KANNUR UNIVERSITY

Faculty of Engineering

Curriculum, Scheme of Examinations and Syllabi for M-Tech Degree Programme with effect from Academic Year 2012-2013

COMPUTER SCIENCE AND ENGINEERING

M- Tech in

COMPUTER SCIENCE AND ENGINEERING

FIRST SEMESTER

Code	Subject	Hours/Week			Sessional Marks	University Examination		Credit
		L	T	P		Hrs	Marks	
MCS101	Advanced Mathematical Structures	3	-	-	50	3	100	3
MCS102	Computer Algorithms and Complexity	3	-	-	50	3	100	3
MCS103	Computer Networks and Network Management	3	-	-	50	3	100	3
MCS104	Computer Architecture	3	-	-	50	3	100	3
MCS105	Elective I	3	-	-	50	3	100	3
MCS106	Elective II	3	-	-	50	3	100	3
MCS107(P)	Advanced Networking Lab	-	-	2	50	3	100	2
MCS108(P)	Seminar	-	-	2	50	-	-	2
	Total	**18**		**4**	**400**	**21**	**700**	**22**

ELECTIVE I

MCS105 (A) Software Project Management

MCS105 (B) Information Security

MCS105 (C) Software Architecture

MCS105 (D) High Performance Computing

ELECTIVE II

MCS106 (A) Mobile And Pervasive Computing

MCS106 (B) Adhoc And Wireless Sensor Networks

MCS106 (C) Soft Computing

MCS106 (D) Linear Algebra And Applications

SECOND SEMESTER

Code	Subject	Hours/Week			Sessional Marks	University Examination		Credit
		L	T	P		Hrs	Marks	
MCS201	Modern Database Systems	3	-	-	50	3	100	3
MCS202	Advanced Operating Systems	3	-	-	50	3	100	3
MCS203	Advanced Compiler Design	3	-	-	50	3	100	3
MCS204	Elective III	3	-	-	50	3	100	3
MCS205	Elective IV	3	-	-	50	3	100	3
MCS206	Elective V	3	-	-	50	3	100	3
MCS207(P)	Software Systems Lab	-	-	2	50	3	100	2
MCS208(P)	Term paper	-	-	2	50	3	100	2
	Total	**18**		**4**	**400**	**24**	**800**	**22**

ELECTIVE III

MCS204 (A) Research Methodology

MCS204 (B) Database Tuning

MCS204 (C) Information Retrieval

MCS204 (D) Cloud Computing

MCS 204 (E) Principles of Distributed Computing

ELECTIVE IV

MCS205 (A) User Interface Design

MCS 205 (B) Game Theory

MCS205 (C) Machine Learning

MCS205 (D) Embedded System Architecture

MCS 205 (E) Data Mining and Data Warehousing

ELECTIVE V

MCS206 (A) Software Testing & Quality Assurance

MCS206 (B) Computational Linguistics

MCS 206 (C) Advanced Computer Networking

MCS 206 (D) Parallel Programming

MCS 206 (E) Quantum Computing

THIRD SEMESTER

Code	Subject	Hours/Week			Marks					Credit
					Internal		University		Total	
		L	T	P	Guide	Evaluation committee	Thesis	Viva		
MCS301(P)	Thesis preliminary	-	-	22	200	200	-	-	400	8
	Total	**-**	**-**	**22**	**200**	**200**	**-**	**-**	**400**	**8**

THESIS PRELIMINARY

This shall comprise of two seminars and submission of an interim thesis report. This report shall be evaluated by the evaluation committee. The fourth semester Thesis- Final shall be an extension of this work in the same area. The first seminar would highlight the topic, objectives, methodology and expected results. The first seminar shall be conducted in the first half of this semester. The second seminar is presentation of the interim thesis report of the work completed and scope of the work which is to be accomplished in the fourth semester.

FOURTH SEMESTER

Code	Subject	Hours/Week			Marks					Credit
					Internal		University		Total	
		L	T	P	Guide	Evaluation committee	Thesis	Viva		
MCS401(P)	Thesis	-	-	22	200	200	100	100	600	12
	Total	**-**	**-**	**22**	**200**	**200**	**100**	**100**	**400**	**12**

Towards the middle of the semester there shall be a pre submission seminar to assess the quality and quantum of the work by the evaluation committee. This shall consist of a brief presentation of Third semester interim thesis report and the work done during the fourth semester. The comments of the examiners should be incorporated in the work and at least one technical paper is to be prepared for possible publication in journals / conferences. The final evaluation of the thesis shall be an external evaluation.

MCS101- ADVANCED MATHEMATICAL STRUCTURES

3 hours lecture per week

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Revisiting Probability and Random Processes, Stochastic Processes: Renewal Processes- Reward and Cost Models, Poisson Process, Point Process Regenerative Processes, Renewal Theorems

Markov Models: Discrete Time Markov Chain- Transition Probabilities Communication Classes- Irreducible Chains. Continuous Markov Chain- Pure Jump Continuous- Time Chains, Regular Chains, Birth and Death Process. Semi- Markov Processes.

Single Class and Multi class Queuing Networks: Simple Markovian queues- M/G/1 queue – Open Queuing Networks Closed Queuing Networks- Mean Value Analysis- Multi- class traffic Model- Service Time distributions- BCMP Networks- Priority Systems.

Time delays and blocking in queuing Networks- Time delays in single server queue- time delays in networks of queues- Types of Blocking – Two finite queues in a closed network- aggregating Markovian States.

References

1. Ronald W. Wolff, “Stochastic Modelling and Theory of Queues”, Prentice- Hall International Inc 1989.
2. Peter G Harrison and Naresh M Patel, Performance Modeling of Communication Networks and Computer Architectures, Addison – Wesley, 1992
3. Gary N Higginbottom, Performance Evaluation of Communication Networks, Artech House, 1998
4. Anurag Kumar, D. Manjunath and Joy Kuri, Communication Networking: An Analytical Approach, Morgan Kaufman Publ. 2004
5. D. Bertsekas and R. Gallager, “Data Networks”, Prentice- Hall of India 2001
6. Ross K W, Multiservice Loss Models for Broadband Telecommunication Networks, Springer- Verlag, 1995
7. Warland J, An Introduction to Queuing Networks, Prentice- Hall ,1988.

Question Pattern:

There would be 7 questions out of which 5 should be answered. Each question would carry 20 marks each. Each question shall carry a maximum of four sub sections which can have uneven distribution of marks. The questions would touch upon all the sections of the syllabus as far as possible and would preferably be analytic in nature.

MCS102-COMPUTER ALGORITHMS AND COMPLEXITY

3 hours lecture per week

Analysis: RAM model – Notations, Recurrence analysis - Master's theorem and its proof - Advanced Data Structures: B-Trees, Binomial Heaps, Fibonacci Heaps, Disjoint Sets, Union by Rank and Path Compression.

Graph Algorithms and complexity: Matroid Theory, All-Pairs Shortest Paths, Maximum Flow and Bipartite Matching. Algorithmic paradigms: Dynamic Programming, Greedy, Branch-and-bound; Asymptotic complexity, Amortized analysis.

Randomized Algorithms**:** Finger Printing, Pattern Matching, Graph Problems, Algebraic Methods, Probabilistic Primality Testing, De-Randomization. Graph Algorithms: Shortest paths, Flow networks; NP-completeness; Approximation algorithms; Randomized algorithms and advanced data structures.

Complexity classes - NP-Hard and NP-complete Problems - Cook's theorem NP completeness reductions. Approximation algorithms – Polynomial Time and Fully Polynomial time Approximation Schemes – Probabilistic Complexity Classes – Probabilistic Proof Theory and Certificates.

