

M. TECH IN MULTIMEDIA & SOFTWARE SYSTEMS

REVISED CURRICULUM

June, 2010

SEMESTER – I

Theory

Code	Paper	Contacts Period per week			Total	Credits
MMS101	Advance Engineering Mathematics	3	1	0	4	4
MMS102	Industrial Management	4	0	0	4	4
MMS103	Software Project & Quality Management	4	0	0	4	4
MMS104	Multimedia Engineering & Application	4	0	0	4	4
	Elective – I	4	0	0	4	4
Total Theory					20	20

Elective – I

Code	Paper
MMS105	Topics on Algorithms
MMS106	Distributed Architecture & Operating Systems
MMS107	Topics on Networking

Practical

Code	Paper	Contacts Period per week			Total	Credits
MMS191	Software Development Lab	0	0	4	4	2
MMS192	Multimedia Lab	0	0	4	4	2
MMS193	Seminar-I	0	2	0	2	1
	Total Practical				10	5
TOTAL					30	25

SEMESTER – II

Theory

Code	Paper	Contacts Period per week			Total	Credits
MMS201	Objective Oriented Software Design	4	0	0	4	4
MMS202	Multimedia Design & E-Learning	4	0	0	4	4
MMS203	Topics on DBMS	4	0	0	4	4
	Elective-II	4	0	0	4	4
	Elective-III	4	0	0	4	4
Total Theory					20	20

Elective – II

Code	Paper
MMS204	Intelligent Computing
MMS205	Knowledge Engineering
MMS206	Image Processing

Elective – III

Code	Paper
MMS207	Computer Security
MMS208	Software Reuse & Requirement Engineering
MMS209	Mobile Computing

Practical

Code	Paper	Contacts Period per week			Total	Credits
MMS291	Object Technology Lab	0	0	4	4	2
MMS292	Semester-II	0	2	0	2	1
MMS293	Comprehensive Exam (Viva-Voce)	-	-	-	-	4
	Total Practical				6	7
TOTAL					26	27

SEMESTER-III**Sessional**

Sl. No.	Code		Contacts Period per week				Credits
			L	T	P	Total	
1.	MMS301	Pre-submission Defence of Dissertation					4
2.	MMS302	Dissertation (Progress)				24	18
Total of Semester						24	22

SEMESTER-IV**Sessional**

Sl. No.	Code		Contacts Period per week				Credits
			L	T	P	Total	
1.	MMS401	Dissertation (Completion)				24	18
2.	MMS402	Post-submission Defence of Dissertation					6
Total of Semester						24	24

Semester-I

Paper : MMS 101

Credit : 4

ADVANCE ENGINEERING MATHEMATICS (3-1-0)

Statistics: Elements of statistics; frequency distribution; Concept of mean, median, mode and different types of distribution; Standard deviation and variance; Curve Fitting by least square method; Correlation and Regression; Testing of hypothesis; Basic types of factorial design and Analysis of Variance.

Matrix Operation: Matrix operation; Eigen value and Eigen Vector by iterative methods; Diagonalization of a square matrix.

Laplace Transform, Fourier Transform; Fourier Integral and their Applications;

Numerical Methods: Interpolation by Polynomials; Error Analysis; Solution of System of Linear equation by Gauss-Seidel iterative method; Newton Rapson method; Numerical Integration by Gauss-quadrature; Solution of ordinary differential equation by Rayleigh-Ritz method.

Ordinary Differential Equation: (i) 2nd Order homogeneous Equation (ii) Euler Cauchy Equation, (iii) Non homogenous linear equation. **Partial Differential Equation:** (i) Wave equation – one dimension and two dimension, (ii) Heat equation – one dimension and two dimension.

