Revised Syllabus of

M.E. (COMPUTER SCIENCE)

[ Effective from July-2013 - 2014 ]

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DEAN Engineering
Dr.B.A.M.U

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Chairman,BOS
Dr.B.A.M.U
# DEGREE OF MASTER OF ENGINEERING (Computer Science)

( Course with effective from Academic Year: 2013-2014 )

<table>
<thead>
<tr>
<th>I</th>
<th>The examination for the Degree of Master of Engineering (Computer Networking Engineering) will be held in four semesters, M.E. Semester-I, M.E. Semester-II, M.E. Semester-III, and M.E. Semester-IV in case of full time course</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Rule for admission to P.G. Degree course in Engineering and Technology refer circular no. ACAD/PROF/ENGG/ME./17/2001-2002 of Dr. Babasaheb Ambedkar Marathwada University, Aurangabad</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>II</th>
<th>The assessment of the term work for any subject will be done by recognized postgraduate teacher.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Rule for assessment of marks are based on Cumulative Grade Point Average (CGPA) system. Refer university circular no :</td>
</tr>
<tr>
<td>3</td>
<td>A candidate will not be allowed to appear for M.E. Semester-III examination unless he passes in all heads of passing under M.E. Semester-I, M.E. Semester-II examination.</td>
</tr>
<tr>
<td>4</td>
<td>Whenever a candidate reappears for M.E. Semester-III and M.E. Semester-IV examinations he will have to resubmit the dissertation with suitable modification and must also reappear for oral examination on it.</td>
</tr>
<tr>
<td>5</td>
<td>A candidate registered for M.E. Examination must clear his examination within five years from the date of registration.</td>
</tr>
</tbody>
</table>

## Rules & Eligibility

1. There shall be an Entrance Examination for admission to the PG Course.

2. There shall be an Admission Committee for PG Course in each college for PG studies consisting of the principal of the College as Chairman, HOD of the concerned Department and one senior staff member of the concerned Department, as members and one Nominee of Dr. B.A.M.U. as its member.

3. The Admission Committee shall hold the concerned Examination and shall also conduct the interview of the Candidates. The principal should approach the University for the Nominee of Dr. B.A.M.U.

4. Based on the performance of the Candidates in the entrance examination, merit of the qualifying examination and performance in the interview, ranking shall be prepared and according admission shall be made in order of merit.

## Attendance Requirement

1. Each semester of the course shall be treated as a separate unit for calculation of the attendance

2. A candidate shall be considered to have satisfied the attendance requirement if he/she has attended not less 75% of the class in each subject of all the semesters (Theory, Laboratory, Semester Practical training and Dissertation work) actually conducted up to the end of the semester.

3. A Candidate, who does not satisfy the attendance required, mentioned as above, shall not be eligible to appear for the Examination of that semester and shall be required to repeat that semester along with regular students later.

4. The Principal of the concerned College shall display regularly, the list of such candidates who fall short of attendance, on the Notice Boards.

5. The list of the candidates falling short of attendance shall be sent to the University at least one week prior to the commencement of theory/practical examination, whichever is earlier.
<table>
<thead>
<tr>
<th></th>
<th>Paper setting and Evaluation of Theory Examination</th>
</tr>
</thead>
<tbody>
<tr>
<td>V</td>
<td>The Question papers in theory subjects shall be set by the Examiners appointed for the purpose by the University on the recommendations of the Board of studies of the concerned PG Course.</td>
</tr>
<tr>
<td>VI</td>
<td>The following are the syllabi in the various subjects of the examination for the Degree of Master of Engineering (Computer Science)</td>
</tr>
</tbody>
</table>
### Faculty of Engineering And Technology
### Tentative Structure for ME (COMPETTER SCIENCE)

<table>
<thead>
<tr>
<th>Sub</th>
<th>Semester – I</th>
<th>Contact Hrs/Week</th>
<th>Examination Scheme (Marks)</th>
<th>Duration of Theory Examination</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Subject</td>
<td>Subject Code</td>
<td>L</td>
<td>T</td>
<td>P</td>
</tr>
<tr>
<td>1</td>
<td>Machine Learning</td>
<td>MCE601</td>
<td>3</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>2</td>
<td>Advanced Database Management System</td>
<td>MCE602</td>
<td>3</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>3</td>
<td>Advanced Algorithm</td>
<td>MCE603</td>
<td>3</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>4</td>
<td>Computer Network Protocol design</td>
<td>MCE604</td>
<td>3</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>5</td>
<td>Elective – I</td>
<td>MCE641, MCE642, MCE643</td>
<td>3</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>6</td>
<td>Software Development Laboratory – I</td>
<td>MCE621</td>
<td>-</td>
<td>-</td>
<td>4</td>
</tr>
<tr>
<td>7</td>
<td>Software Development Laboratory – II</td>
<td>MCE622</td>
<td>2</td>
<td>2</td>
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<tr>
<td>7</td>
<td>Seminar.</td>
<td>MCE623</td>
<td></td>
<td>2</td>
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<tr>
<td></td>
<td>Total of Part – I</td>
<td></td>
<td>15</td>
<td>6</td>
<td>2</td>
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</tbody>
</table>

