 3: Socket Programming, Microprocessor and Microcontroller Lab
Group A: Socket Programming Lab Group B: Microprocessor and Micro controller Lab		

CMSM4257	Marks: 100	Laboratory 4: Internet Technologies I Lab
JavaScript, PHP, MySQL		

CMSM4321	Marks: 100	Compiler Design
<p>Review: Grammars, Languages – types of grammars and their recognizers, Basic concepts of translators: boot strapping, cross compiler, Different phases of compilation.</p> <p>Lexical analyzer: Concepts, Tokens, Schemas, Design using FSM, LEX.</p> <p>Syntax Analysis: Top down and Bottom up parser; Operator precedence; Recursive descent; LL (1); LR (1); LALR (1); Comparison, YACC.</p> <p>Intermediate code generation: Three Address Code, Representation of three address code – Quadruples, Triples and Indirect Triples.</p> <p>Syntax directed translation: Attributes, Semantic Actions, Translation schemes.</p> <p>Code Optimization: Basic blocks, loop optimization, flow graph, DAG representations of basic blocks.</p> <p>Code generation: Object Programs, Problems in Code Generation.</p> <p>Error handling: detection, reporting, recovery and repair</p> <p>Symbol tables: Organization and management techniques.</p> <p>Runtime storage management: static allocation; dynamic allocation, activation records; heap allocation, recursive procedures</p> <p>Books and References:</p> <ol style="list-style-type: none"> 1. Alfred V. Aho and Jeffrey D. Ullman, Principles of Compiler Design, Narossa Publication 2. Aho, Sethi and Ullman, Compilers – Principles, Techniques and Tools, Narossa Publication 3. Peter Linz ,Formal Language and Automata Theory, Narossa Publication 		

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CMSM4322	Marks: 100	Artificial Intelligence
<p>Introduction: AI applications, AI techniques, AI Problems. Importance of AI</p> <p>State Space search: State Space Graphs, Implicit and explicit graphs, Production Systems, formulating the state-space; Uninformed search: breadth first search, depth first search; Uniform cost algorithm; Informed search: use of heuristics, A* algorithm, Admissibility of A*; Analysis and comparison of search algorithms.</p> <p>Adversarial Search: Two agent games, AND/OR graphs, Minimax procedure, and game trees, Alpha – Beta pruning procedure, learning evaluation functions.</p> <p>Constrained Satisfaction Search: Introduction to Constrained Satisfaction search (CSP), Applications, Algorithms to CSPs, Symbolic constraints and propagation.</p> <p>Expert Systems: Introduction to ES, knowledge based systems, knowledge representation, rule based approach: forward and backward chaining, semantic nets based approach, frame based approach.</p> <p>AI tools and techniques: First order predicate calculus, resolution, unification, natural deduction system, refutation</p> <p>Uncertainty: different types of uncertainty - degree of belief and degree of truth, various probability constructs - prior probability, conditional probability, probability axioms, probability distributions, and joint probability distributions, Bayes' rule, other approaches to modeling uncertainty, Dempster-Shafer theory, fuzzy sets/logic.</p> <p>Advanced Concepts: Introductory concepts of soft computing techniques.</p> <p>Books and References:</p> <ol style="list-style-type: none">1. Elaine Rich and Kevin Knight: Artificial Intelligence, TMH2. Dan W. Patterson: Introduction to Artificial Intelligence and Expert Systems, PHI3. S. Russel and P. Norvig, "Artificial Intelligence, A modern Approach"		

