FACULTY OF ENGINEERING, UNIVERSITY OF PUNE
MCA 2008 COURSE
STRUCTURE FOR THIRD YEAR
SEMISTER V

CODE	SUBJECT	TEACHING SCHEME		EXAMINATION SCHEME					
		Lect	Pr.	Paper		TW	Oral	Pr	Total
				Int	Ext	Int	Ext	Ext	
710901	Principles and Practices for IT Project Management	4	--	30	70	--	--	---	100
710902	Computer Graphics	4	--	30	70	--	--	---	100
710903	Advanced Databases	4	--	30	70	--	--	---	100
710904	Enterprise Resource Planning	4	--	30	70	--	--	---	100
710905	Elective II	4	--	30	70	--	--	---	100
710906	Computer Laboratory- I	--	4	---	---	50	50	50	150
710907	Advanced Database Laboratory	--	4	---	---	50	50	50	150
Total of First Term		**20**	**08**	**150**	**350**	**100**	**100**	**100**	**800**

SEMISTER VI

Subject Code	Subject	Teaching Scheme		Examination Scheme				Marks
		Lect.	Pract	Th	Tw	Pr	Or	
710908	Seminar II	—	2	—	50	—	—	50
710909	Project Work	—	—	—	200	—	150	350
Total		—	—	—	**250**	—	**150**	**400**

ELECTIVE II

1. Software Testing
2. Neural Networks & Fuzzy Logic

Guidelines for setting question paper at the Third Year Master in Computer Applications (MCA) 2008 course under faculty of Engineering

1) Since the syllabi of all the subjects in this curriculum is unitized in SIX units, equal weight age shall be given to all the units with respect to number of questions and allotted marks
2) Each paper shall consists of TWO sections viz. Section A and B. Units I through III shall be under Section A and Units IV through VI shall be under section B.
3) Every unit shall carry TWO questions with internal choice/option offered to the candidate as follows

Section A

Unit – I	Q. 1	OR	Q. 2	MARKS 12/11
Unit – II	Q. 3	OR	Q. 4	MARKS 12/11
Unit – III	Q. 5	OR	Q. 6	MARKS 12/11

Section B

Unit – IV	Q. 7	OR	Q. 8	MARKS 12/11
Unit – V	Q. 9	OR	Q. 10	MARKS 12/11
Unit – VI	Q. 11	OR	Q. 12	MARKS 12/11

710901 Principles and Practices for IT Project Management

Teaching scheme: **Examination Scheme:**
Lectures: 4 Hrs/Week **Theory: 70 Marks**

Unit I: **(08 Hrs)**

Role and importance of management, process of management – planning, organizing, staffing, directing, controlling. Nature, purpose and principles of management, Business policy, tools and techniques of strategic management, business ethics and social Responsibilities

Unit II: **(08 Hrs)**

Applications of IT in management: Application of IT in functions like finance and accounting, stores, purchase, product design and development, quality control, logistics, customer relationship, marketing, project management, health care, insurance, banking, agriculture and service sector.
Pre-project & Project Approval

Unit III: **(08 Hrs)**

Preliminary planning of an IT Project: Gathering project Information, defining the project goals, establishing project priorities, requirements analysis, Risk : Identification, Classification, Mitigation and Management, budgeting a project, creating a work breakdown structure, estimation, Stakeholders, Gantt Charts.

Unit IV: **(08 Hrs)**

Organizing an IT Project: Organizing a Project Team: - Assessing internal scales, creating a team, managing team issues, resources procurement.
Preparing and Implementing the project plan: - Defining the project schedule, project network diagram creation and analysis, project constraints, tracking project progress and financial obligations, Decision Trees
Revising the project plan: need for revision , establishing change control, implementing the project changes, coping with project delays, Planning for Versions and Releases.

Unit V: **(08 Hrs)**

Group Dynamics and Team Management : Theories of Group Formation – Formal and Informal Groups and their interaction, Importance of teams - Formation of **Teams –** Team Structure, Team Bonding, Leading the team, Formal Technical Reviews.
Meeting: Conflict Management - Traditional vis-à-vis Modern view of conflict,
Process - Strategies for resolving destructive conflict, Stress management, employee welfare, energy management and energy audit,

Unit VI: **(08 Hrs)**

Modern approaches to management: Concept of Knowledge management**,** change management, technology management, supply chain management, introduction to Intellectual Property Rights (IPR) and cyber, laws, process and project quality standards – Six Sigma, PSP, TSP, CMM, CMMI, PCMM, Impact of IT quality management systems, learning organizations

Text Books

1. Joseph Phillips, “IT Project Management”, Tata McGraw-Hill 2003 Edition
2. S A Kelkar, “Information Technology Project Management”, 2nd Edition, PHI, 2008.

Reference Books:

1. Management-Tasks, Responsibilities and practices, Peter Drucker
2. Management Theory and Practice- Ernst Dale
3. Business Policy- Azhar Kazmi
4. Resisting Intellectual Property – Halbert, Taylor & Francis Ltd. 2007

710902: COMPUTER GRAPHICS

Teaching Scheme
Lectures: 4 Hrs/week

Examination Scheme:
Theory: 70 marks

OBJECTIVES:

- *To understand basic concepts of computer graphics.*
- *To understand algorithms to draw various graphics primitives.*
- *To understand 2-D and 3-D transformations*

UNIT-I (8 hrs)

Basic concepts

Introduction to computer graphics, lines, line segments, vectors, pixels and frame buffers, vector generation, DDA and Bresenham's line and circle drawing algorithms, antialiasing, thick lines, character generation: Stroke Principle, Starburst Principle, Bit map method, display of frame buffer.

Graphics Primitives: Display devices, Interactive devices: Tablets, touch panels, mouse, joysticks, track balls, light pen etc., Data generating devices: Scanners and digitizers, primitive operations, display file structure, algorithms and display file interpreter, Text and line styles.

UNIT-II (8 hrs)

Polygons

Introduction, representation, entering Polygons, Polygon filling: Seed fill, Edge fill, scan conversion algorithm, filling with patterns.

2D Transformations

Introduction, matrices, Scaling, Rotation, homogeneous coordinates, Translation, Co-ordinate transformation, rotation about an arbitrary point, inverse transforms, shear transforms and reflections.

UNIT-III (8 hrs)

Segments

Introduction, segment table, segment creation, closing, deletion, renaming. Image transformations, raster techniques.

Windowing and clipping

Introduction, viewing transforms, 2D clipping, Cohen-Sutherland outcode algorithm, Midpoint subdivision algorithm, Liang-Barsky Line Clipping algorithm, Cyrus-Beck algorithm, Interior and Exterior clipping, Text Clipping, Polygon Clipping, Sutherland-Hodgman algorithm, Generalized clipping.

UNIT-IV (8 hrs)

3-D Transformations

Introduction, 3-D geometry, primitives, transformations, Rotation about an arbitrary axis, Concept of parallel and perspective projections, Viewing parameters, 3D clipping, 3D viewing transformations

UNIT-V (8 hrs)

Hidden Surfaces and Lines

Introduction, Back-face removal algorithm, Z buffers, scan-line and the Painter,s algorithm, Warnock's algorithm, hidden line methods, binary space partition.

Light, Color and Shading

Introduction, Diffuse illumination, point-source illumination, specular reflection, shading algorithms, transparency, reflections, shadows, ray tracing, Colour models and tables.

UNIT-VI (8 hrs)

Curves and fractals

Introduction, Curve generation, Interpolation, interpolating algorithms, interpolating polygons, B-Splines and corners, Bezier curves, Fractals, fractal lines and surfaces.