References

1. Dexter Kozen, The Design and Analysis of Algorithms, Springer, 1992.
2. T. H. Cormen, C. E. Leiserson, R. L. Rivest, Introduction to Algorithms, Prentice Hall India, 1990.
3. Sara Baase, Computer Algorithms: Introduction to Design and Analysis, Addison Wesley, 1998.
4. Michael T Goodrich & Roberto Tamassia, Algorithm Design: Foundations, Analysis & Internet Examples, John Wiley, 2002.

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MCS103-COMPUTER NETWORKS AND NETWORK MANAGEMENT

3 hours lecture per week

Computer networks and Internet, the network edge, the network core, network access, delay and loss, protocol layers and services, Application layer protocols, socket programming, content distribution.

Transport layer services, UDP and TCP, congestion control, Network layer services, routing, IP, routing in Internet, router, IPV6, multicast routing, mobility, Multi-access Communications, Introduction to Layered Network Architecture, Inter Networking, Advanced Topics in flow Control, Congestion Control and routing.

Link layer services, error detection and correction, multiple access protocols, ARP, Ethernet, hubs, bridges, switches, wireless links, PPP, ATM, Protocol Performances in LAN and WAN Environment.

Multimedia networking, streaming stored audio and video, real-time protocols, security, Cryptography, authentication, integrity, key distribution, network management. Network Privacy and Security, Analytical, simulation and experimental methods, High Performance Networks.

ICMP the Forerunner – Monitoring and Control – Network Management Systems – Abstract Syntax Notation – CMIP – SNMP Communication Model – SNMP MIB Group – Functional Model – SNMPv2 and SNMPv3 – Remote monitoring – RMON SMI and MIB.

References

1. J. F. Kurose and K . W. Ross, Computer Networking: A Top-Down Approach Featuring Internet, 3/e, Perason Education, 2005.
2. Peterson L.L. & Davie B.S., Computer Networks, A systems approach, 3/E, Harcourt Asia, 2003.
3. P. Venkatram & SunilKumar S. Manari, Communication Protocol Engineering, PHI, 2004.
4. Nalin k. Sharda, Multimedia Information Networking, Pearson Education, 1999
5. Mani Subramaniam, 'Network Management: Principles and Practices', Pearson Education, 2000
6. John D. Sloan , "Network Troubleshooting", Aug'2001 – O'Reilly

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MCS104 - COMPUTER ARCHITECTURE

3 hours lecture per week

Advanced ILP Exploitation Techniques: Hardware and software techniques for ILP extraction - speculative execution - studies on ILP. Overview and history of computing - Architectural Classification schemes - High performance computing - overview and performance quantification criteria.

Multiprocessor Architecture: Symmetric and distributed shared memory architectures – Cache coherence issues - Performance Issues – Synchronization issues – Models of Memory Consistency - Interconnection networks – Buses, crossbar and multi-stage switches.

Multithreaded processors and Multicore processors, methodologies and analysis. Speculative multithreading. Multicore processor design and compilation issues, scheduling. CMPs and Polymorphic processors Concept, Studies and Analysis, Intel Multi-core architecture – SUN CMP architecture

Simulators in Computer Architecture Introduction – methods, ADLs, traces, dynamic compilation. Multicore simulators. Functional and performance Simulators Design of high performance architecture, parallel vs. pipeline architectures. Pipeline processing. Theory of pipeline scheduling and implementation. Hazards in Pipeline processors. Hazard detection and resolution techniques.

Memory Technology and Optimizations – Transactional Memory - Optimizations of Cache Performance - Protection: Virtual Memory and Virtual Machines - Design of Memory Hierarchies - Case Studies.

References

1. John L. Hennessy and David A. Patterson, Computer Architecture: A Quantitative Approach, 3rd Edition, Morgan Kaufmann Publishers, 2002.
2. The WWW Computer Architecture page http://arch-www.cs.wisc.edu/tools/ (23/07/2012)
3. David E. Culler, Jaswinder Pal Singh, “Parallel Computing Architecture : A hardware/ software approach” , Morgan Kaufmann / Elsevier, 1997
4. K. Hwang and F. A. Briggs, Computer Architecture and Parallel Processing, McGrawHill, 1984.
5. ACM SIGARCH Computer Architecture News.

Question Pattern:

There would be 7 questions out of which 5 should be answered. Each question would carry 20 marks each. Each question shall carry a maximum of four sub sections which can have uneven distribution of marks. The questions would touch upon all the sections of the syllabus as far as possible and would preferably be analytic in nature.

MCS105 (A)-SOFTWARE PROJECT MANAGEMENT

3 hours lecture per week

Software Process : Software Process Maturity ,Software Maturity Framework, Principles Of Software Process Change, Software Process Assessment, The Initial Process, The Repeatable Process, The Defined Process, The Managed Process, The Optimizing Process.

Lifecycle Phases – Artifacts Of The Process – Model Based Software Architectures – Workflows Of The Process – Checkpoints Of The Process

Iterative Process Planning - Organisation And Responsibilities – Process Automation – Process Control And Process Instrumentation – Tailoring The Process

Data Gathering And Analysis : Principles Of Data Gathering, Data Gathering Process , Software Measures , Data Analysis - Managing Software Quality –Defect Prevention C**ase Studies: C**ocomo Cost Estimation Model – Change Metrics – Ccpds-R

References

1. Walker Royce “Software Project Management – A Unified Framework “, Pearson Education, 2004
2. Humphrey, Watts: " Managing The Software Process ", Addison Wesley, 1989
3. Ramesh Gopalaswamy, “Managing Global Projects”, Tata Mcgraw Hill, 2001.
4. Bob Hughes, Mikecotterell, “Software Project Management”, 3rd Edition, Tata Mcgraw

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MCS105 (B)-INFORMATION SECURITY

3 hours lecture per week

Information Security: Issues and Solutions – Attacks –Steganography - Classical Encryption Techniques – DES – Differential and Linear Cryptanalysis – Modes of operation – Encryption Algorithms -Triple DES – Blowfish – CAST128

Public Key Encryption: Uniqueness – Number Theory concepts – Primality – Modular Arithmetic – Fermat & Euler Theorem –Euclid Algorithm – RSA Algorithm – Elliptic Curve Cryptography – Diffie Hellman Key Exchange

Authentication and Security Practice: Digests – Requirements – MAC – Hash function – Security of Hash and MAC – Birthday Attack – MD5– SHA – RIPEMD – Digital Signature Standard - Authentication applications – Kerberos – Kerberos-Encryption Techniques – PGP– IP Security Architecture– Web security – SSL – TLS – SET

System and Network Security: Intruders and Intrusion – Viruses and Worms – OS Security – Firewalls – Design Principles – Packet Filtering – Application gateways – Trusted systems – Counter Measures,–IP and IPV6, Authentication header, Encapsulating security payload - Electronic Mail Security - IP Security - Web Security Web Security consideration, secure socket layer, transport layer security, secure electronic transaction, secured VPN

References

1. Stallings, Cryptography & Network Security - Principles & Practice, Prentice Hall, 3rd Edition 2002.
2. Bruce, Schneier, Applied Cryptography, 2nd Edition, Toha Wiley & Sons, 1996.
3. Man Young Rhee, “Internet Security”, Wiley, 2003.
4. Pfleeger & Pfleeger, “Security in Computing”, Pearson Education, 3rd Edition, 2003.

