ANNA UNIVERSITY, CHENNAI  
AFFILIATED INSTITUTIONS  
R - 2009  
M.E.COMPUTER SCIENCE AND ENGINEERING  
I SEMESTER (FULL TIME) CURRICULUM AND SYLLABI  

**SEMMESTER I**

<table>
<thead>
<tr>
<th>SL. NO</th>
<th>COURSE CODE</th>
<th>COURSE TITLE</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>THEORY</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>MA9219</td>
<td>Operations Research</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>CS9211</td>
<td>Computer Architecture</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>CS9212</td>
<td>Data Structures and Algorithms</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>SE9213</td>
<td>Object Oriented Software Engineering</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>CS9213</td>
<td>Computer Networks and Management</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td><strong>PRACTICAL</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>CS 9215</td>
<td>Data Structures Lab</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>7</td>
<td>CS9216</td>
<td>Networking Lab</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td></td>
<td>15</td>
<td>1</td>
<td>6</td>
<td>20</td>
</tr>
</tbody>
</table>

**LIST OF ELECTIVES FOR M.E.COMPUTER SCIENCE AND ENGINEERING**

<table>
<thead>
<tr>
<th>SL. NO</th>
<th>COURSE CODE</th>
<th>COURSE TITLE</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>CS9251</td>
<td>Mobile Computing</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>CS9252</td>
<td>Grid Computing</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>CS9253</td>
<td>Theory of Computation</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>CS9254</td>
<td>Soft Computing</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>CP9264</td>
<td>Distributed Computing</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>6</td>
<td>CS9256</td>
<td>Multimedia Systems</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>7</td>
<td>CS9257</td>
<td>XML and Web Services</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>8</td>
<td>CS9258</td>
<td>Bio Informatics</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>9</td>
<td>CS9259</td>
<td>Network Security</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>10</td>
<td>CS9260</td>
<td>Embedded Systems</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>11</td>
<td>CS9261</td>
<td>Digital Imaging</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>12</td>
<td>CS9262</td>
<td>Software Quality Assurance</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>13</td>
<td>CS9263</td>
<td>Ad-hoc Networks</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>14</td>
<td>CS9264</td>
<td>Data Warehousing and Data Mining</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>15</td>
<td>CS9265</td>
<td>Performance Evaluation of Computer Systems and Networks</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>16</td>
<td>CS9266</td>
<td>Agent Based Intelligent Systems</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>17</td>
<td>CS9267</td>
<td>Visualization Techniques</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>18</td>
<td>CS9268</td>
<td>Advanced Databases</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>19</td>
<td>CS9269</td>
<td>Software Project Management</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>20</td>
<td>CS9270</td>
<td>Component Based Technology</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
</tbody>
</table>
MA9219 OPERATIONS RESEARCH  L T P C  3 1 0 4

UNIT I QUEUEING MODELS  9
Poisson Process – Markovian Queues – Single and Multi-server Models – Little’s formula –
Machine Interference Model – Steady State analysis – Self Service Queue.

UNIT II ADVANCED QUEUEING MODELS  9
Non- Markovian Queues – Pollaczek Khintchine Formula – Queues in Series – Open Queueing
Networks – Closed Queueing networks.

UNIT III SIMULATION  9
Discrete Even Simulation – Monte Carlo Simulation – Stochastic Simulation – Applications to
Queueing systems.

UNIT IV LINEAR PROGRAMMING  9
Formulation – Graphical solution – Simplex method – Two phase method - Transportation and
Assignment Problems.

UNIT V NON-LINEAR PROGRAMMING  9
Lagrange multipliers – Equality constraints – Inequality constraints – Kuhn- Tucker conditions –
Quadratic Programming.

L : 45 T: 15 TOTAL : 60 PERIODS

TEXT BOOKS:

REFERENCES:

CS9211 COMPUTER ARCHITECTURE  L T P C  3 0 0 3

UNIT I FUNDAMENTALS OF COMPUTER DESIGN AND PIPELINING  9
Fundamentals of Computer Design – Measuring and reporting performance – Quantitative
principles of computer design. Instruction set principles – Classifying ISA – Design issues.
Pipelining – Basic concepts – Hazards – Implementation – Multicycle operations.