**L:** Lecture hours per week  
**T:** Tutorial Hours per week  
**P:** Practical hours per week  
**CH:** Contact Hours  
**CT:** Class Test  
**TH:** University Theory Examination  
**TW:** Termwork  
**P:** Practical / Oral Examination  

**Elective – I**  
1. MCE641-Advanced Computer Architecture  
2. MCE642-Real Time Systems  
3. MCE643-Remote Sensing
## Faculty of Engineering And Technology
### Tentative Structure for ME (COMPUTER SCIENCE)

<table>
<thead>
<tr>
<th>Sub</th>
<th>Semester – II</th>
<th>Contact Hrs/Week</th>
<th>Examination Scheme (Marks)</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Subject</td>
<td>Subject Code</td>
<td>L</td>
</tr>
<tr>
<td>1</td>
<td>Internal of Operating System</td>
<td>MCE751</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>Computer Vision</td>
<td>MCE752</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>Performance Analysis and Simulation</td>
<td>MCE753</td>
<td>3</td>
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<tr>
<td>4</td>
<td>Data Mining and Big Data</td>
<td>MCE754</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>Elective – II</td>
<td>MCE791, MCE792, MCE793</td>
<td>3</td>
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<tr>
<td>6</td>
<td>Software Development Laboratory – III</td>
<td>MCE771</td>
<td>-</td>
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<tr>
<td>7</td>
<td>Software Development Laboratory – IV</td>
<td>MCE772</td>
<td>-</td>
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<tr>
<td>8</td>
<td>Mini Project</td>
<td>MCE773</td>
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<td>Total of Part – II</td>
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P: Practical hours per week  
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TH: University Theory Examination  
TW: Termwork  
P: Practical / Oral Examination

**Elective – II**

1. MCE791-Object Oriented System and Design
2. MCE792-Wireless Communication and Mobile Computing
3. MCE793-Information Security
Faculty of Engineering And Technology
Tentative Structure for ME (COMPUTER SCIENCE)

<table>
<thead>
<tr>
<th>Sub</th>
<th>Semester – III</th>
<th>Contact Hrs/Week</th>
<th>Examination Scheme (Marks)</th>
<th>Duration of Theory Examination</th>
<th>Credit</th>
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<tbody>
<tr>
<td></td>
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<td></td>
<td>Subject Code</td>
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<tr>
<td>1</td>
<td>Dissertation</td>
<td>MCE731</td>
<td>- -</td>
<td>12</td>
<td>12</td>
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<tr>
<td></td>
<td>(Part - I)</td>
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<tr>
<td></td>
<td>Total of Part – III</td>
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<td>12</td>
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<thead>
<tr>
<th>Sub</th>
<th>Semester – IV</th>
<th>Contact Hrs/Week</th>
<th>Examination Scheme (Marks)</th>
<th>Duration of Theory Examination</th>
<th>Credit</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Subject Code</td>
<td>L</td>
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<td></td>
</tr>
<tr>
<td>1</td>
<td>Dissertation</td>
<td>MCE781</td>
<td>- -</td>
<td>20</td>
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<tr>
<td></td>
<td>(Part - II)</td>
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<td>Total of Part – IV</td>
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<td>20</td>
<td>20</td>
</tr>
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Total:- SEM-I + SEM-II + SEM-III + SEM-IV  
= 24 + 24 + 12 + 20  
= 80
DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY
AURANGABAD
FACULTY OF ENGINEERING AND TECHNOLOGY
First Year Engineering ME (CS)
Semester – I
MCE601: Machine Learning

Teaching Scheme
Lectures: 3 Hrs/Week
Tutorial: 1 Hr/Week

Examination Scheme
Theory: 80 Marks
Class Test: 20 Marks
Duration of theory paper: 03 Hrs.

Course objectives:
- After completion of this course student can learn Learning methods, Forms of learning.
- It also covers some concepts of Genetic Algorithm

Prerequisites: Basic concepts of Artificial Neural Network at UG level.

Unit I: Introduction (6 Hrs)
Well-posed learning problems, Designing a learning system, perspectives and issues in machine learning
Concept learning and the General-to-specific ordering:
A concept learning task, Concept learning as search, FIND-S: Finding a maximality specific hypothesis, Version spaces and the candidate-elimination algorithm, Remarks on version spaces and candidate-elimination, Inductive bias

Unit II: Decision Tree Learning (8 Hrs)
Introduction, Decision tree representation, Approximate problems for decision tree learning, The basic decision tree learning algorithm, Hypothesis space in decision tree learning, Issues in decision tree learning
Artificial Neural Networks:
Introduction, Neural Network Representations, Appropriate problems for neural network learning, Perceptrons, multilayer networks and the backpropagation algorithm, Remarks on the backpropagation rule, an illustrative example, Advanced topics in artificial neural networks