Books:

1. S. S. Sastry – “Introductory Methods of Numerical Analysis”, PHI
2. M. K. Jain, S.R.K. Iyengar, R., K. Jain; - “Numerical Methods for Scientific and Engineering Computation” New Age International Pub.
3. A. M. Goon, M. K. Gupta, B. Dasgupta; - “An Outline of Statistical Theory” Volume I, II, The World Press Private Ltd.
4. Yu. P. Adler, E.V. Markova, Ylu V. Granovsky;; - “The Design of Experiment to find Optimal Conditions”, MIR, 1975, Moscow
5. Erwin Kreyszig – Advanced Engineering Mathematics, John Wiley & Sons, Inc.
6. Stanley Grossman and William R. Derrick – Advance Engineering Mathematics – Harper & Row Publishers

Semester-I

Paper : MMS 102

Credit : 4

INDUSTRIAL MANAGEMENT (4-0-0)

1. Classification and Importance of Operations Management:

Operations Management in corporate profitability and competitiveness; Operations strategy; Types and characteristics of manufacturing systems and service systems;

2. Operations Planning and Control:

Forecasting for operations; Inventory planning and control; Materials requirement planning; Planning production in aggregate terms; Operations scheduling;

3. Quality Assurance:

The quality assurance system; choice of process and reliability; control of quality;

4. Maintenance Function;

Preventive maintenance; Overhaul and replacement.

5. Management Information System;

Need and structural of MIS; Data Processing Systems; Data Sources and Management.

6. Human Resource Management

Concept and evolution; Manpower planning; Recruitment and Selection; motivating Personnel; Leadership;

BOOKS:

1. Buffa and Sarin – *Modern Production / Operations Management*, 8th ed., John Wiley & Sons (Asia) Pvt. Ltd.
2. Russell & Taylor – *Operations Management*, Wiley India Pvt. Ltd.
3. Larry Long – *Management Information System*, Prentice Hall
4. A. Leon – *Enterprise Resource Planning*, TMH
5. Gupta, C. B. – *Human Resource Management*, Sultan Chand & Sons

Semester-I

Paper : MMS 103

Credit : 4

SOFTWARE PROJECT AND QUALITY MANAGEMENT (4-0-0)

Software Quality Issues, Requirement Specification & Design Issues.

Software Project Management – Project Management Techniques and their applications in Software projects, Software Development Plan – associated tasks, milestones and deliverables, project scheduling – tasks, dependencies and conflict resolution. Resource management and allocation, cost estimation – COCOMO model and its derivatives, Risk assessment and its impact, software tools for software project management, configuration management, software risk and reliability, software reuse – impact of object – oriented design and programming.

Requirements Engineering – Requirements analysis and specifications, requirement specification documents, validation process of requirements specifications, use of formal methods, interviewing process and feedback with the customer.

Software Quality management – Software Testing Verification –white and black box testing, unit testing, integration testing, system testing, test plans, Mathematical methods for software verification, ISO 9001, Capability Maturity Model.

BOOKS:

1. Software Engineering Beginners Approach : Pressman, TMH
2. Software Engineering: Jolote, Narosa
3. Fundamentals of Software Engineering – Ghezzi et al. PH1
4. Software Engineering – Sommerville, Addison – Wesley
5. Software Engineering with Abstractions, Berzins & Luqi, Addison – Wisley
6. Software Engineering: Aggarwal & Singh, New Age
7. Software Engineering Concepts: Fairley, MGH

Semester-I

Paper : MMS 104
Credit : 4

MULTIMEDIA ENGINEERING AND APPLICATIONS (4-0-0)

Introduction: Overview of multimedia, various types of multimedia information, characteristics, digital representation, hardware and software, accessories, hypertext and hypermedia.

Multimedia Technology: Structure – Components, platforms, Audio & Video Technology – Basics, Digitisation, File Format, Compression & Decompression Techniques, Image and Graphics, Storage media, Video Streaming.

Animation: Definition, types, manipulation technique, rendering, File format, animation software

Graphics: Devices, display technology, pixel, raster, vector, resolution, transformation, solid modelling

Applications: Virtual reality, e-Commerce & Courseware engineering.