Animation: Devices for producing animation, computer assisted animation, real time animation, frame-by-frame animation, method for controlling animation (fully explicit control, procedural)

Introduction to the Graphics Kernel System (GKS) and Basic primitives

Text Books:

- S. Harrington, "Computer Graphics", 2nd Edition, McGraw-Hill Publications, 1987 ISBN 0 – 07 – 100472 – 6
- J. Foley, Van Dam, S. Feiner, J. Hughes, "Computer Graphics Principles and Practice", 2nd Edition, Pearson Education, 2003, ISBN 81 – 7808 – 038 – 9

Reference Books:

- D. Rogers, "Procedural Elements for Computer Graphics", 2nd Edition, TATA Mc-Graw-Hill Publication, 2001, ISBN 0 – 07 – 047371 - 4
- D. Hearn, M. Baker, "Computer Graphics – C Version", 2nd Edition, Pearson Education, 2002, ISBN 81 – 7808 – 794 – 4
- F. Hill, "Computer Graphics: Using OpenGL", 2nd Edition, Pearson Education, 2003 ISBN 81 – 297 – 0181 – 2
- Xiang, Plastock, "Computer Graphics", 2nd Edition, TATA Mc-Graw-Hill Publication, 2002, ISBN-0-07-049958-6

710903: Advanced Databases

Teaching scheme: **Examination Scheme:**
Lectures: 4 Hrs/Week **Theory: 70 Marks**

Objectives:

- To learn and understand various Database system Architectures OO Database Systems
- To learn and understand Data Mining, Warehousing and IR

Prerequisites:

- Database Management Systems

Unit I: **(08 Hrs)**

Query Processing

Introduction to Query processing, measures of query cost, selection operation, sorting, joined operations, other operations, evaluation of expression

Unit II: **(08 Hrs)**

Database System Architecture: Introduction, centralized and client server architecture: centralized systems, Client –server systems, server system architecture, Transaction server process structure, Data servers

Parallel systems: speed up and scaleup, Interconnection Networks, Parallel database architecture

Distributed systems: An examples of Distributed database, implementation issues, DDBMS architectures, network types

Unit III: **(08 Hrs)**

Object Based Database:

Need of OODBMS, storing of objects in relational database, introduction to OO data model

Structure types and inheritance in SQL: Structure types, Type inheritance, Table inheritance, Array and multiset types in SQL: creating and accessing collection values, Querying collection, nesting and unnesting, Object identity and reference types in SQL, implementing object relational features.

Persistent programming languages: Persistent of objects, object identity and pointers, storage and access of persistent objects, persistent systems: C++, JAVA, object management group, object database standard ODMG

Unit IV: **(08 Hrs)**

Data Warehousing

Introduction to Data warehousing, architecture, Dimensional data modeling- star, snowflake schemas, fact constellation, OLAP and data cubes, Operations on cubes, Data preprocessing – need for preprocessing, data cleaning, data integration and transformation, data reduction

Unit V: **(08 Hrs)**

Data Mining

Introduction to data mining, Introduction to machine learning, descriptive and predictive data mining, outlier analysis, clustering – k means algorithm, classification – decision tree, association rules – apriori algorithm, Introduction to text mining, Baysian classifiers.

Unit VI: **(08 Hrs)**

Information Retrieval

Information retrieval – overview , Relevance ranking using terms and hyperlinks, synonyms, homonyms, ontologies, Indexing of documents, measuring retrieval effectiveness , web search engines, Information retrieval and structured data .

Text Books:

1. Abraham Silberschatz, Henry Korth, S. Sudarshan, "Database system concepts", 5th Edition , McGraw Hill International Edition
2. Jiawei Han, Micheline Kamber, "Data Mining : Concepts and systems" , Morgan Kaufmann publishers

Reference Books

1. Rob Coronel, Database systems : "Design implementation and management", 4th Edition, Thomson Learning Press
2. Elmasri R., Navathe S., "Fundamentals of Database Systems", 4th Edition, Pearson Education, 2003, ISBN 8129702282
3. Richard J. Roiger, Michael W. Geatz, "Data Mining",LPE, Pearson Education, 2003, ISBN 8129710897

710904: ENTERPRISE RESOURCE PLANNING

Teaching Scheme
Lectures: 4 Hrs/week

Examination Scheme:
Theory: 70 marks

UNIT I **(8 Hrs)**

Scope of an ERP System. Importance of an integrated system. Benefits of an ERP. Business value of an ERP system. Usefulness of ERP in competitive strategy formulation.