Unit III: Evaluating Hypotheses (6 Hrs)
Motivation, Estimating hypotheses accuracy, basics of sampling theory, a general approach for deriving confidence intervals, difference in error of 2 hypotheses, comparing learning algorithms

Unit IV: Bayesian learning (7 Hrs)
Introduction, Bayes theorem Bayes theorem and concept learning, maximum likelihood and least-squared error hypotheses, maximum likelihood hypotheses for predicting probabilities, minimum description length principle, Bayes optimal classifier, Gibbs algorithm, Naïve Bayes classifier, an example: learning to classify text, Bayesian belief networks, The EM algorithm

Unit V: Computational Learning Theory (7 Hrs)
Introduction, Probably learning an approximately correct hypothesis, Sample complexity for finite hypothesis spaces, sample complexity for infinite hypothesis spaces, the mistake bound model of learning, Instance-based learning: Introduction, K-nearest neighbor learning, Locally weighted regression, radial basis functions, case-based reasoning, remarks on Lazy and Eager learning.

Unit VI: Genetic Algorithms (6 Hrs)
Motivation, Genetic algorithms, An illustrative example, Hypotheses space search, Genetic programming, models of evolution and learning, parallelizing genetic algorithms

Text Book:

Reference Books:
1. S.N. Sivanandanam, S.Sumathi, S. Deepa, “Introduction to Neural Networks using Matlab6.0,” TMH.
Teaching Scheme
Lectures: 3 Hrs/Week
Tutorial: 1 Hr/Week

Examination Scheme
Theory: 80 Marks
Class Test: 20 Marks
Duration of theory paper: 03 Hrs.

Course objectives:
- To cover advanced concepts of Database Management System.
- To study parallel, object oriented and distributed architectures of database systems.
- To understand web databases using XML.
- To familiarize with mobile and multimedia database systems.

Prerequisites: Basic concepts of DBMS & RDBMS at UG level.

UNIT 1
Transaction Processing
(06 Hrs)

UNIT 2
Parallel Databases
(06 Hrs)

UNIT 3
Distributed Databases
(08 Hrs)
Distributed Database Concepts: Data Fragmentation, Replication, and Allocation Techniques for Distributed Database Design- Types of Distributed Database Systems, Query Processing in Distributed Databases, Overview of Concurrency Control and Recovery in Distributed Databases-An Overview of 3-Tier Client-Server Architecture-Distributed Databases in Oracle, Cloud-Based Databases.

UNIT 4
Object And Object Relational Databases
(08 Hrs)
UNIT 5
Xml and Web Databases

UNIT 6
Mobile & Multimedia Databases

Text Books:

Reference Books:
DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY
AURANGABAD
FACULTY OF ENGINEERING AND TECHNOLOGY
First Year Engineering ME (CSE)
Semester – I
MCE603: Advanced Algorithms

Teaching Scheme
Lectures: 3 Hrs/Week
Tutorial: 1 Hr/Week

Examination Scheme
Theory: 80 Marks
Class Test: 20 Marks
Duration of theory paper: 03 Hrs.

Course objectives:
- To develop the appropriate background, foundation and experience for advanced study in Computer Science
- To develop the necessary skills from both a theoretical perspective as well as applying their knowledge on various problem sets
- To develop the skills to design and implement efficient programming solutions to various problems

Unit 1: ROLE OF ALGORITHMS IN COMPUTING 8 Hrs

Unit 2: PROBABILISTIC ANALYSIS AND RANDOMIZED ALGORITHMS 6 Hrs

Unit 3: SORTING AND ORDER STATISTICS 6 Hrs
The sorting problem, Radix sorting, sorting by comparisons, Heap sort- an O (n log n) comparison sort, Quick sort- an O (n log n) expected time sort, order statistics, Expected time for order statistics

Unit 4: NUMBER THEORY ALGORITHMS 8 Hrs
The similarity between integers and polynomials, Integer multiplication and division, Polynomial multiplication and division, Euclid’s GCD algorithm, an asymptotically fast algorithm for polynomial GCD’s, The DFT and FFT, efficient FFT implementations

Unit 5: STRING AND PATTERN MATCHING ALGORITHMS 6 Hrs
The naïve string matching algorithm, The Rabin-Karp Algorithm, String matching with finite automata Finite Automata and Regular expressions, Recognition of regular expression patterns, Recognition of substrings, Position trees and substring identifiers

Unit 6: NP-Completeness 6 Hrs
The classes P and NP, Cooks theorem, NP-complete problems: 3-SAT, clique, vertex-cover problem, Hamiltonian cycle, independent set, feedback edge set.

Reference Books:
Teaching Scheme
Lectures: 3 Hrs/Week
Tutorial: 1 Hr/Week

Examination Scheme
Theory: 80 Marks
Class Test: 20 Marks
Duration of theory paper: 03 Hrs.