BOOKS:

1. Multimedia – An Introduction: John Villamil – Casanova, Louis Molina – Prentice Hall, India
2. Multimedia Handbook : Jessica Keys, Mc. Graw Hill Inc., 1994.
3. Computer Graphics: Hearn D. & Baker M.P., Prentice Hall (EEE)
4. Multimedia Systems: Buford Koegel John F., Addison Wesley (Pearson Education Asia), 2000
5. Multimedia: Computing, Communications & applications; Steinmetz Ralf & Nahrstedt Klara, Pearson Education Asia, 2001
6. Video and Image Processing and Multimedia Systems: Borko Furht, Kluwer Academic Publishers.
7. Multimedia Systems and Techniques: Borko Furht, Kluwer Academic Publishers.
8. Multimedia Systems: John F. Koegel Buford, ACM Press, Addison Wesley
9. Multimedia: Making it Work: Vaughan, Tay (1999), 4th ed. New Delhi, Tata Mcgraw Hill.

Semester-I

Paper : MMS 105

Credit : 4

Elective – I (4-0-0)

TOPICS ON ALGORITHMS

Review of complexity analysis of algorithms. Model of Computation, Turing machines Design Methods – Divide and Conquer, Greedy method, Dynamic programming, Back tracking, Branch and Bound, Approximation and Probabilistic Algorithms.

Graphic Algorithms – Breath-first Search, Depth – First Search, Topological Sort, Minimum Spanning Trees, Shortest Path Algorithms – Bellman – Ford Algorithm, Dijkstra’s Algorithm.

Matrix Operation – Strassen’s algorithm for matrix manipulation, Matrix inversion

Searching, insertion, deletion and other operations with m-way search trees, Binomial Heaps and Fibonacci Heaps.

String Matching algorithms, convex hull, Traveling Salesman Problem, Data Compression techniques – JPEG, MPEG

Theory of NP – Completeness and reducibility, proofs and NP-complete problems

BOOKS:

1. Data Structures and Programme Design: Robert L. Kruse, PHI
2. Fundamentals of Data Structures: Horowitz & Sahabi, Galgotia Booksource
3. An Introduction to Data Structures with Applications: Tremblay & Sorenson, TMH
4. Introduction to Design & Analysis of Algorithms: Goodman & Hedetniemi, TMH
5. Introduction to Algorithms: Corman et.al. PHI
6. Fundamentals of Computer Algorithms: Horowitz et.al. Galgotia
7. The Design & Algorithms: Brassard & Bratley, PHI
8. Fundamentals of Algorithms: Brassard & Bratley, PHI
9. Fundamentals of Algorithm: Knuth, Narosa

Semester-I

Paper : MMS 106

Credit : 4

Elective – I (4-0-0)

DISTRIBUTED ARCHITECTURE & OPERATING SYSTEM

Introduction: Discussion on the limitations on conventional architectures and the remedies; Overview of Parallel Systems, Architecture of Parallel Systems

Characterization of Distributed Systems: Examples of distributed systems; Resource Sharing and the Web; Challenges System Models: Architectural Models; Fundamental Models.

Networking and Internetworking: Types of networks; Network Principles; Internet Protocols
Inter-process Communication: The API for the Internet Protocols; External Data Representation and Marshalling; Client-Server Communication; Group Communication.

Name Services: Name Services and Domain name System: Directory Services, Peer-to-peer systems: Peer-to-peer middleware; Routing Overlays.

Theoretical Foundations: Global Time; Lamport's and Vector Clocks; Global States and Global State Recording Algorithms; Termination Detection.

Distributed Mutual Exclusion: Classification and Distributed Mutual Exclusion algorithms
Distributed Deadlock Detection: Preliminaries-System Model, Resource versus Communication Deadlock, A graph Theoretic Model; Distributed Deadlock handling Strategies; Issues in Deadlock Detection and Resolution; Control Organizations for Distributed Deadlock Detection; Algorithms – Centralized and Distributed; Hierarchical Deadlock Detection Algorithms

Agreement Protocols

BOOKS:

1. Coulouris, Dollimore, and Kindberg: distributed System – Concepts and Design, fourth Edition, 2007, Pearson Education.
2. Singhal and Shivaratri: Advanced Concepts in Operating Systems, TMH Edition 2001.
3. Hwang and Xu: Scalable Parallel Computing, TMH International Editions, 2000.
4. Culler, Singh and Gupta: Parallel Computer Architecture, Morgan Kaufmann Publishers, 2002
5. Hwang and Briggs: Computer Architecture and Parallel Processing, Mc.Graw Hill International Editions.

Semester-I

Paper : MMS 107

Credit : 4

Elective – I (4-0-0)

TOPICS ON NETWORKING

Layered Architecture, TCP/IP reference model, IP addressing scheme, Ipv6

Routing Algorithms, Congestion control algorithms, flow control, TCP

Internetworking – Bridge, Routers, Gateway

Multiple Channel Data Communication – TDM, FDM, T1, T2, SONET, ATM, ISDN

Transmission Impairments, Modem, Dial-up, Broadband, Cable Internet

DNS, e-mail, WWW. URL, HTTP, HTML, XML, Mobile & Wireless networks, GSM, Bluetooth

BOOKS:

1. Computer Network: Tanenbaum, PH1
2. Data Communication & Computer Networks: Stalling, PHI
3. Digital & Data Communications: Miller, Jaico
4. Internetworking with TCP/IP, (Vol I, II & III)
5. Mobile and Wireless Network: Black, PH

Semester-II

Paper : MMS 201
Credit : 4

OBJECT ORIENTED SOFTWARE DESIGN (4-0-0)

Object Oriented Modelling – Life Cycle, Abstraction, Encapsulation, Modularity, Inheritance, Polymorphism, Composition, Aggregation.

Use cases, Classification and Identification of objects.

UML Notation: Class diagram, Object diagram, Sequence diagram, Collaboration diagram, Activity Diagram, Packages, State Transition Diagram, UML model, Meta Model.

Object oriented quality assurance, metrics

Case Studies

BOOKS:

1. Object Oriented Programming: Balaguruswamy, TMH
2. Software Engineering: Pressman, PHI
3. Object Oriented Modeling & Design : Rumbaugh et.al.PH1
4. A first course on Database System: Ullman & Widom, PH
5. Inside and Object Model: Papurt, Sigs Book

Semester-II

Paper : MMS 202

Credit : 4

MULTIMEDIA DESIGN & E-LEARNING SYSTEM (4-0-0)

Life Cycles: Concept and requirement analysis, design, creating scripts, flow charts and story board, development of building blocks, integration, testing and evaluation, publishing.

Human Computer Interaction: HCL design, cognitive aspect in multimedia presentation, methodology of dialog design.

Development Tools: Authoring tools and approaches, page based, icon based and time based tools, comparative analysis and selection.

E-learning: characteristics, opportunities, contemporary trends and practices

LMS: Introduction, features, selection, limitation, SCORM standards

Development Models: Introduction, models of course development, types of e-learning courses, wrap around model, integrated model.

Pedagogical Issues: Distributed, problem solving, CSCL, goal based, case based learning

Tools: Various LMS tools, comparative analysis

Evaluating e-learning system: Costs, access, quality and speed

Research opportunities in e-learning

BOOKS:

1. Computer Mediated Communication: Rapoport, M., John Wiley & sons, Inc, New York
2. The Key to Teaching & Learning online: Salmon & E. Moderating, Kogan Page.
3. Implementing computer Supported Cooperative Learning: McConnell D., London UK, Kogan Page
4. Multimedia Communication Systems: Techniques, Standards, and Networks: K. R. Rao, soran S. Bojkovic, Dragorad A. Milovanovic, D. A. Milovanovic, Prentice Hall.
5. Distributed Multimedia: Palmer W. Agnew and Anne S. Kellerman, ACM Press, Addison Wesley
6. Multimedia Interface Design: Meera M. Blattner and Roger B. Dannenberg, ACM Press, Addison Wesley
7. Digital Multimedia, Chichester: Chapman, Nigel and Chapman, Jenny (2000), John Wiley
8. Practical Guidelines for creating Instructional Multimedia Applications: Fenrich, Peter (1997), Fort Worth, Dryden Press
9. A Developers' handbook to Interactive Multimedia; A practical guide for educational applications: Phillips, Rob (1997, London: Kogan Page
10. Multimedia for Learning: Medhods and Development: Alessi, S. M. & Trollips, S.R. (2001), (3rd ed.) Boston, MA: Allyn & Bacon.

Semester-II

Paper : MMS 203

Credit : 4

TOPICS ON DBMS (4-0-0)

Query Optimization: Query processing, Transactions Management, dead lock detection and recovery, nested transaction, concurrency Control, Recovery, Integrity & Security.