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CMSM4323	Marks: 100	VLSI Design
<p>Introduction to VLSI systems: Overview of VLSI technology, Fabrication and Layout of CMOS(Fabrication Process Flow, CMOS n-Well Process, Layout & Design Rules, CMOS inverter Layout Design),IC production process & Packaging, MOS Transistors, Circuit characterization and performance estimation, Circuit simulation, Combinational and sequential circuit design, Static and dynamic CMOS gates, Memory system design.</p> <p>VLSI automation Algorithms: Partitioning: problem formulation, classification of partitioning algorithms, Group migration algorithms, Kernighan – Lin Heuristics.</p> <p>Floor planning & pin assignment: problem formulation, placement and floor planning, floor planning algorithms for mixed block & cell design, Floor planning based on Simulated Annealing.</p> <p>Global Routing: Global Routing between blocks, classification of global routing algorithms, Maze routing algorithm, line probe algorithm, Steiner Tree based algorithms, ILP based approaches.</p> <p>Detailed routing: Problem formulation, classification of routing algorithms, single layer routing algorithms, two layer channel routing algorithms, three layer channel routing algorithms, and switchbox routing algorithms, constrained & unconstrained via minimization.</p> <p>Digital Design using VHDL.</p> <p>Books and References:</p> <ol style="list-style-type: none"> 1.Neil H. E. Weste and Kamran Eshraghian, Principles of CMOS VLSI Design,2nd edition, Pearson Education Asia, 2000. 2.John P. Uyemura, Introduction to VLSI Circuits and Systems, John Wiley and Sons, Inc., 2002. 3.Samir Palnitkar, Verilog HDL, 2nd Edition,Pearson Education, 2004. 4. Debaprasad Das, VLSI Design, Oxford University Press, 2010 5. Christophn Meinel & Thorsten Theobold, “Algorithm and Data Structures for VLSI Design”, KAP, 2002. 6. Rolf Drechsheler : “Evolutionary Algorithm for VLSI”, Second edition. 		

CMSM4324	Marks: 100	Cryptography and Network Security
<p>Cryptography: Basic objectives of cryptography, private-key and public-key cryptography, mathematics of cryptography - one-way and trapdoor one-way functions, cryptanalysis, attack models, classical cryptography, block ciphers, stream ciphers, Computer Based Symmetric Key Cryptographic Algorithms: Data Encryption Standard (DES), International Data Encryption Algorithm (IDEA). Computer Based Asymmetric Key Cryptographic Algorithms: RSA Algorithm, message digest, Digital Envelope, Digital Signatures, Certificates and standards, key exchange, entity authentication.</p> <p>Network Security: Principles of Security, Certification, public-key infrastructure (PKI), secured socket layer (SSL), Kerberos, Electronic Mail Security, IP and Web Security Protocols, System Security: Firewall, VPN and Intrusion Detection</p> <p>Books and References:</p> <ol style="list-style-type: none"> 1. Cryptography and Network Security - B.A.Forouzan, McGraw-Hill publications 2. Cryptography and Network Security - Atul Kahate, McGraw-Hill publications 3. Cryptography and Network Security - William Stallings, Pearson Education publications 		

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CMSM4356	Marks: 100	Laboratory 5: Internet Technologies II and Artificial Intelligence Lab
Group A: Internet Technologies II (J2EE)		
Group B: Artificial Intelligence Lab: Logic Programming		

CMSM4357	Marks: 50	Term Paper
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CMSM4358	Marks: 50	Project 1
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CMSM4421	Marks: 100	Image Processing and Pattern Recognition
<p>Introduction: Introduction of Image Processing with its applications, Components of Image processing system, Image Formation model. Image digitization process.</p> <p>Image Enhancement: Introduction of Image enhancement, Image enhancement techniques: Contrast intensification by Linear stretching, Non-Linear stretching, Exponential stretching, Noise cleaning or Smoothing by Image averaging, Image sharpening, Basic transformations in the frequency domain</p> <p>Colour Image Processing: Pseudo and False colouring, Image fusion. Colour Models: RGB, CMY, HSI</p> <p>Image Compression: Introduction, Lossy Compression techniques and Loss less image compression techniques, Huffman coding, Run Length Encoding, JPEG, Block Truncation compression.</p> <p>Image Segmentation: Characteristics of segmentation, detection of discontinuities, thresholding, pixel and region based segmentation methods.</p> <p>Pattern Representation and Recognition: Representation, Boundary Descriptors, Regional Descriptors Pattern Recognition and classification: Patterns and Pattern Classes, Recognition based on decision theoretic methods, structural methods</p> <p>Books and References:</p> <ol style="list-style-type: none"> 1. Gonzalez E. Woods, Digital Image Processing, Pearson Education 2. Digital Image Processing and Pattern Recognition, Malay K. Pakhira, PHI 3. Arthur Weeks, Fundamentals of Electronic Image Processing, PHI 		

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CMSM4431	Marks: 100	Mobile Communications (Elective)
<p>Introduction: Advantages and disadvantages, evolution, special considerations for node mobility;</p> <p>Wireless transmission: Frequency band for signal transmission, signal propagation, multiplexing, modulation, spread spectrum, cellular systems;</p> <p>Medium Access Control: Motivation for a specialised MAC, SDMA, TDMA, FDMA, CDMA;</p> <p>Telecommunication systems: GSM architecture and protocol suite in details;</p> <p>Wireless LAN: Infrastructure and ad-hoc network, IEEE 802.11 – PCF, DCF, frame format, services (association, authentication, etc.), Bluetooth – different profiles, introduction to its protocol stacks;</p> <p>Mobile Network Layer: Mobile IP, DHCP, Mobile Ad-hoc networks;</p> <p>Mobile Transport Layer: mobility and effects on transport protocols; TCP performance on wireless links – possible improvement;</p> <p>Management issues in mobile/ wireless environment: Location determination & management, mobility management, power management;</p> <p>Mobile/Wireless applications: WAP, WML, mobile file access;</p> <p>Security: Introduction to special security issues in mobile/wireless environment, notion of WEP;</p> <p>Books and References:</p> <ol style="list-style-type: none"> 1. Jochen Schiller, Mobile Communication, Pearson Education 2. Stallings, Wireless Communication, Pearson Education 		

CMSM4432	Marks: 100	Data Mining and Data Warehousing (Elective)
<p>Basic Concepts: Data Warehouse, Data Warehouse and On-line Transaction Processing System, Advantages and Drawbacks of Data Warehouse, Data Warehouse Architecture -Operational Data Source, Load Manager, Query Manager, Warehouse Manager, Detailed Data, Summarized Data, Archive/Backup Data, Metadata, End-User Access Tools, Data Warehouse Background Processes.</p> <p>Data Warehouse Schema: Star Schema, Snowflake Schema, Fact Constellation Schema.</p> <p>Data Marts: Basic concepts, Advantages and drawbacks of data mart, Components of data mart, Types of data mart.</p> <p>Data Warehouse Design: Different views of designs, processes of design.</p> <p>On-line Analytical Processing: Concepts, OLTP Vs OLAP, Multidimensional Data Model – Data Cube; OLAP Operations - Slicing, Dicing, Drill-Up, Drill-Down, Drill-Within, Drill-Across, Pivot; OLAP Tools – MOLAP, ROLAP, HOLAP.</p> <p>Data Mining: Introduction to Data Mining, Architecture in a Data Mining System, KDD Vs Data Mining, Applications of Data Mining, Data Preprocessing</p> <p>Mining Frequent Patterns and Association: Frequent Itemsets, Closed Itemsets, Association Rules, Market Basket Analysis, The Apriori Algorithm.</p> <p>Classification and Clustering Algorithms: Classification, Prediction, Classification by Decision Tree Induction, Bayesian Classification, Cluster Analysis, Partitioning Methods for Clustering – K-Means, K-Medoids.</p> <p>Books and References:</p> <ol style="list-style-type: none"> 1. “Data Mining: Concepts and techniques”, J Han and M Kamber, Third Edition, Elsevier. 2. “The Top Ten algorithms in Data Mining”, CRC Press. 		

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CMSM4433	Marks: 100	Object Oriented Technology (Elective)
<p>Principles of Object Oriented Programming (OOP): Basic concepts, Programming Paradigms, Benefits of OOP, Applications of OOP.</p> <p>Introduction to Object Oriented Analysis and Design: Best Practices in Software Development, OOSDLC, Requirements modeling, Business modeling, Component based development, Quality criteria for software products, Frameworks - OMT, OOD, OOSE, The Unified approach.</p> <p>Rational Unified Process: Basic Concepts, Process overview, Phases and Iterations – the Time Dimension; Static structure of the process, Core Workflows.</p> <p>Unified Modeling Language: History of UML, Building Blocks of UML, Modeling Concepts - Structural modeling, Behavioral modeling.</p> <p>UML Diagrams: Use Case Diagrams, Class Diagrams, Object Diagrams, Collaboration Diagrams, Sequence Diagrams, State chart Diagrams, Activity Diagrams, Component Diagrams, Deployment Diagrams.</p> <p>Books and References:</p> <ol style="list-style-type: none"> 1. Rumbaugh, Booch, Jacobson ,The Unified Modelling Language Reference Manual, Pearson Education 2. Rumbaugh, Object Oriented Modelling and Design, Pearson Education 3. Grady Booch, Object Oriented Analysis and Design 		

CMSM4456	Marks: 200	Project 2
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CMSM4457	Marks: 100	Seminar
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CMSM4458	Marks: 100	Grand Viva
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