Course Objectives:
1. Student should be able to understand internals of computer networking.
2. Students should be able to design network traffic modeling.

Unit-I Random Processes (6 Hrs)

Unit-II Markov Chains (6 Hrs)

Unit-III Queuing Analysis (6 Hrs)
Introduction, Queue Throughput, M/M/1 Queue, M/M/1/B Queue, Mm/M/1/B Queue, M/Mm/1/B Queue, D/M/1/B Queue, M/D/1/B Queue and performance each queue type.

Unit-IV Modeling Traffic Flow and Error Control Protocols (8 Hrs)
Modeling the Leaky Bucket Algorithm, Single Arrival/Single Departure Model (M/M/1/B), Leaky Bucket Performance (M/M/1/B Case), Multiple Arrival/Single Departure Model (Mm/M/1/B), Leaky Bucket Performance (Mm/M/1/B Case); Modeling the Token Bucket Algorithm Single Arrival/Single Departures Model (M/M/1/B), Token Bucket Performance (M/M/1/B Case), Multiple Arrivals/Single Departures Model (Mm/M/1/B), Token Bucket Performance (Multiple Arrival/Departure Case); Modeling Stop-and-Wait ARQ, ARQ Performance Modeling, Go back n protocol and GBN ARQ Performance.

Unit V: Modeling Network Traffic (7 Hrs)

Unit-VI: Scheduling Algorithms (7 Hrs)
Packet Selection Policy, Packet Dropping Policy, Fair Sharing Policy, Scheduling as an Optimization Problem, Scheduler Design Issues, Rate-Based Versus Credit-Based Scheduling, Analysis of Common Scheduling Algorithms, First-In/First-Out (FIFO), Static Priority (SP) Scheduler, Round Robin Scheduler (RR), Weighted Round Robin Scheduler (WRR) and Max–Min Fairness Scheduling

**Reference Books:**
3. Dayanand Ambawade, Dr. Deven Shah, Mahendra Mehra,”Advanced Computer network” dreamtech press.
Teaching Scheme
Lectures: 3 Hrs/Week
Tutorial: 1 Hr/Week

Examination Scheme
Theory: 80 Marks
Class Test: 20 Marks
Duration of theory paper: 03 Hrs.

Unit – I

Unit – II
Pipelining Techniques:- Linear pipeline processors, nonlinear pipeline processors, Instruction pipeline design, Arithmetic pipeline design.

Unit – III
Super Scalar techniques: Super scalar and super-pipeline design
SIMD array processors: - features and organization, interconnecting networks, parallel algorithms for array processors,

Unit IV
Associative array processing and processors, Performance enhancement of array processors. Vector processing principles and vector instructions, Vector processors

Unit – V
Multiprocessor and multicomputer:- Structures, multiprocessor system interconnects, cache coherence and synchronization mechanisms, Three generations of multi-computers, message passing mechanisms.

Unit – VI
RISC processors, the VLIW Architecture, case studies of at least two of the architectures studied above. Brief introduction to parallel processing models and languages

Reference Books:
1. Advanced Computer Architecture by Kai Wang, TMH.
5. Modern processor Design: Fundamentals of Super scalar Processors Shen and Lipasti, TMH
Course Objective:
- The contents aims to develop the knowledge of the student in the direction of Real Time Systems and solving the practical problems in the development of typical real time application.

Unit-I: Introduction and Requirement analysis of real time systems (6 Hrs)
Real time systems, Types of real time systems, Basic architecture of real time systems, Task description, Characteristics of real time systems, What is requirement analysis? Difference between analysis of general purpose systems and real time systems, Estimation of execution time, Framing of task’s various parameters such as release time, period of invocation, computation time and deadlines.

Unit-II: Design issues in real time systems and Programming in real time systems (8 Hrs)
Difference between design of general purpose systems and real time systems. Use of model driven engineering in real time system design, Real time system design using Event Studio, Feature descriptive language to describe design of real time systems, Case studies of real time system design, Difference between programming of general purpose systems and real time systems. Various programming languages for real systems, Ada, Real Time Java.

Unit-III: Real time operating systems (6 Hrs)
Difference between operating system of general purpose systems (GPOS) and real time operating systems. Monolythic OS and Modular OS, Kernel, microkernel and nanokernel, RT LINUX, POSIX APIs, LynxOS, VxWorks, Resource management in real time systems.

Unit-IV: Real time database systems (6 Hrs)
Difference between data base system of general purpose systems and real time Database systems, Architecture of real time database systems, Concurrency issues of real time database systems, Scheduling of RTDB transaction, Quality service in real time database, In memory database systems, Design issues of in memory database systems.