UNIT II INSTRUCTION LEVEL PARALLELISM WITH DYNAMIC APPROACHES  9
Concepts – Dynamic Scheduling – Dynamic hardware prediction – Multiple issue – Hardware
based speculation – Limitations of ILP – Case studies.

UNIT III INSTRUCTION LEVEL PARALLELISM WITH SOFTWARE APPROACHES  9
Compiler techniques for exposing ILP – Static branch prediction – VLIW – Advanced compiler
support – Hardware support for exposing more parallelism – Hardware versus software
speculation mechanisms – Case studies.
UNIT IV MULTIPROCESSORS AND MULTICORE ARCHITECTURES 9

UNIT V MEMORY AND I/O 9

REFERENCES:

TOTAL : 45 PERIODS

CS9212 DATA STRUCTURES AND ALGORITHMS L T P C
3 0 0 3

UNIT I COMPLEXITY ANALYSIS & ELEMENTARY DATA STRUCTURES 9

UNIT II HEAP STRUCTURES 9

UNIT III SEARCH STRUCTURES 9

UNIT IV GREEDY & DIVIDE AND CONQUER 9
Quick sort – Strassen’s matrix multiplication – Convex hull - Tree-vertex splitting – Job sequencing with deadlines – Optimal storage on tapes.

UNIT V DYNAMIC PROGRAMMING AND BACKTRACKING 9

TOTAL : 45 PERIODS
REFERENCES:

SE9213                   OBJECT ORIENTED SOFTWARE ENGINEERING                     L T P C
                                                                      3 0 0 3

UNIT I    INTRODUCTION                                    9
Software Development – Unified Modeling Language – Project Organization – Communication

UNIT II   ANALYSIS                                      9
Requirements Elicitation – Concepts – Activities – Management – Analysis Object Model –
Analysis Dynamic Models

UNIT III  SYSTEM DESIGN                                  9
Decomposing the system – Overview of System Design – System Design Concepts – System
Design Activities – Addressing Design Goals – Managing System Design

UNIT IV   OBJECT DESIGN AND IMPLEMENTATION ISSUES        9
Reusing Pattern Solutions – Specifying Interfaces – Mapping Models to Code – Testing

UNIT V    MANAGING CHANGE                               9
Rationale Management – Configuration Management – Project Management – Software Life
Cycle

TOTAL : 45 PERIODS

REFERENCES:
1. Bernd Bruegge, Alan H Dutoit, Object-Oriented Software Engineering, 2nd ed, Pearson
UNIT I  HIGH SPEED NETWORKS  9

UNIT II  CONGESTION AND TRAFFIC MANAGEMENT  9

UNIT III  TCP AND ATM CONGESTION CONTROL  10

UNIT IV  INTEGRATED AND DIFFERENTIATED SERVICES  9

UNIT V  PROTOCOLS FOR QoS SUPPORT  8

TOTAL : 45 PERIODS

TEXT BOOKS:


REFERENCES:

CS9215 DATA STRUCTURES LAB

1. Min Heap
2. Deaps
3. Leftist Heap
4. AVL Tree
5. B-Tree
6. Tries
7. Quick Sort
8. Convex hull
9. 0/1 Knapsack using Dynamic Programming
10. Graph coloring using backtracking

TOTAL : 45 PERIODS

CS9216 NETWORKING LAB

1. Socket Programming
   a. TCP Sockets
   b. UDP Sockets
   c. Applications using Sockets
2. Simulation of Sliding Window Protocol
3. Simulation of Routing Protocols
4. Development of applications such as DNS/ HTTP/ E-mail/ Multi-user Chat
5. Simulation of Network Management Protocols
6. Study of Network Simulator Packages – such as opnet, ns2, etc.