UNIT II **(8 Hrs)**

Organizational requirements. Organizational Culture. Organization structure. Change Management: User resistance and how to overcome it.

UNIT III **(8 Hrs)**

ERP system Architecture. Infrastructure Requirements. Critical Success Factors for ERP. Comparative study of available commercial ERP packages. ERP implementation strategies. Reasons for ERP failures and remedies.

UNIT IV **(8 Hrs)**

ERP strategies: Off the shelf packages v/s Development of an ERP solution. In-house development v/s Outsourcing. Selection criteria for ERP packages. Design and Customization issues.

UNIT V **(8 Hrs)**

Global Business: ERP Systems in global context. E-Business Support. ERP integration with CRM, SCM and Data ware housing. ERP and BPR. Service Oriented Architecture

UNIT VI **(8 Hrs)**

ERP system contents: Finance, Manufacturing, Materials Management, Sales and Marketing, Human Resources, Quality Control, Plant Maintenance.

Reference Books:

1. ERP in Practice: Jagan Nathan Vaman. Tata Mc Grew Hill
2. Enterprise Resource Planning. Ashim Raj Singla. Cengage Learning.
3. Enterprise Resource Planning: Concepts and Practice. Vinod Kumar Garg, N K Venkiteklrishnan. Prentice Hall of India

710905: Software Testing (Elective-II)

Teaching scheme: **Examination Scheme:**
Lectures: 4 Hrs/Week **Theory: 70 Marks**

UNIT I: Principles of Measurement (8 Hrs)

Representation Theory of Measurement, Measurement and models, Measurement Scales, Classification of Software Measures, Determining what to measure, Applying Framework, Software Measurement Validation, Four principles of Investigation, Planning Formal Experiments, What is a good data, How to define/collect data, How to Store and Extract data.

UNIT II: Internal Product attributes Measurement (8 Hrs)

Size: Aspects of software size, length, reuse, functionality, complexity
Structure: Types of structural measures, control-flow structures, Modularity and information flow attributes, Object-oriented metrics, Data structure, Difficulties with general complexity measures, Halstead's Software Science.

UNIT III: Software Test Planning and Management (8 Hrs)

Preparation of Test plan, test plan management, execution of test plans, reporting
People and organizational issues in testing, organization structure for testing teams,
Defect Management : Defects, Origins of Defects, Defect Classes, Defect repository and Test Design, Developer/Tester support for Defect Repository

UNIT IV: Software Testing Methods (8 Hrs)

White-Box testing methodologies: Test Adequacy criteria, Static testing by humans, Static analysis tools, Structural Testing, Code Complexity testing, Mutation Testing

Black-Box testing methodologies: Test case Design Criteria, Requirement based testing, Positive and negative testing, Boundary Value analysis, Equivalence Partitioning, State-based or Graph-based Testing, Compatibility Testing, User Documentation Testing, Domain Testing

UNIT V: Software testing phases (8 Hrs)

Unit testing, GUI testing, Validation testing, Integration testing, System and Acceptance testing, Scenario testing, Regression testing, Specification-based testing, Performance Testing, Ad hoc Testing, Usability and Accessibility Testing, Software Test Automation.

UNIT VI: Software Maintenance (8 Hrs)

Problem Reporting: Customer side Preliminary activities, Defects reported by Internal Customers, Logistics and Tooling, Challenges and Best Practices.
Problem Resolution: Overview of Problem Resolution, Categorizing and Identifying problem, Making the Fix and Testing it, Challenges and Best Practices.
Fix Distribution: Overview of Fix Distribution, Choosing method of Fix Distribution, Composing Fixes, Preparing and Testing Shipment unit.