Unit-V: Real Time Communication (6 Hrs)
Need for real time communication, Network topology in real time communication, Message sending techniques, Real time communication network design issues, Various real time communication protocols.
Unit-VI: Real-time scheduling (8 Hrs)
What is real time scheduling, classification of real time scheduling algorithms, various scheduling properties, Various scheduling metrics, Independent task scheduling algorithms, Aperiodic task scheduling algorithms, Precedence constraint task scheduling algorithms

Reference Books:
2. Phillips A.Laplante, “Real time systems design and analysis” IEEE and Wiley publication
Teaching Scheme
Lectures: 3 Hrs/Week
Tutorial: 1 Hr/Week

Examination Scheme
Theory: 80 Marks
Class Test: 20 Marks
Duration of theory paper: 03 Hrs.

Course objectives:
- To articulate the basics of how electromagnetic energy enables remote sensing and be able to describe why different wavelength regions of the electromagnetic spectrum are useful for different types of remote sensing as well as why various portions of the electromagnetic spectrum cannot be used for remote sensing.
- To explain the concepts of spatial, spectral, radiometric and temporal resolution and how they impact the selection of the most appropriate data source(s) for a particular analytical task. Students will also be able to compare and contrast current common sensors on the basis of these properties and explain if a sensor is useful for particular tasks.
- To describe spectral signatures and use this knowledge to explain how different wavelengths can successfully be used to differentiate between different land surface types.
- To explain and perform fundamental digital image processing tasks including: radiometric preprocessing, and supervised and unsupervised image classification.
- To perform Remote Sensed Image analysis and classification using ENVI/MatLab on different data sets.

Section-A

Unit 1: Concepts of Remote Sensing 8 hrs
- Principles of Remote sensing
- History of Remote sensing
- Remote sensing in India,
- Electromagnetic radiation:
  - Electromagnetic Radiation and Electromagnetic Spectrum, EMR quantities: Nomenclature and Units
  - Thermal Emission of Radiation, Radiation Principles, Interaction of EMR with the Earth Surface
  - Spectral signature, Reflectance characteristics of Earths cover types, Remote sensing systems
  - Human vision colors
  - Spectral signatures and their interpretation

Unit 2: Airborne & Space borne platforms and sensors 6 hrs
- Platforms, Types of sensors, resolutions sensor, Passive and Active Sensors, Optical sensors,
• Satellite missions: Landsat series, SPOT series, IRS

Unit 3: Multispectral, thermal and Hyperspectral Sensing  6 hrs
• Multispectral Sensing Concept,
• thermal Sensing Concept
• Hyperspectral Sensing Concept
• Sample imagery

Section-B

Unit 4: Interpretations of Remote Sensing Images  8 hrs
• Types of interpretation, Interpretation Phase.
• Visual Interpretation, Criteria for visual interpretation, Elements for visual analysis.
• Digital image processing enhancement and correction: Structure, Media and data organization, Equipments, visual enhancement, image correction, Radiometric and Geometric corrections.

Unit 5: Image information extraction  6 hrs
• Supervised classification
• Unsupervised classification
• Fuzzy classification
• Expert systems

Unit 6: Accuracy assessment & Application of Remote Sensing  6 hrs
• Accuracy assessment method
• Agriculture and forestry
• Urban and regional development

Lab Course

1. Electromagnetic radiation.
2. Photo interpretation: Spaceborne systems.
3. Introduction to image processing: (1) Spectral signatures.
4. Introduction to image processing: Image interpretation.
5. Geometric correction and image matching: Image restoration and enhancement
6. Image statistics, enhancement and filters: Image information extraction

Text Books:

Reference Books

- Remote sensing Notes –Edited by Japan Associates of Remote sensing- JARS 1999
- Introduction to Remote Sensing, Campbell James, Taylor & Francis London.
- Photogrammetry and Remote Sensing (2000), Lecture notes, Module I, IIRS

Web Resources

- www.esriindia.com
- http://www.exelisvis.com/ProductsServices/ENVI.aspx
- http://rst.gsfc.nasa.gov/start.html
- http://www.isro.org/

Journals

- IEEE Transactions on Geo-science and Remote sensing.
- GeoCarto International.
- ITC Journal.
- ISPRS Journal of Photogrammetry and advances in space research.
MCE621: Software Development Laboratory -I

**Teaching Scheme**
Practicals: 4 Hrs/Week

**Examination Scheme**
Practical/Oral : 50 Marks

Software Development Laboratory –I shall be based on the subjects Machine Learning and protocol design in computer network

Minimum 6 experiments of each above subject shall be implemented by students.

Practical examination will consist of a practical and viva based on the practical work done during the semester.

MCE622: Software Development Laboratory -II

**Teaching Scheme**
Practicals: 2 Hrs/Week

**Examination Scheme**
Term Work : 50 Marks

Software Development Laboratory –I shall be based on the subjects Advanced database management systems and Elective I

Minimum 6 experiments of each above subject shall be implemented by students.