TOTAL : 45 PERIODS

CS9251 MOBILE COMPUTING

UNIT I WIRELESS COMMUNICATION FUNDAMENTALS 9

UNIT II TELECOMMUNICATION SYSTEMS 11

UNIT III WIRELESS NETWORKS 9
UNIT IV NETWORK LAYER

UNIT V TRANSPORT AND APPLICATION LAYERS

TOTAL : 45 PERIODS

TEXT BOOKS:

REFERENCES:
TEXT BOOK:

REFERENCES:

CS9253 THEORY OF COMPUTATION L T P C

UNIT I AUTOMATA

UNIT II REGULAR EXPRESSIONS AND LANGUAGES
Regular Expression – FA and Regular Expressions – Proving Languages not to be regular – Closure Properties of Regular Languages – Equivalence and Minimization of Automata.

UNIT III CONTEXT FREE GRAMMAR AND LANGUAGES

UNIT IV PROPERTIES OF CONTEXT FREE LANGUAGES
Normal Forms for CFG – Pumping Lemma for CFL – Closure Properties of CFL – Turing Machines – Programming Techniques for TM.

UNIT V INDECIDABILITY
A Language That Is Not Recursive Enumerable – An Undecidable Problem that Is RE – Undecidable Problems about TM – Post’s Correspondence Problem, The Class P And NP.

TOTAL : 45 PERIODS

TEXT BOOK:

REFERENCES:
UNIT I INTRODUCTION TO SOFT COMPUTING AND NEURAL NETWORKS 9
Evolution of Computing - Soft Computing Constituents – From Conventional AI to Computational Intelligence - Machine Learning Basics

UNIT II GENETIC ALGORITHMS 9
Introduction to Genetic Algorithms (GA) – Applications of GA in Machine Learning - Machine Learning Approach to Knowledge Acquisition.

UNIT III NEURAL NETWORKS 9

UNIT IV FUZZY LOGIC 9

UNIT V NEURO-FUZZY MODELING 9

TOTAL : 45 PERIODS

TEXT BOOKS:

REFERENCES:
UNIT I
COMMUNICATION IN DISTRIBUTED ENVIRONMENT

UNIT II
DISTRIBUTED OPERATING SYSTEMS

UNIT III
DISTRIBUTED RESOURCE MANAGEMENT
Distributed Shared Memory – Data-Centric Consistency Models – Client-Centric Consistency Models – Ivy – Munin – Distributed Scheduling – Distributed File Systems – Sun NFS.

UNIT IV
FAULT TOLERANCE AND CONSENSUS

UNIT V
CASE STUDIES
Distributed Object-Based System – CORBA – COM+ – Distributed Coordination-Based System – JINI.

TOTAL : 45 PERIODS

REFERENCES:
UNIT III  FILE SYSTEMS AND NETWORKS  9
Traditional and Multimedia File Systems-Caching Policy-Batching-Piggy backing-Ethernet-
Gigabit Ethernet-Token Ring-100VG Any LAN-Fiber Distributed Data Interface (FDDI)- ATM
Networks-MAN-WAN.

UNIT IV  COMMUNICATION  9
Transport Subsystem-Protocol Support for QOS-Transport of Multimedia-Computer Supported
Cooperative Work-Architecture-Session Management-MBone Applications.

UNIT V  SYNCHRONIZATION  9
Synchronization in Multimedia Systems-Presentation-Synchronization Types-Multimedia
Synchronization Methods-Case Studies-MHEG-MODE-ACME.

TOTAL : 45 PERIODS

TEXT BOOK:

REFERENCES:
1. Ralf Steinmetz and Klara Nahrstedt , Media Coding and Content Processing, Prentice hall,
   2002.
3. Mark J.B., Sandra K.M., Multimedia Applications Development using DVI technology,
   2002

CS 9257  XML AND WEB SERVICES  L T P C
3 0 0 3

UNIT I  XML TECHNOLOGY FAMILY  9

UNIT II  ARCHITECTING WEB SERVICES  9
Business motivations for web services – B2B – B2C- Technical motivations – limitations of
CORBA and DCOM – Service – oriented Architecture (SOA) – Architecting web services –
Implementation view – web services technology stack – logical view – composition of web
services – deployment view – from application server to peer to peer – process view – life in the
runtime

UNIT III  WEB SERVICES BUILDING BLOCK  9
Transport protocols for web services – messaging with web services – protocols – SOAP –
describing web services – WSDL – Anatomy of WSDL – manipulating WSDL – web service
policy – Discovering web services – UDDI – Anatomy of UDDI- Web service inspection – Ad-
Hoc Discovery – Securing web services.
UNIT IV IMPLEMENTING XML IN E-BUSINESS