Question Pattern:

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MCS105(C)-SOFTWARE ARCHITECTURE

3 hours lecture per week

Introduction: Definition Of Software Architecture, Software Design Levels Engineering Discipline For Software, The Current State Of Software Engineering And Architecture **Software** Architecture And Development Process **:**Iterative Development, Requirement Management, Effective Technical Meetings, Pitfalls, Software Activities, Case Tools, Software Architecture Approaches

Architecture Styles: Use Of Patterns And Styles In Software Design, Common Architectural Styles (Pipes And Filters, Data Abstraction And Object Orientation, Event Based Implicit Invocation, Layered Systems, Repositories, Interpreters) With An Example Case Study

Architectural Design: Guidelines For Architectural Design, Design Space And Rules, Applying Design Space With An Example, Study Of Quantified Design Space.Architectural Description Languages: Requirements Of An Architectural Description Language, First-Class Connectors, Adding Implicit Invocation To Traditional Programming Languages

Architectural Design Tools: Unicon – A Universal Connecting Language, Exploiting Styles In Architectural Design, Architectural Interconnection

References

1. Jeff Garland And Richard Antony, “Large Scale Software Architecture – A Practical Guide Using Uml”, Wileydreamtech India Pvt. Ltd., 2003.
2. Mary Shaw David Garlan, "Software Architectural Perspectives On An Emerging Discipline", Eee, Phi. 1996. Wolfgang Pree, "Design Patterns For Object Oriented Software Development", Addison Wesley, 1995.

Question Pattern:

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MCS105 (D) – HIGH PERFORMANCE COMPUTING

3 hours lecture per week

Introduction to Computer Systems: Processors, Memory, I/O Devices; Cost, timing, and scale (size) models.

Program Execution: Process, Virtual Memory, System Calls, Dynamic Memory Allocation. Machine-Level View of a Program, typical RISC instruction set and execution, Pipelining. Performance issues and Techniques, Cost and Frequency Models for I/O, paging, and caching. Temporal and spatial locality. Typical Compiler Optimizations. Identifying program bottlenecks – profiling, tracing. Simple high-level language optimizations – locality enhancement, memory disambiguation.

Appropriate Computing Platform selection: benchmarking, cost-performance issues, etc.

Parallel Computing: Introduction to parallel Architectures and Interconnection Networks, communication latencies. Program parallelization: task partitioning and mapping, data distribution, Message passing, synchronization and deadlocks.

Distributed memory programming using MPI/PVM. Shared memory parallel programming. Multithreading.

References

1. Dowd, K., High performance Computing, O'Reilly Series, 1993.
2. Culler, D., and Singh, J.P., Parallel Computer Architecture: A Hardware/Software Approach. Morgan Kaufmann Pub., 1999.
3. Gropp, W., Lusk, E., and Skjellum, A., Using MPI: Portable Parallel Programming with the Message-passing Interface, MIT Press, 1997.

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MCS106 (A)-MOBILE AND PERVASIVE COMPUTING

3 hours lecture per week

Wireless networks- emerging technologies- Blue tooth, WiFi, WiMAX, 3G ,WATM.-Mobile IP protocols -WAP push architecture-Wml scripts and applications.

Mobile computing environment—functions-architecture-design considerations ,content architecture - CC/PP exchange protocol ,context manager. Data management in WAE-Coda file system- caching schemes- Mobility QOS, Security in mobile computing.

Handoff in wireless mobile networks-reference model-handoff schemes. Location management in cellular networks - Mobility models- location and tracking management schemes- time, movement ,profile and distance based update strategies. ALI technologies

Pervasive Computing- Principles, Characteristics- interaction transparency, context aware, automated experience capture. Architecture for pervasive computing- Pervasive devices- embedded controls.- smart sensors and actuators -Context communication and access services

Open protocols- Service discovery technologies- SDP, Jini, SLP, UpnP protocols–data synchronization- SyncML framework - Context aware mobile services -Context aware sensor networks, addressing and communications. Context aware security.

References

1. Ivan Stojmenovic , Handbook of Wireless Networks and Mobile Computing, John Wiley & sons Inc, Canada, 2002.
2. Asoke K Taukder,Roopa R Yavagal,Mobile Computing, Tata McGraw Hill Pub Co. , New Delhi, 2005.
3. Seng Loke, Context-Aware Computing Pervasive Systems, Auerbach Pub., New York, 2007.
4. Uwe Hansmann etl , Pervasive Computing, Springer, New York,2001

Question Pattern

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MCS106 (B) - ADHOC AND WIRELESS SENSOR NETWORKS

3 hours lecture per week

Ad-Hoc Wireless Network – Issues in Ad-Hoc Wireless Networks. MAC Protocols – Issues, Classifications of MAC protocols, Multi-channel MAC & Power control MAC protocol.

Ad-Hoc Network Routing: Issues – Classifications of routing protocols – Hierarchical and Power aware. Multicast routing – Classifications, Tree based, Mesh based. Ad-Hoc Transport Layer Issues. TCP Over Ad Hoc – Feedback based, TCP with explicit link, TCP-BuS, Ad Hoc TCP, and Split TCP.

Wireless Sensor Network : Sensor Network Architecture, Data dissemination, Gathering. MAC Protocols – self-organizing, Hybrid TDMA/FDMA and CSMA based MAC. Issues in WSN routing – OLSR, AODV. Localization – Indoor and Sensor Network Localization. QoS in WSN.

Mesh Networks : Necessity - MAC enhancements – IEEE 802.11s Architecture – Opportunistic routing – Self configuration and Auto configuration – Capacity Models – Fairness – Heterogeneous Mesh Networks – Vehicular Mesh Networks.

References

1. C. Siva Ram Murthy and B.S. Manoj, *Ad Hoc Wireless Networks: Architectures and Protocols*, Prentice-Hall Pearson, 2004
2. Wireless Sensor Networks: An Information Processing Approach, Feng Zhao, Leonidas Guibas, Elsevier Science, ISBN – 978-1-55860-914-3 (Morgan Kauffman)
3. Carlos Corderio Dharma P.Aggarwal , *Ad Hoc and Sensor Networks – Theory and Applications*, World Scientific Publications, March 2006, ISBN – 981-256-681-3
4. Garg, *Wireless Communications and Networks*, Morgan Kaufmann 2007, ISBN 978-0-12-373580-5.

Question Pattern:

There should be 7 questions out of which 5 should be answered. Each question would carry 20 marks each. Each question shall carry a maximum of four sub sections which can have uneven distribution of marks. The questions would touch upon all the sections of the syllabus as far as possible and would preferably be analytic in nature.

MCS106 (C) - SOFT COMPUTING

3 hours lecture per week

Evolution of Computing - Soft Computing Constituents – From Conventional AI to Computational Intelligence - Machine Learning Basics

Introduction to Genetic Algorithms (GA) – Applications of GA in Machine Learning - Machine Learning Approach to Knowledge Acquisition.

Machine Learning Using Neural Network, Adaptive Networks – Feed forward Networks – Supervised Learning Neural Networks – Radial Basis Function Networks - Reinforcement Learning – Unsupervised Learning Neural Networks – Adaptive Resonance architectures – Advances in Neural networks.

Fuzzy Sets – Operations on Fuzzy Sets – Fuzzy Relations – Membership Functions- Fuzzy Rules and Fuzzy Reasoning – Fuzzy Inference Systems – Fuzzy Expert Systems – Fuzzy Decision Making.

Adaptive Neuro-Fuzzy Inference Systems – Coactive Neuro-Fuzzy Modeling – Classification and Regression Trees – Data Clustering Algorithms – Rulebase Structure Identification – Neuro-Fuzzy Control – Case studies.

References

1. Jyh-Shing Roger Jang, Chuen-Tsai Sun, Eiji Mizutani, “Neuro-Fuzzy and Soft Computing”, Prentice-Hall of India, 2003.
2. George J. Klir and Bo Yuan, “Fuzzy Sets and Fuzzy Logic-Theory and Applications”, Prentice Hall, 1995.
3. James A. Freeman and David M. Skapura, “Neural Networks Algorithms, Applications, and Programming Techniques”, Pearson Edn., 2003.
4. Mitchell Melanie, “An Introduction to Genetic Algorithm”, Prentice Hall, 1998.
5. David E. Goldberg, “Genetic Algorithms in Search, Optimization and Machine Learning", Addison Wesley, 1997.