Text Books:

1. Fenton, Fleeger, “Software Metrics: A Rigourous and Practical Approach”, Thomson, ISBN 981-240-385-X
2. Srinivasan Desikan, Gopalswamy Ramesh “Software Testing Principles and Practices”, Pearson Education.

Reference Books:

1. Ramesh Bhattiprolu, “Software Maintenance”, Tata McGraw Hill, ISBN 0-07-048345-0
2. Burnstein, “Practical Software Testing”, Springer International Edition, ISBN 81-8128-089-X

710905 : Neural Network and Fuzzy Logic(Elective-II)

Teaching Scheme **Examination Scheme:**
Lectures: 4 Hrs/week **Theory: 70 marks**

Unit – I **(8 Hrs)**

Artificial Neural Systems: Preliminaries

Classifiers, Approximaters, and Autonomous Drivers, Simple Memory and Restoration of Patterns, Optimizing Networks, Clustering and Feature Detecting Networks.

Fundamental Concepts : Biological Neurons , McCulloch-Pitts Neuron Model, Neuron Modeling for Artificial Neural Systems, Feed-forward and feedback Networks
Neural Processing, Supervised and Unsupervised Learning

Neural Network Learning Rules : Hebbian Learning Rule, Perceptron Learning Rule, Delta Learning Rule, Widrow-Hoff Learning Rule, Winner-Take-All Learning Rule, Outstar Learning Rule.

Unit – II **(8 Hrs)**

Single-Layer Perceptron Classifiers

Classification Model, Features, and Decision Regions, Discriminant Functions, Linear Machine and Minimum Distance Classification, Nonparametric Training Concept, Training and Classification Using the Discrete Perceptron, Single-Layer Continuous Perceptron Network for Linearly Separable Classifications, Multicategory Single-Layer Perceptron Networks.

Unit – III **(8 Hrs)**

Multilayer Feedforward Networks :

Linarly Nonseparable Pattern Classification, Delta Learning Rule for Multiperceptron Layer, Generalized Delta Learning Rule, Feedforward Recall, Error Back –Propagation Training, Training Errrors, Multilayer Feedforward Networks as Universal Approximators.

Learning Factors : Initial Weights, Cumulative Weight Adjustment versus, Incremental Updating, Steepnesss of the Activation Function, Learning Constant, Momentum Method, Network Architectures Versus Data Representation, Necessary Number of Hidden Neurons, Character Recognition Application, Expert Systems Application, Learning Time Sequences.

Unit – IV **(8 Hrs)**

Introduction : History of Fuzzy Logic, Principle of incompatability,

Basic Concepts : Fuzzy sets, Membership Functions, basic operations, Linguistic variables, Possibility Distributions, Fuzzy rules,

Fuzzy sets : Classical sets, Fuzzy sets, operations of Fuzzy sets, Properties of Fuzzy sets, Geometric Interpretations, Possibility Theory.

UNIT – V **(8 Hrs)**

Fuzzy Relations: Compositions, Fuzzy Graph, Fuzzy number, Function with Fuzzy arguments, arithmetic operations on Fuzzy number.

Fuzzy IF-THEN Rule: Introduction, 2 types of Fuzzy rules, Fuzzy rule based model for function approximation, Foundation of Fuzzy mapping rules, Classification of fuzzy rule based model, Mamdani model, TSK model, Standard additive model.

UNIT –VI **(8 Hrs)**

Fuzzy implications and approximate reasoning: Propositional Logic, First Order Predicate Calculus, Fuzzy Implication, approximate reasoning**,** Criteria of Fuzzy Implications, Families of Fuzzy Implications, Major Fuzzy Implication function.

Fuzzy Logic and probability theory: Introduction, Possibility versus Probability, Probability of Fuzzy event, Fuzzy Probability, Probabilistic Interpretation of Fuzzy sets, Fuzzy major.

Text Book:

1) Jacek M. Zurada, "Introduction to Artificial Neural Systems", PWS Publishing Co., 1st edition, ISBN:053495460X
2) John Yen, Reza Langari, "Fuzzy Logic Intelligence, Control, and Information" PEARSON 2009 Edition.

Reference Book:

1) Fuzzy Sets and Fuzzy Logic Theory and Applications: George J. Klir and Bo Yuan, PHI.
2) Fuzzy Logic with Engineering Applications: Timothy J. Ross., WILEY INDIA, SECOND Edition.

910906: COMPUTER LAB

Teaching Scheme	Examination Scheme:
Practical: 4 Hrs/week	**Term work: 50 marks** **Practical: 50 marks** **Oral: 50 Marks**

Suggested List of Assignments

1. Write a program to implement algorithm for line drawing
2. Write a program to implement algorithm for circle generation
3. Write a program to implement algorithm for filling a polygon using scan-fill method
4. Write a program to implement 2-D transformations
5. Write a program to implement 3-D transformations
6. Write a program to implement concept of segmentation
7. Write a program to implement line clipping
8. Write a program to implement algorithm for arc drawing
9. Write a program to implement algorithm for removal of hidden surfaces
10. Write a program to generate fractals
11. Write a program to generate curves.

Students will submit journal for term work assessment to be carried out jointly by internal & external examiner. Practical examination will be based on the term work and questions will be asked to judge the understanding of the concepts learnt.

710907: ADVANCED DATABASES LABORATORY

Teaching Scheme	**Examination Scheme:**
Practical: 4 Hrs/week	**Term work: 50 marks** **Practical: 50 marks** **Oral: 50 Marks**

Suggested list of Assignments

1. Design database using XML & evaluate queries.
2. Build different types of classifier models (Neural network, Decision tree, Lazy etc) for any dataset used for data mining using a tool WEKA
3. Build classification models using built-in various attribute and Instance filters in WEKA.
4. Build models for Clustering, Association Rules using WEKA
5. Write simple OLAP queries.
6. Write simple SQL queries using Object-oriented features

Staff member should frame minimum 12 assignments on the above topic. Students will submit journal for term work assessment to be carried out jointly by internal & external examiner. Oral examination will be based on the term work submitted.

710908: SEMINAR - II

Teaching Scheme
Practical: 2 Hrs/Week

Examination Scheme:
Term Work: 50 Marks

Each student will select a topic in the area of Computer Engg./Technology preferably keeping track with recent technological trends and development. The topic must be selected in consultation with the institute guide. Each student will make a seminar presentation in the term making use of audio/visual aids for duration of 20 – 25 minutes and submit two copies of the seminar report in a prescribed format duly signed by the guide and Head of the department. Attendance for all seminars for all students is compulsory. A panel of staff members of the institute will assess the seminar internally.

710909: PROJECT WORK

Examination Scheme:

Term work: 200 marks **Oral: 150 marks**

The Students will undertake one project in a group over the semester, which will involve the design of a system or sub system in the area of applications in Computer Science/Engineering/IT.

The aim of project is to allow the student to study the feasibility of implementing project and planning project, studying existing system, tools available and state of art, software testing procedures and technology with use of case tools.

The project must involve the detail Software design Specification, Data Structure Layout, File Design, Testing with complete documentation and user interface with life cycle testing and as an executable package

The students will select a project and submit the name of the project with a synopsis of not more than 2 to 3 pages in the first week of January in the academic year. Students will submit at the end of Semester II.

(A) The workable project

(B) Project report in the form of bound journal complete in all respect - 1 copy for the Institute and 1 copy for the student

(C) The term work will be accessed by the examiners in consultation with the guide. Oral examination will be based on the project work completed by the candidates.

The project repot should contain

1. Problem definition and requirement specification, acceptance tests procedure (ATP).
2. System definition-requirement Analysis
3. System design.
4. System implementation - code documentation – dataflow diagrams! Algorithm, protocols used.
5. Test result and procedure - test repot as per ATP.
6. Platform choice use
7. Conclusion.
8. Appendix tools used, References.

Documentation will use UML approach with presentation, Category, Use Case, and Class Diagrams etc.