Distributed Databases: Fragmentation, design, transaction management, concurrency control, timestamp

Spatial Database: Storage & Retrieval of Spatial & Non-spatial Data, Quad tree, Address Square, GIS

Statistical Database: Security in Statistical Database, Linear Queries,

Temporal Database: Updating, Temporal Query, Real-time Database

Data mining, Data warehousing

BOOKS:

1. Fundamentals of Database System: Elmasri & Navathe, Addison-Wesley
2. An Introduction to Database Systems: Date, Addison-Wesley
3. Principles of Database Systems: Ullman, Galgotia
4. Database Systems Concepts: Korth et. al, MGH
5. A first Course on Database System: Ullman & Widom, PH
6. Introduction to Data Compression: Sayood, Elsevier

Semester-II

Paper : MMS 204

Credit : 4

Elective-II (4-0-0)

INTELLIGENT COMPUTING

Review of the concepts of computational intelligence, Turing test.

Knowledge representation techniques – First order predicate logic, automatic theorem proving, logic programming, semantic networks.

State space search – exhaustive search – BFS, DFS, bidirectional search, Heuristic search – Hill climbing, A/A* algorithm, constraint satisfaction, mini-max search, AND-OR graph search, AO* algorithm.

Statistical and probabilistic reasoning – Bayesian Systems, Certainty, Certainty factors, Dempster – Shafer theory.

Elements of soft computing – Fuzzy set theory, Fuzzy logic, Fuzzy rules, Fuzzy relations, Fuzzy inference systems, Fuzzy controllers.

Artificial Neural Networks – Early neural models – McCulloch – Pitts neuron, pattern classification and pattern association with ANNs, supervised and unsupervised learning rules, recurrent networks.

Evolutionary Search – Genetic (GAs) – Darwinian principle of survival of the fittest, genetic operators, selection, crossover, mutation, genetic parameters, simulated annealing.

BOOKS:

1. Artificial Intelligence – A Modern Approach: S. Russell & P. Norvig, Pearson Education
2. Artificial Intelligence; E. Rich & K. Knight, TMH
3. An Introduction to Fuzzy Sets 0 – Analysis & Design; W. Pedrycz & F. Gomix, PHI.
4. Fundamentals of Neural Networks – Architectures, Algorithms, and Applications; L. Frusett; Prentice Hall.
5. An Introduction to Genetic Algorithms: M. Mitchell; PH1

Semester-II

Paper : MMS 205

Credit : 4

Elective-II (4-0-0)

KNOWLEDGE ENGINEERING

Overview: KE Cycle, Knowledge economy and society, Organizational Knowledge, Individual Knowledge, explicit knowledge, tacit knowledge, evolution of knowledge management, development applications of knowledge engineering.

KMS: Create, capture, Organize, Access and use of knowledge, spiral of knowledge management.

Knowledge Networks: Knowledge networking, distributed heterogeneous knowledge networks, knowledge creating organization, mapping and measuring knowledge.

Web-Based System: Building knowledge site, knowledge modelling, tools for web based knowledge networking system

Case Studies: IMB, UNESCO, SEARCA K-Net

BOOKS:

1. Information Technology for Knowledge management: Borghoff, U. and R. Pareschi, 1997, Journal of University Computer Science, Vol.3/No.8.
2. Enterprise Knowledge Management Modelling and Distributed Knowledge Management Systems: Firestone, Joseph M., 1999
3. Managing Organizational Knowledge: Perspectives on Business Innovation, Earnest and Young, Issue I.
4. The Fifth Discipline: The Art and Practice of the Learning Organization: Senge, Peter M. 1994, Doubleday/Currency.
5. Electronic Performance Support Systems: Show Me the Knowledge: Wells, Jonathan and Christopher Pravetz, Price water house Coopers, 1998.

Semester-II

Paper : MMS 206

Credit : 4

Elective-II (4-0-0)

IMAGE PROCESSING

Introduction: Examples of fields that use digital image processing, fundamental steps in digital image processing, components of image processing system.

Image in the spatial domain: Basic gray-level transformation, histogram processing, enhancement using arithmetic and logic operators, basic spatial filtering, smoothing and sharpening spatial filters.

Color Image Processing: Color Fundamentals, Color models, Pseudo Colour image processing, Basics of Full-color image processing, Color transforms, smoothing and sharpening, Color segmentation.

Image Compression: fundamentals, Image Compression models, Error-free compression, Loss predictive coding, Image Compression Standards.

Morphological Image Processing: Preliminaries, Dilation, Erosion, Open and Closing, Basic Morphologic Algorithms.

Image Segmentation: Detection of Discontinuous, edge linking and boundary detection, thresholding, region-based segmentation.

Object Recognition: Patterns and patterns classes, Recognition based on decision-theoretic methods, matching, Optimum Statistical Classifiers, neural networks.

BOOKS:

Text Books:

1. Digital Image Processing, Rafeal C. Gonzalez, Richard E. Woods, Second Edition, Pearson Education/PHI
2. Image Processing, Analysis, and Machine Vision, Milan Sonka, Vaclav Hlavac and Roger Boyle, Second Edition, Thomson Learning.
3. Introduction to Digital Image Processing with Matlab, Alasdair McAndrew, Thomson Course Technology.
4. Computer Vision and Image Processing, Adrian Low, Second Edition, B.S. Publications.
5. Digital Image Processing using Matlab, Fafeal C. Gonzalez, Richard E. Woods, Steven L. Eddins, Pearson Education.
6. Digital Image Processing, William K. Prat, Wily Third Edition
7. Digital Image Processing and Analysis, B. Chanda, D. Datta Majumder, Prentice Hall of India.

Semester-II

Paper : MMS 207

Credit : 4

Elective-III (4-0-0)

COMPUTER SECURITY

Private Key Cryptosystems: Classical Ciphers, DES, Differential and Linear Crypto analysis.

Public Key Cryptosystems: RSA, Elliptical Cryptosystems

Digital Signature: Generic Signature Schemes, RSA Signature

Authentication, Intrusion Detection, Digital Money, Database Protection, Access Control
Secure Sockets.

BOOKS:

1. Cryptography and Network Security (Sie), by Forouzan, Tata McGraw-Hill
2. **Network Security:** Current Status and future directions, by Christor Douligeris, Dimitris N. Serpanos, John Wiley and Sons.
3. **Network Security:** Private Communication in a public world, by Charlie Kaufman, Radia Perlman, Mike Speciner, Prentice Hall PTR
4. Network security Fundamentals, by Gert De Laet, Gert Schauwers, Cisco Press, 2005-Computer.

Semester-II

Paper : MMS 208

Credit : 4

Elective-III (4-0-0)

SOFTWARE REUSE AND REQUIREMENT ENGINEERING

Impact of Object-Based and Object-Oriented design and programming, Architecture Centric, domain Specific, Library based reuse methodologies – influence on reliability, efficiency and cost.

Requirement analysis and specifications: Requirement definitions and requirement specification documents, types of requirement, validation process, Software Prototyping, use of formal methods.

BOOKS:

1. Software Engineering Beginners Approach: Pressman, TMH
2. Software Engineering: Jalote, Narosa
3. Fundamentals of Software Engineering – Ghezzi et al. PHI
4. Software Engineering – Sommerville, Addison-Wesley
5. Software Engineering with Abstractions, Berzins & Luqi, Addison-Wesley
6. Software Engineering: Aggarwal & Singh, New Age
7. Software Engineering Concepts: Fairley, MGH

Semester-II

Paper : MMS 209

Credit : 4

Elective-III (4-0-0)

MOBILE COMPUTING

1G, 2G, 3G Networks, Cellular Concepts, GSM, Channel Assignments, Security

Mobile ad hoc networks – MAC Layer, MANET

Energy Analysis – AODV & DSR Routing Protocols, Location Updates, handovers, Multicasting & Broadcasting

Mobile IP, Mobile, distributed & Pervasive Computing

BOOKS:

1. Wireless Communications Principles & Practice by T. S. Rappaport, PHPTR
2. MOBILE Communications by J. Sehiller, Pearson Education
3. Mobile Computing by S. DasBit & B. K. Sikdar, PHI