Internal submission examination will consist of a practical and viva based on the practical work done during the semester.
Teaching Scheme
Contact Hours: 2 Hrs/Week

Examination Scheme
Term Work : 50 Marks

Seminar should be evaluated on the following basis
  - Depth of Literature survey
  - PPT prepared and Presentation skills
  - Understanding of subject
  - Report preparation
Course objectives:

- Expose students to current and classical operating systems literature
- Give students an understanding of various operating systems flavors required for various purposes

Section-A

Unit 1: Windows internals  
Architecture Overview, Local Procedure Calls, process and Thread management, Memory management in Windows, I/O management and storage management and File systems in Windows.

Unit 2: Linux internals  

Unit 3: Windows Azure Operating System for Cloud Computing  

Section-B

Unit 4: Operating System for Multicore Processors  
Assignment, Determining the Granularity of Tasks, Scaling Workloads and Machines, Shared Memory Multiprocessors, Cache Coherence

**Unit 5: RTOS and EOS**  
**6 hrs**  
RTOS Vs. GPOS, RTLinux kernel Vs Linux kernel, Design, microkernel, nano kernel architectures Issues of RTOS, EOS VS RTOS, Design issues of EOS, RTLinux, QNX, VxWorks, LynxOS, Windows CE

**Unit 6: Operating system Security**  
**6 hrs**  
Security Ratings, Trusted Computer System Evaluation Critiera, Common criteria, Difference between security of Windows and Linux, why Linux is more secure than Windows?, Windows and Linux security components, Account rights and policy, security auditing mechanism, Windows and Linux.

**Reference Books:**
Course Objectives:
- To provide a glimpse of what computer vision is about
- To give an understanding of image processing for computer vision
- To study 3D vision
- To analyse motion images

Unit –I (7 Hrs )
Introduction to Computer Vision, Review of image processing concepts like filtering elementary segmentation techniques, transforms etc.
Image segmentation: Mean shift segmentation, Active controls model, 3D graph based segmentation and graph Cut segmentation.

Unit –II (7 Hrs)
Object and Pattern Recognition:- Elementary methods of Statistical, syntactic and neural net object /pattern recognition.

Unit –III (6 Hrs)
Recognition as graph matching, Dimensionality Reduction : PCA and LDA , non parametric methodologies (clustering) for grouping of objects

Unit –IV (7 Hrs)
Shape representation and description: Contour based and region based.
Image Understanding:- Image Understanding control strategies, RANSAC: filtering via random sample consensus., point distribution models, Active apperance models.

Unit-V (7 Hrs)
3D Vision:- 3D Vision tasks ,Basics of projective geometry, A single perspective camera, Scène construction form multiple views.
Textures: Statistical and symentatic texture description methods, Applications

Unit –VI (6 Hrs)
Motion Analysis:- Differential motion Analysis methods ,optical flow, video tracing ,detection of specific motion patterns.


**Reference Books:**

Course objectives:
- To explore fundamentals of computer systems performance analysis
- To develop experience in the "practice" of systems analysis
- To introduce simulation techniques applied in performance modeling of computer systems

Unit 1: INTRODUCTION  
Introduction to performance Evaluation; Common Mistakes in Performance Analysis and How to avoid them; Selection of Techniques and Metrics: selecting an evaluation technique, selecting performance metrics, commonly used performance metrics, utility classification and setting performance requirements

Unit 2: MEASUREMENT TECHNIQUES AND TOOLS  
Types of Workloads; Workload Selection; Workload Characterization Techniques: Terminology, averaging, specifying dispersion, single-parameter and multi-parameter histograms, principal component analysis, markov models, clustering, Hardware and Software monitors

Unit 3: ANALYSIS  
OS Components: System Architecture, Workloads, Design, Simulation, Analysis; Database System Performance; Computer Networks Components: Simulation and Modeling of LAN.

Unit 4: INTRODUCTION TO SIMULATION AND MODELING  
Simulation – introduction, appropriate and not appropriate, advantages and disadvantage, application areas, history of simulation software, an evaluation and selection technique for simulation software, general – purpose simulation packages. System and system environment, components of system, type of systems, model of a system, types of models and steps in simulation study.

Unit 5: RANDOM NUMBER GENERATION  
Properties of random numbers, generation of true and pseudo random numbers, techniques for generating random numbers, hypothesis testing, various tests for uniformity (Kolmogorov-Smirnov and chi-Square) and independence (runs, autocorrelation, gap, poker).

Unit 6: VERIFICATION AND VALIDATION OF SIMULATION MODEL  

Introduction; model building; verification of simulation models; calibration and validation of models: validation process, face validity, validation of model, validating input-output transformation, t-test, power of test, input output validation using historical data and Turing test.

**Reference Books:**

Teaching Scheme | Examination Scheme
---|---
Lectures: 3 Hrs/Week | Theory: 80 Marks
Tutorial: 1 Hr/Week | Class Test: 20 Marks
Duration of theory paper: 03 Hrs.

Course Objectives:
1. The explore different techniques of data mining
2. To apply data mining in real world application
3. To introduce Big Data Tools and applications

Unit 1: (6 Hrs)
Mining Frequent Patterns, Associations: Basic Concepts, Efficient and Scalable Frequent Itemset Mining methods (Apriori Algorithm, improving efficiency of Apriori, Mining frequent Itemsets without Candidate generation, using vertical data formats, closed frequent itemsets). Mining various kinds of association rules, from association analysis to Correlation analysis, constraint-based association mining.

Unit 2: (6 Hrs)
Types of data in cluster analysis, classical Partitioning methods: k-Means and k-Medoids, Hierarchical clustering, outliers.

Unit 3: (8 hrs)
Graph Mining, Social Network Analysis, Web Mining: Types of Web mining, information retrieval and web search, Temporal Mining, Sequence mining, Spatial Mining.

Unit 4: (4 Hrs)
Introduction to Big Data, Getting Up to Speed with Big Data - What Is Big Data?, What is apache hadoop, Why Big Data is Big.

Unit 5: (8 Hrs)

Unit 6: (8 Hrs)

Reference Books:
1. Data Mining: Concepts and Techniques by Jiawei Han, Micheline Kamber, Morgan Kaufmann Publishers.
5. Frank Ohlhorst, “Big data Analytics” Wiely Publication.
   Big Data Now: Current Perspectives from O’Reilly Radar, O’Reilly Media, Inc.
Teaching Scheme | Examination Scheme
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Lectures: 3 Hrs/Week | Theory: 80 Marks
Tutorial: 1 Hr/Week | Class Test: 20 Marks
Duration of theory paper: 03 Hrs.

Course objectives:
- To apply the process of object-oriented analysis and design for software development
- To develop the skills to determine which processes & OOAD techniques should be applied to a given project.
- Use the widely adopted graphical modeling language - the Unified Modeling Language (UML)

Section-A

Unit 1: Introducing Object Oriented Software Development Process  6 Hrs
- The inherent complexity of software
- The structure of complex systems bringing order to chaos, on designing complex systems
- categories of analysis & design methods
- Object-Oriented Software Development (OOSD) process
- Structure Analysis Vs OO Analysis
- Modeling and OOSD process
- Requirements Gathering, Requirements Analysis

Unit 2: Class Diagram  6 hrs
- Identify a set of candidate key abstractions
- Identify the key abstractions using CRC analysis
- Constructing the Problem Domain Model
- Components of a UML Class diagram
- Construct a Domain model using a Class diagram
- Components of a UML Object diagram
- Validate the Domain model with one or more Object diagrams

Unit 3: Use Case Diagrams  8 hrs
- Use Case diagram
- Components of UML Use Case diagram
- Develop a Use Case diagram for a software system
- Recognize and document use case dependencies using UML notation for extends, includes, and generalization
- UML packaged views
- Identify and document scenarios for a use case
• Create a Use Case form describing a summary of the scenarios in the main and alternate flows
• Describe how to reference included and extending use cases.
• Identify and document non-functional requirements (NFRs), business rules, risks, and priorities for a use case

Section-B

Unit 4: Transitioning from Analysis to Design using Interaction Diagrams  5 hrs
• Purpose and elements of the Design model
• Components of a UML Communication diagram
• Create a Communication diagram view of the Design model
• Components of a UML Sequence diagram
• Create a Sequence diagram view of the Design model

Unit 5: State Machine Diagrams & Activity Diagrams  5 hrs
• Model object state
• Components of a UML State Machine diagram
• Components of a UML Activity diagram
• Model a Use Case flow of events using an Activity diagram

Unit 6: Applying Design Patterns to the Design Model  10 hrs
• Define the essential elements of a software pattern
• Describe the Creational pattern
• Describe the Structural pattern
• Describe the Behavioral pattern

Reference Books:
4. Gamma, Belm, Johnson, “Design Patterns: Elements of Reusable Object Oriented Software”
First Year Engineering ME (CS)
Semester – II

MCE792: Elective-II: Wireless Communication & Mobile Computing

Teaching Scheme
Lectures: 3 Hrs/Week
Tutorial: 1 Hr/Week

Examination Scheme
Theory: 80 Marks
Class Test: 20 Marks
Duration of theory paper: 03 Hrs.

Course objectives:
• To learn the basics of Wireless communications technologies.
• To build working knowledge on various telephone and satellite networks.
• To study the working principles of wireless LAN and its standards.
• To build knowledge on various Mobile Operating Systems.
• To build skills in working with Wireless application Protocols to develop mobile content applications.

Section-A

Unit 1: Fundamentals of Wireless Communication 6 Hrs
• Evolution of Wireless Communications, Applications, Examples of Wireless Communication Systems,
• Multiple Access Technique- TDMA, CDMA, FDMA,SDMA,
• Introduction to Medium Access Control, Telecommunication System, Satellite System, Broadcasting Systems,
• Emerging Technologies- Bluetooth, WiFi, WiMAX, 3G, WAT, EDGE.

Unit 2: Wireless Protocols 6 Hrs
• WAP- Model, Architecture, WML,
• Media Access Techniques- ALOHA, CSMA, Wireless LAN, MAN, WAN, IEEE 802.11,
• Wireless Routing Protocols- Mobile IP, IPv4, IPv6, Wireless TCP,
• Mobility Management & Hand off Management

Unit 3: GSM & GPRS 8 Hrs
• Global System for Mobile (GSM) - Features, Architecture, GSM Channel, Network Aspect, Operations, Administration and Maintenance.
• General Packet Radio Service (GPRS) - Features, Architecture, Network Operations, Applications.

Section-B

Unit 4: Mobile Computing Environment 6 Hrs
• Functions-architecture-design considerations
• Content architecture -CC/PP exchange protocol ,context manager
• Data management issues
• Data replication for mobile computers
• File system
• Caching schemes
• Mobility QOS.

**Unit 5: Wireless Devices and Their Operating Systems**

6 Hrs

• PalmOS
• Windows CE
• EPOC
• Symbian OS
• Linux for Mobile Devices
• Mobile Agents

**Unit 6: Issues and Challenges**

8 Hrs

• Issues and challenges of mobile networks - Location Management, Resource Management, Routing
• Security Issues , Security Models, Authentication in mobile applications, Privacy Issues, Power management, Energy awareness computing
• Mobile IP and Ad-hoc networks
• VoIP applications

**Reference Books**

5. S: Stallings, W. “Wireless Communications and Networks”
6. Dr. Sunilkumar Manvi, M. Kakkasageri,”Wireless and Mobile Network Concepts & Protocols, Wiley-India
Course Objectives:
- Students should be able to understand various issues of computer security.
- Students should be able to design security policies and various mechanisms required for the same.

Unit-I : Introduction

Unit-II : Security Policies

Unit-III : Cryptography

Unit - IV : Logical Design & Physical Design

Unit-V : Anti-Virus Techniques
Detection: Static Methods, Dynamic Methods, Comparison of Anti-Virus Detection Techniques, Verification, Quarantine, and Disinfection, Virus Databases and Virus Description Languages, Anti-Stealth Techniques, Macro Virus Detection, Compiler Optimization, Anti-anti-virus techniques: Retroviruses, Entry Point Obfuscation, Anti-Emulation, Armoring, Tunneling, Integrity Checker Attacks, Avoidance.
Unit-VI: Cellular Network Security

(7 Hrs)


Reference Books:
**Teaching Scheme**
Practical: 4 Hrs/Week

**Examination Scheme**
Practical : 50 Marks

Software Development Laboratory –II shall be based on the subjects Computer Vision and Internals of Operating System.

Minimum 6 experiments of each above subject shall be implemented by students.

Practical examination will consist of a practical and viva based on the practical work done during the semester

**Teaching Scheme**
Practical: 2 Hrs/Week

**Examination Scheme**
Term Work : 50 Marks

Software Development Laboratory –II shall be based on the subjects Data Mining and Big Data and Elective -II.

Minimum 6 experiments of each above subject shall be implemented by students.

Internal submission will consist of a practical and viva based on the practical work done during the semester
The student will have to make a literature survey and should select a mini project (as suggested by faculty adviser) relevant to subjects which they study in Software Engineering. The candidate should submit a comprehensive report on the work done and should demonstrate a project at the end of the semester which will be judged by external examiner.
Dissertation Guidelines

Student’s Dissertation can be categorize into two category
1) Application based
2) Algorithmic based

1) Application based

If students Dissertation is application based then Dissertation should evaluate based on following criteria
1) Requirement analysis: (Industry standard documents need to be prepared)
2) System design:
   i) Use case diagrams
   ii) Data flow diagrams
   iii) Architectural design
   iv) Sequence diagrams
   v) Activity diagrams
   vi) HCI design
   vii) E-R diagrams

3) Implementation:
   Implementation phase should follow principle’s of programming language norms
4) Testing: unit testing, Test cases and batch form, Integrated testing
5) Deployment observations

2) Algorithmic based

If student’s Dissertation is algorithmic based then Dissertation should be evaluated on basis of following criteria
1) Literature survey
2) Algorithm & its mathematical modeling
3) Simulation / Implementation
4) Performance evaluation considering various test cases
5) Comparative analysis with performance of previous algorithms designed on similar line.
Teaching Scheme
Contact Hours: 2 Hrs/Week

Examination Scheme
Term work: 50 marks
Practical viva: 50 Marks

1. Step 1 & 2 of guidelines to be completed. Project report must be submitted in the prescribed format only.

2. The dissertation -seminar will consist of a typewritten report covering the work completed so far. The work will be judged by two examiners (one internal guide and one external) by taking viva-voce and practical examination marks will be given accordingly.

The student should complete the dissertation work taken in Part-III. All steps of guidelines need to be completed.

1. The final examination will consist of the demonstration of work which will be judged by two examiners (one internal and one external) and the practical examination marks will be given accordingly.

2. The student should publish at least one paper based on his/her topic in international (Springer/ACM/IEEE etc.) journals or conference.

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