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MCS106 (D) – LINEAR ALGEBRA AND APPLICATIONS

3 hours lecture per week

Algebraic Structures – Vector Spaces – Subspaces – Linear Equations – Gauss Elimination – Generating Systems – Linear Independence – Bases – Dimension of Vector Spaces – Homomorphism of Groups - Linear Maps – Space of Linear Maps – Linear Maps and Bases

The Rank Theorem – Direct Sums and Projections – Dual Spaces – Quotient Spaces – Operations of Groups

Matrices – Rank of Matrices – Elementary Matrices – Permutations – Multi Linear Maps – Determinant Functions – Computation Rules for Determinants – Determinants of Linear Maps – Orientations – Determinants and Volumes – Polynomials in One Variable and Several Variables – Eigen Values – Characteristic Polynomials – Minimal Polynomials

Diagonalisable and Trigonalisable Operators - Decompositions Theorems – Jordan Normal Form

References

1. Peter D. Lax, “Linear Algebra and its Application”, Second Edition, Wiley.
2. Greub, W. : Linear Algebra, Springer-Verlag, Graduate Texts in Mathematics 97, (4-th
3. edition) 1981
4. http://joshua.smcvt.edu/linearalgebra/book.pdf - free ebook.
5. Halmos, P. R. : Finite-Dimensional Vector Spaces, Springer-Verlag, 1993
6. Hoffman, K. and Kunze, R. : Linear Algebra, Prentice-Hall, 1972.
7. Gilbert Strang, “Linear Algebra and Its Applications.”, 4th Edition, Brooks Cole, 2005
8. Herstein, I.N. : Topics in Algebra, Wiley Eastern, 1987
9. Current Literature

Question Pattern:

There should be 7 questions out of which 5 should be answered. Each question would carry 20 marks each. Each question shall carry a maximum of four sub sections which can have uneven distribution of marks. The questions would touch upon all the sections of the syllabus as far as possible and would preferably be analytic in nature.

MCS107 (P)-ADVANCED NETWORKING LAB

3 hours practical per week

List of Experiments (*but not limited to*)

1. Implementation of Remote command Execution
2. Implementation of ARP
3. Implementation of RARP
4. Implementation of Shortest Path Routing Algorithm
5. Implementation of Sliding Window Protocol
6. Basic Network Simulation using simulator. (Eg. NS2)
7. Simulating Local Area Network
8. Measuring Network Performance
9. Simulate Wireless Networks (Eg. WiFi, WiMAX, Adhoc, WSN)

Sessional work assessment

Regularity – 5 marks

Class work, Lab Record, Mini project Report, viva– 30 marks

Test – 15 marks

Total: Internal continuous assessment: 50 marks

University evaluation

Examination will be for 100 marks of which 70 marks are allotted for writing the procedure/formulae/sample calculation details, preparing the circuit diagram/algorithm/flow chart, conduct of experiment, tabulation, plotting of required graphs, results, inference etc., as per the requirement of the lab experiments, 20 marks for the viva-voce and 10 marks for the lab record.

Note: Duly certified lab record must be submitted at the time of examination

MCS108 (P) – SEMINAR

2 hours practical per week

The student is expected to present a seminar in one of the current topics in the field of specialization and related areas. The student shall prepare a Paper and present a Seminar on any current topic related to the branch of specialization under the guidance of a staff member. The student will undertake a detailed study based on current published papers, journals, books on the chosen subject and submit seminar report at the end of the semester. The student shall submit typed copy of the paper to the Department. Grades will be awarded on the basis of contents of the paper and the presentation. A common format in (.pdf format) shall be given for reports of Seminar and Project. All reports of Seminar and Project submitted by students shall be in this given format.

Sessional work assessment

Presentation : 25

Report : 25

Total marks : 50

MCS201- MODERN DATABASE SYSTEMS

Prerequisite(s) : A basic Course in Database Management Systems

3 hours lecture per week

Revisiting Relational Database Systems , Database System Architectures: Centralized and Client-Server Architectures – Server System Architectures – Parallel Systems- Distributed Systems – Parallel Databases: I/O Parallelism – Inter and Intra Query Parallelism – Inter and Intra operation Parallelism – Distributed Database Concepts - Distributed Data Storage – Distributed Transactions – Commit Protocols – Concurrency Control – Distributed Query Processing – Three Tier Client Server Architecture- Case Studies

Concepts for Object Databases: Object Identity – Object structure – Type Constructors – Encapsulation of Operations – Methods – Persistence – Type and Class Hierarchies – Inheritance – Complex Objects – Object Database Standards, Languages and Design: ODMG Model – ODL – OQL – Object Relational and Extended – Relational Systems : Object Relational featuresinSQL/Oracle – Case Studies

Multidimensional Data Structures – Image Databases – Text/Document Databases- Video Databases – Audio Databases – Multimedia Database Design

Mobile Databases: Location and Handoff Management - Effect of Mobility on Data Management - Location Dependent Data Distribution - Mobile Transaction Models - Concurrency Control - Transaction Commit Protocols- Mobile Database Recovery Schemes

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References

1. Elmasri, Navathe. Fundamentals of Database Systems, Third Edition, Pearson Education, 2000.
2. Thomas Cannolly and Carolyn Begg, " Database Systems, A Practical Approach to Design, Implementation and Management", Third Edition, Pearson Education, 2007.
3. Henry F Korth, Abraham Silberschatz, S. Sudharshan, "Database System Concepts", Fifth Edition, McGraw Hill, 2006.
4. C.J.Date, A.Kannan and S.Swamynathan,"An Introduction to Database Systems", Eighth Edition, Pearson Education, 2006
5. . V.S.Subramanian, "Principles of Multimedia Database Systems", Harcourt India Pvt Ltd., 2001.
6. Vijay Kumar, " Mobile Database Systems", John Wiley & Sons, 2006

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MCS202 - ADVANCED OPERATING SYSTEMS

3 hours lecture per week

Uniprocessing operating system: Review of Operating system concepts. Process Concept – Threads process Scheduling – process synchronization – Interprocess Communication - semaphores – Messages – Monitors – critical Regions – conditional critical regions – dead Locks. Real and virtual Memory management Schemes.

Multiprocessor Operating System: Multiprocessor UNIX design goals - Master slave and multithreaded UNIX - Multicomputer UNIX extensions.

Distributed Operating System: Introduction - Design Issues. Communication in distributed systems Layered protocols – ATM - client server model - remote Procedure call – Group communication.

Synchronization distributed systems: Clock Synchronization – Mutual Exclusion – Election algorithms – Atomic transactions - Deadlocks in distributed systems. Processes and processors in distributed systems: Threads – system models - Processor allocation - Scheduling in distributed Systems.

Distributed file system – Design and implementation – Trends in distributed file systems. Case study AMOEBA, MACH, Recent trends and developments

References

1. A.S.Tanenbaum, “Modern Operating Systems”, PHI Edition, 1992
2. A.S.Tanenbaum, “Distributed Operating systems”, PHI.
3. M. Singhal and N.G.Sivarathri, “Advanced Concepts in Operating Systems”, M.C.Grawhill Inc. 1994.System Concepts, Wiley, 2000.
4. J.L.Peterson and A. Silberchatz, “Operating System Concepts”
5. M.Maekawa, A.E.Oldehoeft And R.R. Oldehoeft, “Operating systems.”
6. M.Milenkovic, “Operating Systems : Concepts and Design” , McGrawhill Inc Newyork, 1992
7. K.Khawng, “Advanced Computer Archiecture : Parallelism , Scalability, Programmmability”, M.C.Grawhill Inc, 1993
8. C.Crowley, “Operating Systems – A design Oriented Approach”, Irwin 1997.

Question Pattern:

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MCS203- ADVANCED COMPILER DESIGN

3 hours lecture per week

Review of compiler phases –Symbol Table Structure – Intermediate Representations. Control Flow Analysis: Basic Blocks and CFG, Dominators and Loops.

Data Flow Analysis: control-flow and data-flow analysis, Reaching Definitions, Available Expressions, and Live Variable Analysis. Optimizations: classical optimization, Redundancy Elimination – Loop Optimizations –Value Numbering.

Static Single Assignment Form (SSA): SSA Construction – Optimizations on SSA Form. Register Allocation –Graph Colouring Algorithm.

Machine Code Generation: Instruction Selection - Maximal munch and Dynamic programming Algorithm. Code Generation – Target Machine – Code Generation for Run- time Stage Management. Code Generation Algorithms. memory hierarchy management, optimization for instruction-level parallelism, modulo scheduling, predicated and speculative execution.

References

1. Aho A.V., Lam M.S., Sethi R., and Ullman J.D., Compilers: Principles, Techniques, and Tools. Pearson Education, 2007.
2. Steven Muchnick., Advanced Compiler Implementation. Morgan Kauffman Publishers, 1997.
3. Steven S.Muchnicc, Advanced Compiler Design & Implementation, Morgan Kaufmann, 2004.
4. Robert. Morgan, Building an Optimizing Compiler, Butterworth-Heinemann, 1998.

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MCS204 (A) - RESEARCH METHODOLOGY

(*Common to MTE 204(A)*)

3 hours lecture per week

Introduction – Meaning of research – Objectives of research – Motivation in research –Types of research – Research approaches – Significance of research – Research methods vs Methodology – Criteria of good research.

Defining Research Problem – What is a research problem – Selecting the problem – Necessity of defining the problem – Literature review – Importance of literature review in defining a problem – Critical literature review – Identifying gap areas from literature review

Research design – Meaning of research design – Need– Features of good design – Important concepts relating to research design – Different types – Developing a research plan

Method of data collection – Collection of data- observation method – Interview method– Questionnaire method – Processing and analysis of data – Processing options – Types of analysis – Interpretation of results

Report writing – Types of report – Research Report, Research proposal ,Technical paper – Significance – Different steps in the preparation – Layout, structure and Language of typical reports – Simple exercises – Oral presentation – Planning – Preparation –Practice – Making presentation – Answering questions - Use of visual aids – Quality & Proper usage – Importance of effective communication – Illustration

References

1. Coley S M and Scheinberg C A, 1990, *"Proposal Writing"*, Newbury Sage Publications.
2. Leedy P D, *"Practical Research : Planning and Design"*, 4th Edition, N W MacMillan Publishing Co.
3. Day R A, *"How to Write and Publish a Scientific Paper"*, Cambridge UniversityPress,1989.
4. CR Kothari, “Research Methodologies – Methods and Techniques”, Second Edition, New Age International
5. John W Best and James V Kahn, “ Research in Education”, Fifth Edition, PHI, New Delhi

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MCS204 (B)-DATABASE TUNING

3 hours lecture per week

Fundamentals Of Tuning**:** Review of Relational Databases – Relational Algebra – Locking and Concurrency Control – Correctness Consideration – Lock Tuning – Logging and the Recovery Subsystem – Principles of Recovery – Tuning the Recovery Subsystem – Operating Systems Considerations – Hardware Tuning.

Index Tuning **:** Types of Queries – Data Structures – B tree – B+ Tree – Hash Structures – Bit Map Indexes – Clustering Indexes – Non Clustering Indexes – Composite Indexes – Hot Tables – Comparison of Indexing and Hashing Techniques.

Query Optimization **:** Techniques **–** Tuning Relational Systems – Normalization – Tuning Denormalization – Clustering Two Tables – Aggregate Maintenance – Record Layout – Query Tuning – Triggers – Client Server Mechanisms – Objects, Application Tools and Performance – Tuning the Application Interface – Bulk Loading Data – Accessing Multiple Databases.

Troubleshooting: Query Plan Explainers – Performance Monitors – Event Monitors – Finding "Suspicious" Queries – Analyzing a Query's Access Plan – Profiling a Query Execution – DBMS Subsystems. Transaction Chopping – Time Series Databases – Understanding Access Plans – Configuration Parameters: Oracle; SQL Server; DB2UDB – Distributed Database – Implementation.

References

1. Dennis Shasha and Philippe Bonnet "Database Tuning, Principles, Experiments, and Troubleshooting Techniques", Morgan Kaufmann, An Imprint of Elsevier, 2003
2. M.Tamer Ozsu, Patrick Valduriez and S.Sridhar "Principles of Distributed Database Systems", Pearson Education, 2007.
3. Thomas Connoly and Carlolyn Begg, "Database Systems, A Practical Approach to Design, Implementation and Management", Third Edition, Pearson Education, 2003.

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MCS204 (C) - INFORMATION RETRIEVAL

3 hours lecture per week

Introduction: Goals and history of IR. The impact of the web on IR. The role of artificial intelligence (AI) in IR. **Basic IR Models*:*** Boolean and vector-space retrieval models; ranked retrieval; text-similarity metrics; TF-IDF (term frequency/inverse document frequency) weighting; cosine similarity.

Basic Tokenizing Indexing, and Implementation of Vector-Space Retrieval*:* Simple tokenizing, stop-word removal, and stemming; inverted indices; efficient processing with sparse vectors; Java implementation. **Experimental Evaluation of IR*:*** Performance metrics: recall, precision, and F-measure; Evaluations on benchmark text collections.

Query Operations and Languages*:* Relevance feedback; Query expansion; Query languages. **Text Representation*:*** Word statistics; Zipf's law; Porter stemmer; morphology; index term selection; using thesauri. Metadata and markup languages (SGML, HTML, XML). **WebSearch*:***Search engines; spidering; metacrawlers; directed spidering; link analysis (e.g. hubs and authorities, Google PageRank); shopping agents.

Text Categorization and Clustering*:* Categorization algorithms: naive Bayes; decision trees; and nearest neighbour. Clustering algorithms: agglomerative clustering; k-means; expectation maximization (EM). Applications to information filtering; organization; and relevance feedback. **Recommender Systems*:*** Collaborative filtering and content-based recommendation of documents and products. Information Extraction and Integration***:*** Extracting data from text; XML; semantic web; collecting and integrating specialized information on the web.

References

1. Introduction to Information Retrieval by C. Manning, P. Raghavan, and H. Schütze. Cambridge University Press, 2008
2. Introduction to Information Retrieval by Manning, Raghavan, and Schutze.
3. Information Retrieval: Algorithms and Heuristics. D.A. Grossman, O. Frieder. Springer, 2004. Excellent textbook.
4. Building Search Applications: Lucene, Lingpipe, and Gate. M. Konchady. Mustru Publishing, 2008

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Kannur University

MCS204 (D)-CLOUD COMPUTING

3 hours lecture per week

Introduction to Cloud Computing- The Evolution of Cloud Computing – Hardware Evolution – Internet Software Evolution – Server Virtualization - Web Services Deliver from the Cloud – Communication-as-a-Service – Infrastructure-as-a-Service – Monitoring-as-a-Service – Platform-as-a-Service – Software-as-a-Service – Building Cloud Network

Federation in the Cloud - Presence in the Cloud - Privacy and its Relation to Cloud-Based Information Systems – Security in the Cloud - Common Standards in the Cloud – End-User Access to the Cloud Computing

Introduction - Advancing towards a Utility Model – Evolving IT infrastructure – Evolving Software Applications – Continuum of Utilities- Standards and Working Groups - Standards Bodies and Working Groups – Service Oriented Architecture – Business Process Execution Language – Interoperability Standards for Data Center Management - Utility Computing Technology – Virtualization – Hyper Threading – Blade Servers - Automated Provisioning - Policy Based Automation – Application Management – Evaluating Utility Management Technology - Virtual Test and development Environment - Data Center Challenges and Solutions - Automating the Data Center

Software Utility Application Architecture - Characteristics of a SaaS - Software Utility Applications - Cost Versus Value - Software Application Services Framework - Common Enablers – Conceptual view to Reality – Business Profits - Implementing Database Systems for Multitenant Architecture

Other Design Considerations - Design of a Web Services Metering Interface - Application Monitoring Implementation - A Design for an Update and Notification Policy - Transforming to Software as a Service - Application Transformation Program - Business Model Scenarios - Virtual Services for Organizations - The Future..

References

1. John W. Rittinghouse and james F. Ransome, “Cloud Computing Implementation, Management and Security”, 2010, CRC Press, Taylor & Francis Group. London New York
2. Alfredo Mendoza, “Utility Computing Technologies, Standards, and Strategies”, Artech House INC, 2007
3. Bunker and Darren Thomson, “Delivering Utility Computing”, 2006, John Wiley & Sons Ltd.
4. George Reese, “Cloud Application Architectures”, O’reilly Publications, 2009.

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MCS204 (E) -PRINCIPLES OF DISTRIBUTED SYSTEMS

3 hours lecture per week

Introduction to Open Distributed Computing : Motivation, Characteristics, Design goals of distributed systems, distribution data and control, clock synchronization, distributed termination problem, load distribution, deadlocks in distributed systems, fault tolerant computing , high level language supports for distributed computing, tools for developing distributed applications, issues in the design of distributed information systems, case study of some distributed systems – Amoeba, Mach..

Communication paradigm : Message passing based communication primitives, atomic actions, basic issues in remote procedure call mechanism, parameter marshalling, stub generation, semantics in presence of failures, orphan handling etc., distributed object based programming paradigms, group communication.

Distributed Shared Memory: Types of shared memory multiprocessors, Consistency models, Page based distributed shared memory,Shared variable distributed shared memory, Object based distributed shared memory

Distributed file system :Issues such as naming, protection, semantics of file- sharing, cache coherence, etc. **Case studies** of SUN – NFS. **Client/server computing :**Client/server building blocks- client/server infrastructure, choice of client OS or server OS.

References

1. Distributed Systems – Coulouris [Pearson Education]

2. Distributed Operating Systems- Tannenbaum [Pearson Education]

3. Distributed Systems : Principles and Paradigms – Tannenbaum [Pearson Education]

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MCS205 (A)-USER INTERFACE DESIGN

3 hours lecture per week

Introduction: Human–Computer Interface – Characteristics Of Graphics Interface –Direct Manipulation Graphical System – Web User Interface – Popularity – Characteristic & Principles.

Human Computer Interaction User Interface Design Process – Obstacles – Usability – Human Characteristics In Design – Human Interaction Speed – Business Functions –Requirement Analysis – Direct – Indirect Methods – Basic Business Functions – Design Standards – System Timings – Human Consideration In Screen Design – Structures Of Menus – Functions Of Menus – Contents Of Menu – Formatting – Phrasing The Menu – Selecting Menu Choice – Navigating Menus – Graphical Menus.

Windows :Characteristics – Components – Presentation Styles – Types – Managements – Organizations – Operations – Web Systems – Device – Based Controls Characteristics – Screen – Based Controls – Operate Control – Text Boxes – Selection Control – Combination Control – Custom Control – Presentation Control.

Multimedia: Text For Web Pages – Effective Feedback – Guidance and Assistance – Internationalization – Accessibility – Icons – Image – Multimedia – Coloring. WINDOWS Layout– Test: Prototypes – Kinds Of Tests – Retest – Information Search – Visualization – Hypermedia – WWW– Software Tools.

References

1 Wilbent. O. Galitz ,“The Essential Guide To User Interface Design”, John Wiley& Sons, 2001.

2 Ben Sheiderman, “Design The User Interface”, Pearson Education, 1998.

3 Alan Cooper, “The Essential Of User Interface Design”, Wiley – Dream Tech Ltd., 2002.

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MCS205 (B)-GAME THEORY

3 hours lecture per week

Introduction to Non Co-operative Game Theory: Extensive Form Games, Strategic Form Games, Pure Strategy Nash Equilibrium

Nonco-operative Game Theory (in detail), Mixed Strategies, Existence of Nash Equilibrium, Computation of Nash Equilibrium, Two Player Zero-Sum Games, Bayesian Games

Mechanism Design : An Introduction, Dominant Strategy Implementation of Mechanisms, Vickrey-Clorke-Groves Mechanisms, Bayesian Implementation of Mechanisms, Revenue Equivalence Theorem, Design of Optimal Mechanisms

Cooperative Game Theory, Correlated Strategies, Correlated Equilibria, The Two Person Bargaining Problem, Games in Coalitional Form, The Core Shapley Value, Other Solution Concepts for Co-operative Games

References

1. Roger B. Myerson. Game Theory: Analysis of Conflict. Harvard University Press, September 1997.
2. Andreu Mas-Colell, Michael D. Whinston, and Jerry R. Green. Microeconomic Theory. Oxford University Press, New York, 1995.
3. Martin J. Osborne, Ariel Rubinstein. A Course in Game Theory. The MIT Press, August 1994.
4. Philip D. Straffin, Jr. Game Theory and Strategy. The Mathematical Association of America, January 1993.
5. Ken Binmore, Fun and Games : A Text On Game Theory, D. C. Heath & Company, 1992.
6. Paul Klemperer, Auctions: Theory and Practice, The Toulouse Lectures in Economics, Princeton University Press, 2004

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MCS205 (C)-MACHINE LEARNING

3 hours lecture per week

Learning Problems – Perspectives and Issues – Concept Learning – Version Spaces and Candidate Eliminations – Inductive bias – Decision Tree learning – Representation – Algorithm – Heuristic Space Search.

Neural Network Representation – Problems – Perceptrons – Multilayer Networks and Back Propagation Algorithms – Advanced Topics – Genetic Algorithms – Hypothesis Space Search – Genetic Programming – Models of Evalution and Learning.

Bayesian Learning: Bayes Theorem – Concept Learning – Maximum Likelihood – Minimum Description Length Principle – Bayes Optimal Classifier – Gibbs Algorithm – Naïve Bayes Classifier – Bayesian Belief Network – EM Algorithm – Probability Learning – Sample

K- Nearest Neighbour Learning – Locally weighted Regression – Radial Bases Functions – Case Based Learning.

Learning Sets of Rules – Sequential Covering Algorithm – Learning Rule Set – First Order Rules – Sets of First Order Rules – Induction on Inverted Deduction – Inverting Resolution – Analytical Learning – Perfect Domain Theories – Explanation Base Learning – FOCL Algorithm – Reinforcement Learning – Task – Q-Learning – Temporal Difference Learning

References

1. Tom M. Mitchell, “Machine Learning”, McGraw-Hill Science /Engineering /Math; 1 edition, 1997
2. Ethem Alpaydin, “Introduction to Machine Learning (Adaptive Computation and Machine Learning)”, The MIT Press 2004
3. T. Hastie, R. Tibshirani, J. H. Friedman, “The Elements of Statistical Learning”, Springer; 1 edition, 2001

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MCS205 (D)-EMBEDDED SYSTEM ARCHITECTURE

3 hours lecture per week

Introduction to Embedded Systems**:** Definition and Classification – Overview of Processors and Hardware Units in an Embedded System – Software Embedded into the System – Exemplary Embedded Systems – Embedded Systems on a Chip (SoC) and use of VLSI Designed Circuits.