UNIT V XML AND CONTENT MANAGEMENT

TEXT BOOKS:

REFERENCES

TOTAL: 45 PERIODS

CS9258 BIO INFORMATICS L T P C
3 0 0 3

UNIT I INTRODUCTORY CONCEPTS

UNIT II SEARCH ENGINES AND DATA VISUALIZATION

UNIT III STATISTICS AND DATA MINING
UNIT IV  PATTERN MATCHING  9

UNIT V  MODELING AND SIMULATION  9

TOTAL : 45 PERIODS

REFERENCES:

CS9259  NETWORK SECURITY  L T P C 3 0 0 3

UNIT I  INTRODUCTION  9

UNIT II  PUBLIC KEY ENCRYPTION  9
RSA - Elliptic Curve Cryptography - Number Theory Concepts

UNIT III  MESSAGE AUTHENTICATION  9
Hash Functions - Digest Functions - Digital Signatures - Authentication Protocols.

UNIT IV  NETWORK SECURITY PRACTICE  9

UNIT V  SYSTEM SECURITY  9

TOTAL : 45 PERIODS

TEXT BOOK:

REFERENCES:
UNIT I  EMBEDDED COMPUTING  
Challenges of Embedded Systems – Embedded system design process. Embedded processors – ARM processor – Architecture, ARM and Thumb Instruction sets

UNIT II  EMBEDDED C PROGRAMMING  

UNIT III  OPTIMIZING ASSEMBLY CODE  

UNIT IV  PROCESSES AND OPERATING SYSTEMS  
Multiple tasks and processes – Context switching – Scheduling policies – Interprocess communication mechanisms – Exception and interrupt handling - Performance issues.

UNIT V  EMBEDDED SYSTEM DEVELOPMENT  
Meeting real time constraints – Multi-state systems and function sequences. Embedded software development tools – Emulators and debuggers. Design methodologies – Case studies – Complete design of example embedded systems.

TOTAL : 45 PERIODS

REFERENCES:

UNIT I  FUNDAMENTALS OF IMAGE PROCESSING  

UNIT II  IMAGE ENHANCEMENT  
UNIT III IMAGE SEGMENTATION AND FEATURE ANALYSIS 9

UNIT IV MULTI RESOLUTION ANALYSIS AND COMPRESSIONS 9

UNIT V APPLICATIONS OF IMAGE PROCESSING 9

TOTAL : 45 PERIODS

REFERENCES:

CS9262 SOFTWARE QUALITY ASSURANCE L T P C
3 0 0 3


UNIT II Basics of software testing – test generation from requirements – finite state models – combinatorial designs - test selection, minimization and prioritization for regression testing – test adequacy, assessment and enhancement

UNIT III Testing strategies – white box and black box approach – integration testing – system and acceptance testing – performance testing – regression testing - internationalization testing – ad-hoc testing – website testing – usability testing – accessibility testing
Test plan – management – execution and reporting – software test automation – automated testing tools

UNIT V

Project progress control – costs – quality management standards – project process standards – management and its role in SQA – SQA unit

REFERENCES:

TOTAL : 45 PERIODS

CS9263 AD-HOC NETWORKS L T P C
3 0 0 3

UNIT I AD-HOC MAC

UNIT II AD-HOC NETWORK ROUTING & TCP

UNIT III WSN -MAC

UNIT IV WSN ROUTING, LOCALIZATION & QOS

UNIT V MESH NETWORKS

TOTAL : 45 PERIODS

REFERENCES:
UNIT I

UNIT II

UNIT III

UNIT IV

UNIT V

REFERENCES
CS9265 PERFORMANCE EVALUATION OF COMPUTER SYSTEMS AND NETWORKS L T P C 3 0 0 3


UNIT III Markovian FIFO Queuing Systems – M/M/1 – M/M/a – M/M/∞ – M/G/1 – M/M/m/m and other Markov-Non-Markovian and self-similar models – Network of Queues – Burke’s Theorem – Jackson’s Theorem.