Devices And Buses For Devices Network**:** I/O Devices – Device I/O Types and Examples – Synchronous – ISO–synchronous and Asynchronous Communications from Serial Devices – Examples of Internal Serial–Communication Devices – UART and HDLC – Parallel Port Devices – Sophisticated interfacing features in Devices/Ports – Timer and Counting Devices – '12C'– 'USB'– 'CAN' and Advanced I/O SerialHigh Speed Buses – ISA – PCI – PCI – X – CPCI and Advanced buses.

Embedded Programming**:** Programming in Assembly Language (ALP) vs. High Level Language – C Program Elements – Macros and Functions – Use of Pointers – NULL Pointers – Use of Function Calls – Multiple Function Calls in a Cyclic Order in the Main Function Pointers – Function Queues and Interrupt Service Routines Queues Pointers – Concepts of EMBEDDED PROGRAMMING in C++ – OOP – Embedded Programming in C++ – 'C' Program compilers – Cross compiler – Optimization of Memory Codes.

Real Time Operating Systems**:** OS Services – Interrupt Routines Handling – Task Scheduling Models – Handling of Task Scheduling and Latency and Deadlines as Performance Metrics – Inter Process Communication and Synchronization – Shared Data Problem – Use of Semaphore(s) – Priority Inversion Problem and Deadlock Situations – IPC using Signals – Semaphore Flag or Mutex as Resource key – Message Queues – Mailboxes – Pipes – Virtual (Logical) Sockets – RPCs. Study of RTOS– VxWorks – Basic Features – Task Management Library at the System – Library Header File – VxWorks System Functions and System Tasks – Inter Process (Task) Communication Functions – Case Study of Coding for Sending Application Layer Byte Streams on a TCP/IP Network Using RTOS Vxworks.

References

1. Rajkamal, "Embedded Systems Architecture, Programming and Design", Tata McGraw Hill, First reprint, 2003
2. David E. Simon, "An Embedded Software Primer", Pearson Education Asia, First Indian Reprint, 2000.

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MCS205 (E)- DATAMINING AND DATAWAREHOUSING

3 hours lecture per week

Introduction: Fundamentals of data mining, Data Mining Functionalities,Classification of Data Mining systems, Major issues in Data Mining, Data Warehouse and OLAP Technology for Data Mining Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, Further Development of Data Cube Technology, From Data Warehousing to Data Mining.

Data warehousing : Definition – Multidimensional Data Model – Data Cube – Dimension Modelling– OLAP Operations – Warehouse Schema – Data Warehouse Architecture – Data Mart – Meta Data – Types of Meta Data – Data Warehouse Backend Process –Development Life Cycle.

Classification And Prediction: Issues Regarding Classification and Prediction, Classification by Decision Tree Induction, Bayesian Classification, Classification by Back propagation, Classification Based on Concepts from Association Rule Mining, Other Classification Methods, Prediction, Classifier Accuracy.

Mining Complex Types of Data: Multidimensional Analysis and Descriptive Mining of Complex, Data Objects, Mining Spatial Databases, Mining Multimedia Databases, Mining Time-Series and Sequence Data, Mining Text Databases, Mining the World Wide Web.

References

1. Paulraj Ponnaiah, “Data Warehousing Fundamentals”, Wiley Publishers, 2001.
2. Jiawei Han, Micheline Kamber, “Data Mining: Concepts and Techniques”,Morgan Kaufman Publishers, 2000.
3. Data Warehousing in the Real World – sam anahory & dennis murray. Pearson Asia.
4. Data Mining Introductory and advanced topics –margaret h dunham, pearson education

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MCS206 (A)-SOFTWARE TESTING AND QUALITY ASSUARANCE

3 hours lecture per week

Need For Testing - Psychology Of Testing - Testing Economics - White Box, Black Box, Grey Box Testing – Sdlc And Testing - Verification & Validation - Weyuker's Adequacy Axioms.White Box Testing Techniques - Black Box Testing Techniques-Levels Of Testing - Unit, Integration And System Testing.

Testing Object Oriented Software-Challenges - Differences From Testing Non-Oo Software - Class Testing Strategies- Class Modality - State-Based Testing - Message Sequence Specification. **Inspection And Review**: Need, Process Of Inspection, Srs And Design Document Inspection

Software Quality Assurance Framework And Standards Sqa Framework: What Is Quality? Software Quality Assurance, Components Of Software Quality Assurance "Software Quality Assurance Plan: Steps To Develop And Implement A Software Quality Assurance Plan Quality Standards: Iso 9000 And Companion Iso Standards, Cmm, Cmmi, Pcmm

Software Quality Assurance Metrics And Measurement Software Quality Metrics: Product Quality Metrics, Inprocess Quality Metrics, Metrics For Software Maintenance, Examples Of Metric Programs Software Quality Metrics Methodology: Establish Quality Requirements, Identify Software Quality Metrics, Implement The Software Quality Metrics, Analyze Software Metrics Results, Validate The Software Quality Metrics ,Software Quality Indicators

References

1. Glenford J.Myers, " The Art Of Software Testing ", John Wiley & Sons, 2/E,2004.

2. Boris Beizer, Black-Box Testing: " Techniques For Functional Testing Of Software And Systems", John Wiley & Sons, 1995.

3. P.C.Jorgensen, " Software Testing - A Craftman's Approach ", Crc Press, 1995.

4. William E.Perry, " Effective Methods For Software Testing (2nd Edition) "John Wiley & Sons, 2000.

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MCS206 (B)- COMPUTATIONAL LINGUISTICS

3 hours lecture per week

Introduction: Issues – Motivation – Theory of Language -Features of Indian Languages – Issues in Font – Coding Techniques – sorting & searching issues.

Morphology And Parts-Of-Speech Phonology – Computational Phonology - Words and Morphemes – Segmentation – Categorization and Lemmatisation – Word Form Recognition – Valency - Agreement - Regular Expressions and Automata – Morphology- Morphological issues of Indian Languages – Transliteration.

Probabilistic Models Probabilistic Models of Pronunciation and Spelling – Weighted Automata – N- Grams – Corpus Analysis – Smoothing – Entropy - Parts-of-Speech – Taggers – Rule based – Hidden Markov Models – Speech Recognition **SYNTAX** Basic Concepts of Syntax – Parsing Techniques – General Grammar rules for Indian Languages – Context Free Grammar – Parsing with Context Free Grammars – Top Down Parser – Earley Algorithm – Features and Unification - Lexicalised and Probabilistic Parsing.

Semantics And Pragmatics : Representing Meaning – Computational Representation – Meaning Structure of Language – Semantic Analysis – Lexical Semantics – WordNet – Pragmatics – Discourse – Reference Resolution – Text Coherence – Dialogue Conversational Agents.

References

1. Daniel Jurafskey and James H. Martin “Speech and Language Processing”, Prentice Hall, 2000.
2. Ronald Hausser “Foundations of Computational Linguistics”, Springer-Verleg, 1999.
3. James Allen “Natural Language Understanding”, Benjamin/Cummings Publishing Co. 1995.
4. Steve Young and Gerrit Bloothooft “Corpus – Based Methods in Language and Speech Processing”, Kluwer Academic Publishers, 1997.

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MCS206 (C)-ADVANCED COMPUTER NETWORKING

3 hours lecture per week

High Performance Network - Integrated Services Architecture – Components and Services – Differentiated Services Networks – Per Hop Behaviour – Admission Control – MPLS Networks – Principles and Mechanisms – Label Stacking – RSVP – RTP/RTCP

High Speed Networks- Frame relay, Packet Switching Networks, Frame Relay Networks, ATM Protocol Architecture, ATM Logical connections, ATM cells, Service categories, ATM Adaptation Layer, High Speed LANS- emergence, Ethernet, Fibre Channel, Wireless LANS.

Congestion and Traffic Management: Congestion control in Data Networks and Internets, Link Level Flow and Error Control, TCP Traffic Control, Traffic and Congestion Control in ATM Networks.

Addressing and Routing: Addressing – Flat, Classless, Hierarchical, Multicast, Anycast Routing, Overview of existing routing, Interior and Exterior Routing Protocols.

Quality of services in IP Networks: Integrated and Differentiated Services, Integrated Services Architecture (ISA), Queueing Discipline, Random Early Detection, Differentiated Services. Protocols for QoS Support, Resource Reservation : RSVP, MultiProtocol label Switching, Real Time Transport Protocol(RTP).

Understanding Storage Networking – Storage etworking Architecture – The Storage in Storage Networking, The Network in Storage Networking, Basic Software for Storage Networking – SAN Implementation Strategies.

References

1. Mahbub Hassan and Raj Jain, 'High Performance TCP/IP Networking', Pearson Education, 2004
2. William Stallings, " High Speed Networks and Internets – Performance and Quality of Service", Pearson India 2005
3. Larry L Peterson and Bruce S Davie, 'Computer Networks: A Systems Approach', Fourth Edition, Morgan Kaufman Publishers, 2007.
4. Jean Warland and Pravin Vareya, 'High Performance Networks', Morgan Kauffman Publishers, 2002
5. J. F. Kurose and K . W. Ross, Computer Networking: A Top-Down Approach Featuring Internet, 3/e, Perason Education, 2005.
6. Tom clark, " Designing Storage Area Network: A practical reference for implementing fiber channel and IP SAN's ", Second Edition, Addison Wesley professional ,2003
7. A. S. Tanenbaum, "Computer Networks", Prentice Hall India 1997

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MCS206 (D) – PARALLEL PROGRAMMING

Pre-requisite(s): High Performance Computing and preferably Linear Algebra.

3 hours lecture per week

Introduction: Scope of parallel computing, challenges, performance metrics, parallel architecture models, parallel programming paradigms, algorithm models.

Principles of parallel algorithm design: decomposition techniques, data distribution methods, mapping techniques for load balancing.

Shared memory programming: OpenMP; Programming using the message passing paradigm: Principles of message-passing programming, The Message Passing Interface (MPI): MPI-1, Collective communications, MPI-2, Parallel I/O.

Parallel applications: Laplace equation, molecular dynamics, Gaussian elimination, iterative methods. Other topics: Parallel FFT. Parallelism in Bioinformatics and other Applications, Scheduling on parallel systems

References

1. Grama, Gupta, A., Karypis, G., Kumar, V., Introduction to Parallel Computing, Addison Wesley, 2003. ISBN: 0-201-64865-2
2. Dongarra, J., Foster, I., Fox, G., Kennedy, K., White, A., Torczon, L., Gropp, W. (Eds), The Sourcebook of Parallel Computing, Morgan Kaufmann, 2002. ISBN: 1-558-60871-0.
3. Dongarra, J., Duff, I., Sorensen, D.C., Van der Vorst, H.A., Numerical Linear algebra for High Performance Computers, 1998. ISBN –0-89871-428-1.

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MCS206 (E)-QUANTUM COMPUTING

3 hours lecture per week

Foundations: Finite Dimensional Hilbert Spaces – Tensor Products and Operators on Hilbert Space – Hermitian and Trace Operators - Basic Quantum Mechanics necessary for the course.

odel of Computation: Quantum Gates and operators and Measurement – Quantum Computational Model – Quantum Complexity – Schemes for Physical realization (Only peripheral treatment expected).

Algorithms and Complexity: Shor's Algorithm – Application to Integer Factorization – Grover's Algorithm – Quantum Complexity Classes and their relationship with classical complexity classes.

Coding Theory: Quantum Noise – Introduction to the theory of Quantum Error Correction – Quantum Hamming Bound – Coding Schemes – Calderbank-Shor-Steane codes – Stabilizer Codes

References

1. Nielsen M. A. and I. L. Chauang, Quantum Computation and Quantum Information, Cambridge University Press, 2002.
2. Gruska, J. Quantum Computing, McGraw Hill, 1999.
3. Halmos, P. R. Finite Dimensional Vector Spaces, Van Nostrand, 1958.
4. Julian Brown. Minds, Machines and the Multiverse: The Quest for the Quantum Computer by Julian Brown. Simon and Schuster, 2000

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MCS207 (P)-SOFTWARE SYSTEMS LAB

3 hours practical per week

1. General purpose programming tools
2. Web programming
3. Tools for good software development process
4. Make / gmake
5. Source code control systems
6. Debuggers & memory allocation debuggers – Eg. gdb , ddd etc.
7. Integrated development environments
8. Scripting languages – Eg. perl, python etc.
9. Tools for text processing
10. Document creation tools – Eg. LaTeX etc.

Sessional work assessment

Regularity – 5 marks

Class work, Lab Record, Mini project Report (if any), viva – 30 marks

Test – 15 marks

Total: Internal continuous assessment: 50 marks

University evaluation

Examination will be for 100 marks of which 70 marks are allotted for writing the procedure / formulae / sample calculation details, preparing the circuit diagram / algorithm / flow chart, conduct of experiment, tabulation, plotting of required graphs, results, inference etc., as per the requirement of the lab experiments, 20 marks for the viva-voce and 10 marks for the lab record.

Note: Duly certified lab record must be submitted at the time of examination.

MCS208 (P) – TERM PAPER

3 hours practical per week

The student is expected to present a report on the literature survey conducted as a prior requirement for the project to be taken up in the third and fourth semesters. Head of department can combine TP hours of many weeks and allot a maximum of 4 weeks exclusively for it. Students should execute the project work using the facilities of the institute. However, external projects can be taken up, if that work solves a technical problem of the external firm. Prior sanction should be obtained from the head of department before taking up external project work. Project evaluation committee should study the feasibility of each project work before giving consent. An overview on the project work should be introduced before the closure of first semester. A paper should be prepared based on the project results and is to published in refereed Conferences/Journals.

Sessional work assessment

Presentation : 25

Report : 25

Total marks : 50

MCS301 (P) – THESIS PRELIMINARY

This shall comprise of two seminars and submission of an interim thesis report. This report shall be evaluated by the evaluation committee. The fourth semester Thesis-Final shall be an extension of this work in the same area. The first seminar would highlight the topic, objectives, methodology and expected results. The first seminar shall be conducted in the first half of this semester. The second seminar is presentation of the interim thesis report of the work completed and scope of the work which is to be accomplished in the fourth semester.

Weightages for the 8 credits allotted for the Thesis-Preliminary

Evaluation of the Thesis-Preliminary work: by the guide - 50% (200 Marks)

Evaluation of the Thesis–Preliminary work: by the Evaluation Committee-50% (200 Marks)

MCS401 (P) – THESIS

Towards the end of the semester there shall be a pre submission seminar to assess the quality and quantum of the work by the evaluation committee. This shall consists of a brief presentation of Third semester interim thesis report and the work done during the fourth semester. At least one technical paper is to be prepared for possible publication in journals / conferences. The final evaluation of the thesis shall be an external evaluation. The 12 credits allotted for the Thesis-Final may be proportionally distributed between external and internal evaluation as follows.

Weightages for the 12 credits allotted for the Thesis

Internal Evaluation of the Thesis work: by the guide - (200 Marks)

Internal Evaluation of the Thesis work: by the Evaluation Committee - (200 Marks)

Final Evaluation of the Thesis work by the Internal and External Examiners:-

(Evaluation of Thesis + Viva Voce) - (100+100 Marks)