UNIT IV Multi-User Uplinks/Downlinks – Capacity Regions – Opportunistic Scheduling for Stability and Max Throughput – Multi-Hop Routing – Mobile Networks – Throughput Optimality and Backpressure


TOTAL : 45 PERIODS

TEXT BOOKS:

REFERENCES:

CS9266 AGENT BASED INTELLIGENT SYSTEMS L T P C 3 0 0 3

UNIT II KNOWLEDGE REPRESENTATION AND REASONING 9
Logical Agents-First order logic-First Order Inference-Unification-Chaining-Resolution
Strategies-Knowledge Representation-Objects-Actions-Events

UNIT III PLANNING AGENTS 9
Planning Problem-State Space Search-Partial Order Planning-Graphs-Nondeterministic
Domains-Conditional Planning-Continuous Planning-MultiAgent Planning.

UNIT IV AGENTS AND UNCERTAINTY 9
Acting under uncertainty – Probability Notation-Bayes Rule and use - Bayesian Networks-Other
Approaches-Time and Uncertainty-Temporal Models- Utility Theory - Decision Network –
Complex Decisions.

UNIT V HIGHER LEVEL AGENTS 9
Knowledge in Learning-Relevance Information-Statistical Learning Methods-Reinforcement
Learning-Communication-Formal Grammar-Augmented Grammars- Future of AI.

TOTAL : 45 PERIODS

TEXT BOOK:
   Prentice Hall, 2002

REFERENCES:

CS9267 VISUALIZATION TECHNIQUES L T P C
3 0 0 3

UNIT I VISUALIZATION 9
Introduction – Issues – Data Representation – Data Presentation - Interaction

UNIT II FOUNDATIONS FOR DATA VISUALIZATION 9
Visualization stages – Experimental Semiotics based on Perception Gibson's Affordance theory –
A Model of Perceptual Processing – Types of Data.

UNIT III COMPUTER VISUALIZATION 9
Non-Computer Visualization – Computer Visualization: Exploring Complex Information Spaces –
Fisheye Views – Applications – Comprehensible Fisheye views – Fisheye views for 3D data –
Non Linear Magnification – Comparing Visualization of Information Spaces – Abstraction in
computer Graphics – Abstraction in user interfaces.

UNIT IV MULTIDIMENSIONAL VISUALIZATION 9
UNIT V  CASE STUDIES  9
Small interactive calendars – Selecting one from many – Web browsing through a key hole – Communication analysis – Archival analysis

TOTAL : 45 PERIODS

TEXT BOOKS:

REFERENCE:

CS9268  ADVANCED DATABASES  L T P C
3 0 0 3

UNIT I  PARALLEL AND DISTRIBUTED DATABASES  9

UNIT II  OBJECT AND OBJECT RELATIONAL DATABASES  9

UNIT III  XML DATABASES  9

UNIT IV  MOBILE DATABASES  9
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

UNIT V  MULTIMEDIA DATABASES  9

TOTAL : 45 PERIODS
REFERENCES:

CS9269 SOFTWARE PROJECT MANAGEMENT  L T P C
3 0 0 3

UNIT I BASIC CONCEPTS

UNIT II FORMAT PROCESS MODELS AND THEIR USE
Definition and Format model for a process – The ISO 9001 and CMM Models and their relevance to Project Management – Other Emerging Models like People CMM.

UNIT III UMBRELLA ACTIVITIES IN PROJECTS

UNIT IV IN STREAM ACTIVITIES IN PROJECTS
Project Initiation – Project Planning – Execution and Tracking – Project Wind up – Concept of Process/Project Database.

UNIT V ENGINEERING AND PEOPLE ISSUES IN PROJECT MANAGEMENT

TOTAL : 45 PERIODS

REFERENCES:
4. Bob Hughes and Mike Cotterell,"Software Project Management".
UNIT I    INTRODUCTION

UNIT II    JAVA COMPONENT TECHNOLOGIES

UNIT III    CORBA TECHNOLOGIES

UNIT IV    COM AND .NET TECHNOLOGIES

UNIT V    COMPONENT FRAMEWORKS AND DEVELOPMENT

TOTAL : 45 PERIODS

TEXT BOOK:

REFERENCE: