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Dr. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY,

AURANGABAD

PROPOSED

SCHEME AND DETAILED SYLLABUS

of

Final Year Engineering of Information Technology BE (IT)

of

FOUR YEAR DEGREE COURSE IN ENGINEERING

With Effect from Academic Year 2014-2015

Faculty of Engineering and Technology
Board of Studies in Information Technology
Curriculum structure of B.E. (Information Technology)

Sub Code	Semester-I	Contact Hrs/Week				Examination Scheme					
	Subject	L	T	P	Total	CT	TH	TW	PR	Total	Duration of The Theory Examination
CSE401	DataWarehousing & Data Mining	4	--	--	4	20	80	--	--	100	**3 Hrs**
ITD402	Cloud Computing	4	--	--	4	20	80	--	--	100	**3 Hrs**
ITD403	Geographical Information System	4	--	--	4	20	80	--	--	100	**3 Hrs**
ITD404	E-Business Management	4	--	--	4	20	80	--	--	100	**3 Hrs**
	Elective - I	4	--	--	4	20	80	--	--	100	**3 Hrs**
CSE421	LAB-I DataWarehousing & Data Mining	--	--	2	2	--	--	--	50	50	
ITD422	LAB-II Cloud Computing	--	--	2	2	--	--	--	50	50	
ITD423	LAB-III Geographical Information System	--	--	2	2	--	--	--	50	50	
ITD424	LAB-IV Elective - I	--	--	2	2	--	--	50	--	50	
ITD425	Project Part - I	--	--	2	2	--	--	25	--	25	
ITD426	Seminar	--	--	--	--	--	--	25	--	25	
	Total	**20**	**--**	**10**	**30**	**100**	**400**	**100**	**150**	**750**	

Elective - I:

Code	Subject
ITD441	Artificial Neural Network & Fuzzy Logic
ITD442	Compiler Construction
ITD443	Object Oriented Analysis & Modeling
ITD444	Open Elective

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Dr. Vijaya B. Musande
Chairman, Board of Studies
Computer Science & Engineering

Sub Code	Semester-II	Contact Hrs/Week				Examination Scheme					
	Subject	**L**	**T**	**P**	**Total**	**CT**	**TH**	**TW**	**PR**	**Total**	**Duration of The Theory Examination**
CSE451	Computer System Security and Laws	4	--	--	4	20	80	--	--	100	**3 Hrs**
CSE452	Mobile Computing	4	--	--	4	20	80	--	--	100	**3 Hrs**
ITD453	Big Data Analytics	4	--	--	4	20	80	--	--	100	**3 Hrs**
	Elective - II	4	--	--	4	20	80	--	--	100	**3 Hrs**
CSE471	Lab - V Computer System Security and Laws	--	--	2	2	--	--	--	50	50	**3 Hrs**
CSE472	Lab - VI Mobile Computing	--	--	2	2	--	--	--	50	50	
ITD473	Lab - VII Big Data Analytics	--	--	2	2	--	--	--	50	50	
ITD474	Lab - VIII Elective -II	--	--	2	2	--	--	50	--	50	
ITD475	Project Part-II	--	--	6	6	--	--	50	100	150	
	Total	**16**	**--**	**14**	**30**	**80**	**320**	**100**	**250**	**750**	
	Total of Semester I & II	**36**	**--**	**24**	**60**	**180**	**720**	**200**	**400**	**1500**	

Elective - II:

Code	Subject
ITD491	Image Processing & Pattern Recognition
CSE492	Green IT
CSE493	Agile Methodology
ITD494	Open Elective

L: Lecture hours per week, **T**: Tutorial hours per week, **P**: Practical hours per week, **CT**: Class Test, **TH**: University Theory Examination, **TW**: Term Work, **PR**: Practical/Oral Examination

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FACULTY OF ENGINEERING AND TECHNOLOGY
Final Year Engineering (CSE/IT)
Semester – I

Course Code: CSE401 **Title: Data Warehousing and Data Mining (DWDM)**

Teaching Scheme:
Theory: 4 Hours/Week

Examination Scheme:
Class Test: 20 Marks
Theory Examination (Marks): 80 Marks
Theory Examination (Duration):03 Hours

Prerequisite:

Data Base Management System, Discrete Mathematics.

Objectives:

1. To understand data warehouse.
2. To understand and implement multidimensional model.
3. To identify the problems and apply mining algorithms.
4. To describe the business intelligence (BI) methodology and concepts.

CONTENTS

SECTION-A

Unit 1: (7 Hrs)
Introduction to Decision Support System, Data Warehousing and Online Analytical Processing, Data Warehouse: Basic Concepts, Data Warehouse Modeling: Data Cube and OLAP, Data Warehouse Design and Usage, Data Warehouse Implementation.

Unit 2: (5 Hrs)
Introduction to Data Mining, Integration of Data Mining system with a Database or a Data Warehouse System, Major issues in Data Mining, Applications and Trends in Data Mining.

Unit 3: (8 Hrs)
Know your Data: Data objects and Attribute Types, Basic Statistical Descriptions of Data, Measuring Data Similarity and Dissimilarity, Data Preprocessing – An Overview.

SECTION-B

Unit 4: (5 Hrs)

Mining Frequent Patterns: Mining Frequent Patterns, Associations: Basic Concepts, Apriori Algorithm, association rules from frequent item sets. Cluster Analysis: Types of data in cluster analysis, classical Partitioning methods: k-Means and k-Medoids.

Unit 5: (8 Hrs)

Introduction to Classification and Prediction, Classification by Decision tree Induction, Bayesian classification, Rule based classification, Prediction: Linear Regression, non-linear regression.

Unit 6: (7Hrs)

Introduction to Business Intelligence, Changing Business Environments and Computerized Decision Support, The Business Pressures-Responses- Support Model, A Framework for Business Intelligence (Bl), Intelligence Creation and Use and BI Governance, Transaction Processing versus Analytic Processing, Successful BI Implementation, Major Tools and Techniques of Business Intelligence.

Text Books:

1. Jiawei Han and Micheline Kamber, Data Mining: Concepts and Techniques, Third Edition, Elsevier Publication.
2. Paulraj Ponniah: Data Warehousing: Fundamentals for IT Professionals, Wiley Publication.

Reference Books:

1. C. S. R. Prabhu, Data Warehousing Concepts, Techniques, Products and Applications, Prentice Hall of India.
2. Alex Berson,Stephan J.Smith **:**Data Warehousing ,Data Mining and OLAP,Tata McGraw Hill Edition.
3. Ivan Bayross: SQL, PLSQL:The Programming Language of ORACLE,BPB Publication.
4. Business Intelligence: A Managerial Approach (2nd Ed.) Turban, Sharda, Delen, King, Wiley Publication.

Pattern of Question Paper:

Six units in the syllabus shall be divided in two equal parts i.e. 3 units in each part. Question paper shall be set having two sections A and B. Section A questions shall be set on first part and Section B questions on second part. Question paper should cover the entire syllabus.

For 80 marks Paper:

1. Minimum ten questions.
2. Five questions in each section.
3. Question no. 1 from section A and Question no. 6 from section B, 10 marks each, will be compulsory.

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Final Year Engineering (IT)
Semester – I

Course Code: ITD402 **Title: Cloud Computing (CC)**

Teaching Scheme:
Theory: 4hrs/week

Examination Scheme:
Class Test: 20 Marks
Theory Examination (Marks): 80Marks
Theory Examination (Duration): 03Hours

Prerequisite:

- Awareness of basics of Data Base Management Systems and Operating Systems concepts.

Objectives:

1. To know the difference between cloud and virtualization.
2. To learn and understand Cloud Technologies.
3. To know cloud application domains and platforms.
4. To design, develop and deploy Cloud applications.
5. To know the functional use of the cloud.

CONTENTS

SECTION-A

Unit 1: Evolution of Model Computing: (06 Hrs)
Introduction to Mainframe architecture, Client-server architecture, Cluster Computing, Grid Computing, Parallel Computing and Distributed Computing, Evolution of sharing on the Internet, Introduction of Cloud Computing: Definition of cloud, Cloud Deployment Models, Cloud Service Models, Key Characteristics, Benefits and Risks in Cloud Computing, Service oriented architecture (SOA) and Cloud Computing Reference Architecture by IBM.

Unit 2: Services Delivered from the Cloud: (08 Hrs)
Model architecture, Benefits and Drawbacks: Infrastructure-as-a-Service (IaaS), Platform-as-a-Service (PaaS), Software-as-a-Service (SaaS), Business-Process-as-a-service (BPaaS), Identity-as-a-service (IDaaS), Communication-as-a-service (CaaS), Monitoring-as-a-service (MaaS), Storage as a service: Traditional storage versus storage cloud, Cloud Service providers: Infrastructure as service: Amazon EC2, Platform as Service: Google App Engine, Force.com.

Unit 3: Cloud Technologies: (06 Hrs)
Web services: SOAP and REST, SOAP VS REST, Virtualization: Introduction to virtualization, Types of Virtualization, Pros and cons of virtualization, Virtualization applications in

enterprises: Server virtualization, Desktop and Application Virtualization, Storage and Network Virtualization.

SECTION-B

Unit 4: Data Processing Technologies: (08 Hrs)
Big Data, Challenges in Big Data, Hadoop: Definition, Architechture, Cloud file systems: GFS and HDFS, BigTable, HBase and Dynamo, MapReduce and extensions: Parallel computing, The MapReduce model: Parallel efficiency of MapReduce , Relational operations using MapReduce, Projects in Hadoop: Hive, HBase, Pig, Oozie, Flume, Sqoop.

Unit 5: Security in the Cloud: (06 Hrs)
Security, Cloud Security Challenges, Infrastructure Security: Network, Host and Application level, Data security and Storage, Security Management in the cloud, Data Privacy, Life cycle of Data, Key Privacy concerns in cloud and Disaster Recovery

Unit 6: Using Google web Services: (06 Hrs)
Using Google Web Services Exploring Google Applications, Surveying the Google Application Portfolio, Indexed search,The dark Web, Aggregation and intermediation, Productivity applications and services, Enterprise offerings ,AdWords ,Google Analytics, Google Translate, Exploring the Google Toolkit, The Google APIs,Working with the Google App Engine

Text Books:

1. Enterprise Cloud Computing: Technology, Architecture, Applications by Gautam Shroff, Cambridge University Press.
2. Cloud Computing Implementation, Management, and Security By John W. Rittinghouse, James F. Ransome , CRC Press.
3. IBM smart storage cloud Red paper by Larry Coyne Mark Bagley Gaurav Chhaunker.
4. Cloud Security and Privacy Tim Mather, Subra Kumaraswamy, Shahed Latif.

Reference Books:

1. Cloud computing Bible by Barrie Sosinsky Publisher Wiley India Pvt Ltd (2011).
2. Mastering Cloud Computing Rajkumar Buyya, Christian Vecchiola, S. Thamarai Selvi.

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For 80 marks Paper:

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2. Five questions in each section
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Final Year Engineering (IT)
Semester – I

Course Code: ITD403 **Title: Geographical Information System (GIS)**

Teaching Scheme:
Theory: 04 Hours/Week

Examination Scheme:
Class Test: 20 Marks
Theory Examination (Marks): 80 Marks
Theory Examination (Duration): 03 Hours

Prerequisite:

- Knowledge of Geography, Mathematical Formulas, Concepts of Image Processing.

Objectives:

1. To understand the importance of GIS.
2. To understand the use of GIS in developing new locations in a city or village, developing new cities, environment conservation, etc.
3. To expose students to theoretical and fundamental concepts of GIS, its applications and various tasks of it.
4. To understand and learn the issues involved in capturing, processing, manipulating, storing and retrieving spatial and non-spatial data from GIS.
5. To introduce students to the characteristics and design methodologies of any GIS project.

CONTENTS

SECTION-A

Unit 1: GIS – An Overview (6 hrs)
Introduction, Defining GIS, Components of GIS, Spatial Data, Maps & their Influence on the Character of Spatial Data, Thematic Characters, Other Sources of Spatial Data.

Unit 2: Spatial Data Modeling and Database Management (6 hrs)
Spatial Data Modeling, Entity Definition, Spatial Data Models, Spatial Data Structures, Modeling Surfaces Modeling, Networks, Building, Computer Worlds, Modeling the Third and Fourth Dimension.

Unit 3: Database Management and Data Editing (8 hrs)
Database Approach, Attribute Data in GIS, Relational Model, Attribute Data Entry, Manipulation of Fields and Attribute Data, GIS Database Applications, Web GIS, Developments in Databases, Data Input and Editing, Methods of Data Input, Data Editing, Integrated Database.

SECTION-B

Unit 4: Data Analysis (6 hrs)

Measurements in GIS-Lengths, Perimeters, Areas, Queries, Reclassification, Buffering and Neighborhood Functions, Map Overlay, Spatial Interpolation, Analysis of Surfaces, Network Analysis.

Unit 5: Modeling and Output (6 hrs)

Analytical Modeling in GIS, Modeling Physical and Environmental Processes, Modeling Human processes, Modeling the Decision-Making Process, Output: from New Maps to Enhanced Decisions, Maps as Output, Non-Cartographic Output, Spatial Multimedia, Mechanisms of Delivery, GIS and Spatial Decision Support

Unit 6: Remote Sensing and Applications (8 hrs)

Introduction, Concepts, Elements of Remote Sensing, Working of Remote Sensing, Applications, Case Study 1, Case Study 2.

Text Books:

1. Ian HeyWood, Sarah Cornelius Steve Carver, "An Introduction to Geographical Information Systems", Pearson Education, Second Edition
2. Kang-tsung Chang, "Introduction to Geographic Information Systems", Tata McGrawHill, Fourth Edition.

Reference Books:

1. Peter A. Burrough, Rachael A. McDonnell, "Principles of Geographical Information System", Oxford University Press.
2. Keith C. Clarke, Bradley O. Parks, Michael P. Crane, "Geographical Information Systems and Environmental Modeling", Prentice-Hall India.
3. Fundamentals of Remote Sensing 2nd Edition George Joseph Universities Press.
4. Remote Sensing and Image Interpolation by Lillesand, Kiefer Chipman Wiley Publication.

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For 80 marks Paper:

1. Minimum ten questions
2. Five questions in each section

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Final Year Engineering (IT)
Semester – I

Course Code: ITD404 **Title: E - Business Management (EBM)**

Teaching Scheme:
Theory: 04 Hours/Week

Examination Scheme:
Class Test: 20 Marks
Theory Examination (Marks):80 Marks
Theory Examination (Duration):03 Hours

Prerequisite:

- Concepts of Website Development.
- Concepts of Online Shopping.

Objectives:

1. To introduce to the students the concepts of e-Business.
2. To focus on elements of e-Business.
3. To expose student to theoretical working of e-Business and the techniques involved.
4. To make the student understand the concepts of on-line shopping websites and what happens at the back-end.

CONTENTS

SECTION A:

Unit 1: Overview of e-Business and its Strategy: (06 Hrs)
An Overview of e-Business: Introduction to e-Business, e-Business vs e-Commerce, Characteristics of e-Business, Elements of an e-Business Solution, e-Business Roles and their Challenges, e-Business Requirements, Impacts of e-Business, Inhibitors of e-Business like Management, Financial, Security, Legal, and Technological Issues.
e-Business Strategy: Definition, Types of Strategies like Supply Chain Management, Marketing and IS, Strategic positioning, Levels of e-Business Strategy like Supply Chain, Line of Business and Corporate Level, Strategic Planning Process, Strategic Alignments, Consequences of e-Business: Theory of Competitive Strategy, Resource-Based View, Transaction Cost Economics.

Unit 2: e-Business Models and Architecture: (06 Hrs)
e-Business Models: Definitions, Classifications of Business Models like Internet Enabled, Value Web, e-Business Enabled, Market Participants and Cybermediaries Business Models.

e-Business Architecture: Introduction, Trends Driving e-Business Architecture, New Customer Care Objectives, New Competitive Conditions, Fast moving Competitors, Problems Caused by Lack of Integration.

Unit 3: CRM and Selling Chain Management: (08 Hrs)

Customer Relationship Management: Basics, Definitions, Phases of CRM, CRM Process Competencies, Building a CRM Infrastructure.

Selling Chain Management: Basics, Definitions and goals of Selling Chain Management, Order Acquisition Process, Elements of Selling Chain Infrastructure.

SECTION B:

Unit 4: ERP and SCM: (06Hrs)

Enterprise Resource Planning: Basics and Elements, ERP Decision, Software Decision, Capabilities of COTS ERP Solutions, ERP Implementations.

Supply Chain Management: Basics, Definitions, Interenterprise Integration, Supply Chain Planning, Supply Chain Execution, e-Supply Chain Fusion, Diagnosing Root Causes of Supply Chain Problems, Fixing Root Causes, Management Issues in E-Supply Chain Fusion

Unit 5: e-Procurement and KM: (06Hrs)

e-Procurement: e-Procurement models, B2E: Purchasing and Requisitioning Applications, Corporate Procurement Portals, e-Procurement Infrastructure: Integrating Ordering, Fulfilment and Payment.

Knowledge Management: Elements of Knowledge Management Applications, Data Organization and Collection, Analysis and Segmentation, Real-Time Personalization, Infrastructure for Broadcast, Retrieval and Interaction, Performance Monitoring and Measurement, Three-Layer BI Solutions Architecture, Overview of Enterprise Application Integration

Unit 6: BP, E-Markets and Security: (08 Hrs)

Business Process: Introduction, Business Process Management, Five Tenets of Business Process Management, Characteristics of Business Process, Types of Business Processes, Business Process Integration Scenario, Role of IT in Business Processes, Business Management Strategy (Six Sigma), Types of e-Business Relationships, Information Exchange, Characteristics e-Business Relationships.

e-Markets: Classification of e-Markets, Effects of e-Markets, Impact of its Emergence, Stakeholders, e-Market Success Factors, Context-related, Process-related.

Security and Reliability for e-Business: Reliability and Quality Considerations, Quality Requirements, Trust, e-Business Risks, e-Business Security.

Text Books:

1. Michael P. Papazoglou and Pieter M. A. Ribbers, 'e-Business organizational and Technical Foundations', Wiley India Edition.
2. Dr. Ravi Kalakota and Marcia Robinson, 'e-Business 2.0 roadmap for Success, Pearson Edition.
3. en.wikipedia.org/wiki/Business_process

Reference Books:

1. Daniel Amor, E-business (R) Evolution, 2nd Ed. Prentice Hall, New York 2002.

Note: Case Studies from the books and/or e-Tendering, e-Office, mahaonline from e-Governance project undertaken by Government of Maharashtra can be considered for giving examples.

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Final Year Engineering (IT)
Semester – I

Course Code: ITD441
Title: Elective-I Artificial Neural Network & Fuzzy Logic (ANN & FL)

Teaching Scheme:
Theory: 4 Hours/Week

Examination Scheme:
Class Test: 20 Marks
Theory Examination (Marks): 80 Marks
Theory Examination (Duration):03 Hours

Prerequisite:

- Image Processing.

Objectives:

1. To know the basic structures of artificial neural networks.
2. Analyze feed-forward networks and understand the significance of nonlinear output functions of processing unit in feedback network for pattern storage.
3. Describe and explain core concepts and techniques of fuzzy logic.
4. To understand Fuzzy Logic in database System and modeling.

CONTENTS

SECTION-A

Unit 1: Soft Computing: (7 Hours)
Introduction of soft computing, soft computing vs. hard computing, various types of soft computing techniques, applications of soft computing. Characteristics of Neural Networks, Structure and Working of a biological neural network, Artificial Neural Network Teminology, models of neurons: MP model, Perceptron model, Adaline model, Topology, Basic Learning laws, What is learning, supervised and unsupervised learning, Functional Units of ANN for pattern recognition task: Pattern Recognition Problem, Basic functional units.

Unit 2: Perceptron Learning: (7 Hours)
Single layer and multilayer perceptron, linear and non-linear separability problems, supervised learning algorithms**,** Error correction and Gradient Decent Rules, FFNN, Architecture of FFNN, Back-propagation learning algorithm, pattern classification, pattern association by FFNN.

Unit 3: Pattern Association: (6 Hours)

Auto Association And Hetero Association, Feedback NN, Architecture of FBNN, Energy Function, Associative Memory, Bidirectional Associative Memory, Hopfield Network.

SECTION -B

Unit 4: Unsupervised learning: (7 Hours)

Pattern Clustering, Self-Organization Map (SOM), Generalized Learning Laws, Competitive Learning, Examples, Learning Vector Quantization, Self Organizing Feature Map, Applications of Self-Organizing Feature Map.

Unit 5: Fuzzy Logic: (6 Hours)

Classical Sets, Fuzzy Sets, Crisp Relations, Fuzzy Relations, Examples, Properties of Membership Functions, Fuzzification And Defuzzification To Crisp Sets, Application of Fuzzy Control.

Unit 6: Fuzzy Systems: (7 Hours)

Fuzzy Logic in Database and Information Systems, Fuzzy Relational Data Models, Operations in Fuzzy Relational Data Models, Design Theory for Fuzzy Relational Databases. Fuzzy If-Then Rules, Fuzzy Linear Programming, Fuzzy Inference Systems: Mamdani Fuzzy Models, Sugeno Fuzzy Models, Tsukamoto Fuzzy Models, Input Space Partitioning and Fuzzy Modeling.

Text Books:

1. S.N.Sivanandam & S.N. Deepa, "Principles of Soft Computing", Wiley Publications.
2. B. Yegnanarayana, "Artificial Neural Networks", PHI Publications.
3. John Yen, Reza Langari, "Fuzzy Logic", Pearson Education.
4. S. Rajasekaran, Vijaylakshmi Pai, "Neural Networks, Fuzzy Logic and Genetic algorithms-Synthesis and Applications", PHI Publications.

Reference Books:

1. Timothy J Ross, "Fuzzy Logic with Engg. Applicatioons", Wiley Publications.
2. B. Satish Kumar, "Neural Networks - A Classroom Approach", McGrawHill Publications
3. MATLAB, 7.8.0.347 (R2009a), Wavelet Toolbox, Fuzzy Logic Toolbox.

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Semester – I

Course Code: ITD442 **Title: Elective - I Compiler Construction (CC)**

Teaching Scheme:
Theory: 4 Hours/Week

Examination Scheme:
Class Test: 20 Marks
Theory Examination (Marks): 80 Marks
Theory Examination (Duration): 03 Hours

Prerequisite:

1. Understanding of Data structure, Discrete Mathematics and Algorithms.
2. Basic Knowledge of subject Theory of Computation.
3. Programming skill in basic programming language like C

Objectives:

1. To understand the major phases in the design of a compiler.
2. To learn and use tools for construction of a compiler.
3. In particular students will understand the structure of a compiler, and how the source and target languages influence various choices in the design.

SECTION A

Unit 1: Introduction: (06 Hrs)
Introduction to compilers & translators, Phases of compilers, bootstrapping, compiler construction tools.
Lexical analysis: Role of LA, Finite automata as recognizer, Language for specifying LEX Programs, The syntactic specification of programming languages: Context free grammars, derivations & parse trees, Ambiguity

Unit 2: Syntax Analyzers (or Parsers): (07 Hrs)
Parsing techniques, shift reduce parsing, top down parsing. Recursive Descent parsing left factoring, Predictive parsing – FIRST & FOLLOW functions, LR parsers, LR grammars, the canonical collection of LR (O) items, LALR parser, Automatic parser Generator YACC, YACC program.

Unit 3: Syntax Directed Translation (SDT): (07 Hrs)

SDT schemes, SDT schemes for desks calculator, intermediate code, Postfix notations, syntax trees, three address code –Quadruples and triples, indirect triples. SDT scheme for translation of following types of statement – assignment statements, Boolean expressions, Boolean expressions with control flow method, if then else statement, while do statement, procedure calls, variable declarations, CASE statements

SECTION B

Unit 4: Symbol tables: (07 Hrs)

Contents of symbol table, data structures for symbol table: lists, Self organizing lists, search trees, hash tables, Representing scope information.

Run – time storage Administration: Implementation of simple stack – allocation scheme, implementation of block structured languages – displays.

Error detection & Recovery: Types of errors, sources of errors, panic mode of recovery, error recovery in LR passing, and automatic error recovery in YACC.

Unit 5: Code Optimization: (07 Hrs)

Principal sources of optimization , loop optimization Basic blocks, flow graphs, loops, code motion, induction variables, DAG representation of basic blocks, Application of DAGs, Global Data Flow Analysis, Data Flow equations. Loop unrolling, loop jamming.

Unit 6: Code Generation: (06 Hrs)

Object programs, the environment of code generator, runtime addresses for names, problems in code generation, working of a simple code generator in brief, register allocation and assignments, peephole optimization

Text Books:

1. A V Aho, R. Sethi, J D Ullman, "Compilers: Principles, Techniques, and Tools", Pearson Education, ISBN 81 – 7758 – 590 – 8
2. D. M. Dhamdhere, "Compiler Construction – Principles & practices"

Reference Books:

1. Dick Grune, Henri E. Bal, Ceriel J.H. Jacobs, Koen G. Langendoen, "Modern Compiler Design", Wiley publication.
2. Parag H.Dave, Himanshu B. Dave, "Compilers: Principles and Practice", Pearson Education.
3. Dr.O.G.Kakde, "Compiler Design", University Science Press

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Final Year Engineering (IT)
Semester – I

Course Code: ITD443, Title: Elective - I Object Oriented Analysis & Modeling (OOAM)

Teaching Scheme:
Theory: 4 Hours/Week

Examination Scheme:
Class Test: 20 Marks
Theory Examination (Marks): 80 Marks
Theory Examination (Duration):03 Hours

Prerequisite:

- Software Engineering, Object Oriented programming languages.

Objectives:

1. To provide a sound understanding of the fundamental concepts of the object model.
2. To understand how large, complex software systems are developed using modern software engineering methods and models.
3. To understand the frame work for software engineering to collaborate in the design and development process
4. To know the realistic application of object oriented development within a variety of problem domains.

CONTENTS

SECTION-A

Unit 1: Complexity and The Object Model: (6 hrs)
The inherent Complexity of software, The Structure of Complex Systems, Bringing Order to Chaos, On Designing Complex Systems. The Evolution of the Object Model, Foundations of the Object Model**,** Elements of the Object Model, Applying the Object Model.

Unit 2: Classes and Objects: (6 hrs)
The Nature of an Object ,Relationships Among Objects ,The Nature of a Class, Relationships Among Classes, The Interplay of Classes and Objects, On Building Quality Classes and Objects. The importance of proper classification, Identifying Classes and Objects, Key Abstraction and Mechanism,

Unit 3: The Notation and Pragmatics: (8 hrs)
Elements of the Notation, Use case Diagram, Class Diagram, State Transition Diagrams, Object Diagrams, Intersection Diagram, Module Diagrams, Process Diagrams, Applying the Notation,

Management and Planning, Staffing, Release Management, Reuse, Quality Assurance and Metrics, Documentation, Tools, Domain specific issues ,Technology Transfer , The Benefits and Risk of Object-Oriented Development.

NOTE: Case Study for Unit 2 & 3: ATM System, Courseware Management System, Library Management System.

SECTION-B

Unit 4: Introduction to Design Patterns: (8 hrs)

What is a Design Pattern?, The Catalog of Design Patterns, Organizing the Catalog, Creational Design Pattern, Intent, applicability, structure, collaborations, consequence, implementations: Abstract Factory Prototype, Singleton.

Unit 5: Structural Design Patterns: (6 hrs)

Intent, applicability, structure, collaborations, consequence, implementations: Adapter, Decorator, Proxy.

Unit 6: Behavioral Design Patterns: (6 hrs)

Intent, applicability, structure, collaborations, consequence, implementations: Command, Observer, Strategy.

NOTE: Case Study for Unit 4, 5 and 6: Document Editor.

Text Books:

1. Object-Oriented Analysis and Design by Grady Booch, 2nd Edition , Addison Wesley
2. Alan Dennis, Barbara Haley Wixom,David Tegarden ,"System Analysis and Design with UML 2.0 " Wiley India Edition.
3. Software Modeling and Design UML, Use Cases, Patterns, and Software Architectures by Hassan Gomaa.
4. Design Patterns (ISBN: 81-7808-135-0) by Erich Gamma, Richard Helm, Ralph Johnson, John Vlissides (Pearson Education Inc.), (Gang-of Four)

Reference Books:

1. Software Architecture Design – Methodology and Styles ISBN: 1-58874-621-6 Stipes Publishing L.L.C. by Lixin Tao, Xiang Fu and Kai Qian
2. Pattern Oriented Software Architecture (ISBN: 9971-51-421-4) by Frank Bushmann
3. Hank-Erik Eriksson, Magnus Penkar,Brian Lyons,David Fado," UML 2 Tool Kit" OMG Press.

Pattern of Question Paper:

Six units in the syllabus shall be divided in two equal parts i.e. 3 units in each part. Question

paper shall be set having two sections A and B. Section A questions shall be set on first part and Section B questions on second part. Question paper should cover the entire syllabus.

For 80 marks Paper:

1. Minimum ten questions
2. Five questions in each section
3. Question no. 1 from section A and Question no. 6 from section B, 10 marks each, will be compulsory.
4. From the remaining questions in section A and B students are supposed to solve any two questions from each section, 15 marks each.

Dr. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, AURANGABAD
FACULTY OF ENGINEERING AND TECHNOLOGY
Final Year Engineering (CSE/IT)
Semester – I

Course Code: CSE421 **Title: LAB-I Data Warehousing and Data Mining**

Teaching Scheme:
Practical: 2 Hours/Week

Examination Scheme:
Practical /Oral Examination: 50 Marks
Practical /Oral Examination (Duration): 03 Hours

List of Practical Assignments: Minimum 4 should be conducted from each set.
Minimum 8 assignments should be conducted (04 assignments from each set).

SET I:

Implementation of assignments should be performed using any appropriate language.

1. Implementation of OLAP operations.
2. Implementation of Varying Arrays.
3. Implementation of Nested Tables.
4. Demonstration of any ETL tool.
5. Write a program of apriori algorithm using any programming language.
6. Write a program of naive Bayesian classification using c.
7. Write a program of cluster analysis using simple k-means algorithm using any programming language.
8. A case study of Business Intelligence in Government sector/Social Networking/Business.

SET II:

Following assignments should be performed in WEKA with detail analysis.

9. Create data-set in arff file format. Demonstration of preprocessing on WEKA dataset.
10. Demonstration of Association rule process on data-set contact lenses.arff /supermarket using apriori algorithm
11. Demonstration of classification rule process on WEKA data-set using j48 algorithm
12. Demonstration of classification rule process on WEKA data-set using id3 algorithm
13. Demonstration of classification rule process on WEKA data-set using naive bayes algorithm
14. Demonstration of clustering rule process on data-set iris.arff using simple k-means

Practical Examination:

Practical Examination should be conducted by internal examiner for three hours under the supervision of external examiner. External examiner should evaluate student by checking practical performance and conducting viva.

Dr. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, AURANGABAD
FACULTY OF ENGINEERING AND TECHNOLOGY
Final Year Engineering (IT)
Semester – I

Course Code: ITD422 **Title: LAB-II Cloud Computing**

Teaching Scheme:
Practical: 2 Hours/Week

Examination Scheme:
Practical /Oral Examination: 50 Marks
Practical /Oral Examination (Duration): 03 Hours

List of Practical Assignments:
Minimum 8 assignments should be conducted.

1. Introduction to cloud computing.
2. Implementation of SOAP Web services in JAVA Applications.
3. Implementation of RESTFul Web services in JAVA Applications.
4. Implementation of Para-Virtualization using VMWare's Workstation/ Oracle's Virtual Box and Guest O.S.
5. Implementation of Full-Virtualization using VMWare's ESXi and Guest O.S./ Ovirt.
6. Creating a Warehouse Application in SalesForce.com.
7. Installations and Configuration of Single-Node Setup in Hadoop.
8. Create any Application (Ex: Word Count) Using Hadoop Map/Reduce.
9. To study Cloud security challenges.
10. Case Study: PAAS (Face book, Google App Engine)
11. Case Study: Amazon Web Services.

Practical Examination:

Practical Examination should be conducted by internal examiner for three hours under the supervision of external examiner. External examiner should evaluate student by checking practical performance and conducting viva.

Dr. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, AURANGABAD
FACULTY OF ENGINEERING AND TECHNOLOGY
Final Year Engineering (IT)
Semester – I

Course Code: ITD423 **Title: LAB - III Geographical Information System**

Teaching Scheme:
Practical: 2 Hours/Week

Examination Scheme:
Practical /Oral Examination: 50 Marks
Practical /Oral Examination (Duration): 03 Hours

List of Practical Assignments:

Minimum 08 assignments should be conducted.

1. Introduction to GIS with study of one GIS application in detail.
2. Study of overview of Open source Quantum GIS.
3. Importing Raster Layer and Vector Layer in GIS using Quantum GIS
4. Demonstrating the concept of Symbolism in GIS using Quantum GIS.
5. Demonstrating the concept of Labeling in GIS using Quantum GIS
6. Demonstrating the concept of Overlaying in GIS using Quantum GIS.
7. Drawing map of our institute using Map Maker.
8. Study of Databases in GIS.
9. Case Studies of Hydrological Project and Lavasa.

Practical Examination:

Practical Examination should be conducted by internal examiner for three hours under the supervision of external examiner. External examiner should evaluate student by checking practical performance and conducting viva.

Dr. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, AURANGABAD
FACULTY OF ENGINEERING AND TECHNOLOGY
Final Year Engineering (IT)
Semester – I

Course Code: ITD424 **Title: LAB - IV Elective - I Compiler Construction**

Teaching Scheme:
Practical: 2 Hours/Week

Examination Scheme:
Term Work: 50 Marks

List of Practical Assignments:

Minimum 8 assignments should be conducted.

Implementation of assignments should be performed in any appropriate Programming Language.

1. Program to convert nondeterministic finite automata to deterministic finite automata.
2. Program to generate lexical tokens.
3. Study of LEX/FLEX and write LEX program to identify tokens: integer, decimal numbers, identifiers, keywords, arithmetic operators, relational operators.
4. Program to implement LR parser.
5. Study of YACC tool.
6. Program to implement any one code optimization technique.
7. Implementation of any one method of Intermediate Code Generator.
8. Implementation of code generator.

Term Work:

The term work shall consist of at least 8 experiments/ assignments based on the syllabus above.
Assessment of term work should be done as follows

- Continuous lab assessment
- Actual practical performance in Laboratory.

Dr. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, AURANGABAD
FACULTY OF ENGINEERING AND TECHNOLOGY
Final Year Engineering (IT)
Semester – I

Course Code: ITD424 Title:LAB - IV Elective - I Object Oriented Analysis & Modeling

Teaching Scheme: **Examination Scheme:**

Practical: 2 Hours/Week Term Work : 50 Marks

List of Practical Assignments:

Minimum 8 assignments should be conducted. (04 assignments from each set).

Student should develop a mini project based on the 12 exercises given in SET-I by using any UML tool and conduct any four assignments on design patterns given in SET-II.

SET-I:

1. Design a problem statement.
2. Develop SRS document, risk management and project plan (Gantt chart).
3. Identify Use Cases and develop the Use Case model.
4. Identify the business activities and develop an UML Activity diagram.
5. Identity the conceptual classes and develop a domain model with UML Class diagram.
6. Using the identified scenarios find the interaction between objects and represent them using UML Interaction diagrams.
7. Draw the State Chart diagram.
8. Identify the User Interface, Domain objects, and Technical services. Draw the partial layered, logical architecture diagram with UML package diagram notation.
9. Implement the Technical services layer.
10. Implement the Domain objects layer.
11. Implement the User Interface layer.
12. Draw Component and Deployment diagrams.

SEI-II:

Write a program in Java to implement any Four Design patterns of the following

1) Abstract factory
2) Singleton
3) Prototype
4) Adapter

5) Decorator Pattern
6) Observer Patterns
7) Strategy

Suggested domains for SET-I Mini-project:

1. Passport automation system.
2. Book bank
3. Exam Registration
4. Stock maintenance system.
5. Online course reservation system
6. E-ticketing
7. Software personnel management system
8. Credit card processing
9. e-book management system
10. Recruitment system
11. Foreign trading system
12. Conference Management System
13. BPO Management System

Term Work:

The term work shall consist of at least 8 experiments/ assignments based on the syllabus above. Assessment of term work should be done as follows

- Continuous lab assessment
- Actual practical performance in Laboratory.

Dr. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, AURANGABAD
FACULTY OF ENGINEERING AND TECHNOLOGY
Final Year Engineering (IT)
Semester – I
Course Code: ITD424

Title: LAB – IV Elective – I Artificial Neural Network & Fuzzy Logic

Teaching Scheme:
Practical: 2 Hours/Week

Examination Scheme:
Term Work: 50 Marks

List of Practical Assignments:

Minimum 8 assignments should be conducted.

1. Write a program to implement MP-model.
2. Write a program for solving linearly separable and nonlinearly separable problems with single layer and multilayer perception.
3. Write a program to solve pattern recognition problem with FFNN using back propagation algorithm.
4. Write a program solve pattern storage problem with feedback NN.
5. Write a program to solve pattern clustering problem by unsupervised learning method using self-organizing map (SOM).
6. Write a program to solve pattern recognition problem with learning vector quantization (LVQ).
7. Write a program to solve face recognition problem using ANN as a classifier.
8. Write a program to solve character recognition problem (or classification for medical database).
9. Write a program to implement Fuzzy set operation and properties.
10. Write a program to perform Max-Min composition of two matrices obtained from Cartesian Product.
11. Write a program to solve an optimization problem using Fuzzy If-Then Rules.

Term Work:

The term work shall consist of at least 8 experiments/ assignments based on the syllabus above.
Assessment of term work should be done as follows

- Continuous lab assessment
- Actual practical performance in laboratory.

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FACULTY OF ENGINEERING AND TECHNOLOGY
Final Year Engineering (IT)
Semester – I

Course Code: ITD425 **Title: Project Part I**

Teaching Scheme: **Examination Scheme:**
Practical: 02 Hours/Week Term Work: 25 Marks

1. Project Group size should be of maximum 4 students.
2. The project is to be taken up at the start of the semester I and the project must be completed by the end of semester II.
3. While submitting project proposal care is to be taken that project will be completed within the available time of two terms.
4. Project title should be precise and clear. Selection and approval of topic: Topic should be related to real life or commercial application in the field of Information Technology.

OR

Investigation of the latest development in a specific field of Information Technology.

OR

Commercial and Interdisciplinary projects should be encouraged. The examination will be conducted independently in respective departments.

5. The group should maintain a logbook of activities. It should have entries related to the work done, problems faced, solution evolved etc., duly signed by guide. This data should be used for finding the total man hours and estimating the cost of the project.
6. The group is expected to complete details Literature Survey, system/problem definition, analysis, design, etc. in (B.E. first Term) seventh term, as a part of term work in the form of a joint report. Project report must be submitted in the prescribed format only. No variation in the format will be accepted.
7. The guides should regularly monitor the progress of the project work.
8. Assessment of the project for award of term work marks shall be done by the guide and a departmental committee as per the guidelines given in the following table.
9. The suggestive format of the report is as follows:

(Only one report should be submitted per group as a part of term work submission.)

Title of the Project:
Names & Roll Numbers of the students:
Name of the guide:
Chapter 1: Introduction
Chapter 2: Literature Survey
Chapter 3: System Development

A) Assessment of project –I Term Work B.E. First Term

Name of the Project:_____

Name of the Guide:_____

Sr. No.	Exam Seat No.	Name of the Student	Assessment by Guide (70 %)					Assessment by Departmental Committee (30 %)			
			Literature Survey	Topic Selection	Documentation	Attendance	Total	Evaluation (10%)	Presentation (20%)	Total	Grand Total
		Marks	05	2.5	7.5	2.5	17.5	2.5	5	7.5	25

Sign of Guide Sign of Committee Members Sign of HOD

Dr. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, AURANGABAD
FACULTY OF ENGINEERING AND TECHNOLOGY
Final Year Engineering (IT)
Semester – I

Course Code: ITD426 **Title: Seminar**

Examination Scheme: Term Work: 25 Marks

All the final year students are informed to present a seminar on a topic related to current trends and technologies. Seminar should be evaluated on the following basis:

- PPT prepared and Presentation skills
- Understanding of subject
- Report preparation

Dr. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, AURANGABAD
FACULTY OF ENGINEERING AND TECHNOLOGY
Final Year Engineering (CSE/IT)
Semester – II

Course Code: CSE451 **Title: Computer System Security and Laws (CSSL)**

Teaching Scheme:
Theory: 04 Hours/Week

Examination Scheme:
Class Test: 20 Marks
Theory Examination (Marks): 80 Marks
Theory Examination (Duration): 03 Hours

Prerequisite:

- Fundamentals of Computer Networking.

Objectives:

1. Understand the five security components and apply them when evaluating a given security mechanism.
2. Understand basic cryptography including symmetric and asymmetric cryptography, message digests, digital signatures and digital certificates.
3. To understand the basics of system security along-with the mechanisms for authentication and authorization.
4. To understand the legal aspect and Forensics in the computer system security.

CONTENTS

SECTION-A

Unit 1: Introduction: **(06 hrs)**
Need for Security, security approaches, principles of security, security attacks, security services, model for network security.

Unit 2: Authentication and Authorization controls: (06 hrs)
User-names and password, certificate based authentication, extensible Authentication protocol(EAP), biometric authentication, role based authentication, access control lists(ACL), rule based authentication.

Unit 3: Securing Communications: (08 hrs)
Cryptography Techniques, Cryptographic keys, cryptographic hash functions, Digital Signatures, Digital Certificates, RSA, Advanced Encryption Standard (AES). Steganography, Authentication Applications: Kerberos, Firewalls, Intrusion detection.

SECTION-B

Unit 4: Internet Security Protocols: (06 hrs)
Introduction, Basic concepts, SSL,Transport Layer Security(TLS), Secure HTTP, Secure Electronic Transaction(SET), Email Security, Wireless Application Protocol Security, Security in GSM, Security in 3G, IEEE 802.11 security.

Unit 5: Incident Handling Basics: (06 hrs)
Purpose of Incident Response, Common terms, organizational planning for incident handling, organizational roles, procedures for responding to incidents, types of incidents, stages of incident response, Incident prevention and detection
Information Technology Act 2000: Scope, jurisdiction, offense and contraventions, powers of police, adjudication.

Unit 6: Cyber Forensics: (08 hrs)
History of Cyber forensics, Computer forensics and law, cybercrime examples, forensic Evidence Forensics Casework, Preserving integrity of crime scene, Investigative incident response actions, forensics analysis investigative actions, computer forensic tools.

Textbooks:

1. Atul Kahate, Cryptography and Network Security, 3e, McGraw Hill Education
2. John W. Rittinghouse, William M. Hancock, "Cyber security Operations Handbook", Elsevier Pub.
3. Roberta Bragg, Mark Rhodes-Ousley, Keith Strassberg , "The Complete reference - Network Security" , Tata McGraw Hill publication

Reference Books:

1. William Stallings, Cryptography and Network Security, Pearson Education.
2. Behrouz A. Forouzan, Debdeep Mukhopadhyay, Cryptography and Network Security, McGraw Hill Education.
3. Vivek Sood, 'Cyber Law Simplified', McGraw Hill Education.

Pattern of Question Paper:

Six units in the syllabus shall be divided in two equal parts i.e. 3 units in each part. Question paper shall be set having two sections A and B. Section A questions shall be set on first part and Section B questions on second part. Question paper should cover the entire syllabus.

For 80 marks Paper:

1. Minimum ten questions
2. Five questions in each section
3. Question no. 1 from section A and Question no. 6 from section B, 10 marks each, will be compulsory.
4. From the remaining questions in section A and B students are supposed to solve any two questions from each section, 15 marks each.

Dr. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, AURANGABAD
FACULTY OF ENGINEERING AND TECHNOLOGY
Final Year Engineering (CSE/IT)
Semester – II

Course Code: CSE452 **Title: Mobile Computing (MC)**

Teaching Scheme:
Theory: 4 Hours/Week

Examination Scheme:
Class Test: 20 Marks
Theory Examination (Marks): 80 Marks
Theory Examination (Duration): 03 Hours

Prerequisite:

- Knowledge of Computer Network

Objectives:

1. To make students familiarize with Wireless Networking.
2. To make student familiarize with mobile OS.
3. To make student familiarize with mobile IP.
4. To know the basics of WAP and WML.
5. To familiarize students with open source tools for Mobile Applications.

CONTENTS

SECTION-A

Unit 1: Mobile Operating Systen (4 Hrs)
Features and Technology:- Windows mobile os , Symbian ,Black berry, Android, Iphone OS.

Unit 2: Wireless and Mobile Network Architecture (8 Hrs)
Principle of Cellular Communication, Overview 1G, 2G, 2.5G and 3G and 4G technologies, GSM Architecture and Mobility management hand off management, Network signaling, Mobile Devices: PDA, first generation phone and smart phone

Unit 3: **Medium Access Control (8 Hrs)**
Medium Access Control: Motivation for a specialized MAC (Hidden and exposed terminals, SDMA, FDMA, TDMA, CDMA.

SECTION-B

Unit 4: Mobile IP Protocol Architecture (8 Hrs)

Mobile IP (Goals, assumptions, entities and terminology, IP packet delivery, agent advertisement and discovery, registration, tunneling and encapsulation, optimizations) , Mobile IPv4 and IP v 6 and its application in mobile computing.. CDPD, VOIP, GPRS architecture and Services, Wireless Local Loop-WLL system

Unit 5: Wireless Application Protocol (WAP) (4 Hrs)

The Wireless Application Protocol application environment, wireless application protocol Client software, hardware and websites, wireless application protocol gateways, Implementing enterprise wireless application protocol strategy.

Unit 6: Wireless Markup Language (8 Hrs)

An Introduction to Wireless Technologies, Markup Languages, An Introduction to XML, Fundamentals of WML. Writing and Formatting Text, Navigating Between Cards and Decks, Displaying Images, Tables, Using Variables, Acquiring User Input ,An Introduction to WMLScript, WMLScript Control Structures, Events, Phone.com

Text Books:

1. Yi Bing Lin, "Wireless and Mobile Networks Architecture", John Wiley
2. Jochen Schiller,"Mobile Communications",Addison-Wesley.

Reference Books:

1. Professional Android™ 4 Application Development by Reto Meier
2. Wrox, "The Beginning WML and WML Script", Wrox Publication

Pattern of Question Paper:

Six units in the syllabus shall be divided in two equal parts i.e. 3 units in each part. Question paper shall be set having two sections A and B. Section A questions shall be set on first part and Section B questions on second part. Question paper should cover the entire syllabus.

For 80 marks Paper:

1. Minimum ten questions
2. Five questions in each section
3. Question no. 1 from section A and Question no. 6 from section B, 10 marks eac , will be compulsory.
4. From the remaining questions in section A and B students are supposed to solve any two questions from each section, 15 marks each.

Dr. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, AURANGABAD
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Final Year Engineering (IT)
Semester – II

Course Code: ITD453 **Title: Big Data Analytics (BDA)**

Teaching Scheme:
Theory: 4 Hours/Week

Examination Scheme:
Class Test: 20 Marks
Theory Examination (Marks): 80 Marks
Theory Examination (Duration): 03 Hours

Prerequisite:

Students should have the knowledge of Database Management Systems and Data warehousing & Data Mining.

Objectives:

1. To understand the basic concepts of big data from both a technical and a business perspective.
2. To introduce the major concepts and components of big data.
3. To understand technical and business professionals who need to understand the different types of big data components and the underlying technology concepts that support big data.
4. To understand concepts of Hadoop, MapReduce, Hadoop filesystems (HDFS).
5. To understand the practical steps needed to develop a MapReduce application and Analytics platforms of Hadoop

CONTENTS

SECTION-A

Unit 1: Fundamentals of Big Data: (06 hours)
The Evolution of Data Management, Understanding the Waves of Managing Data, Defining Big Data, Building a Successful Big Data Management Architecture, The Big Data Journey.
Big Data Types: Defining Structured Data, Defining Unstructured Data, Looking at Real-Time and Non-Real-Time Requirements, Putting Big Data Together.

Unit 2: Technology Foundations for Big Data: (08 hours)
Digging into Big Data Technology Components: Exploring the Big Data Stack, Layer 0: Redundant Physical Infrastructure, Layer 1: Security Infrastructure, Layer 2: Operational

Databases, Layer 3: Organizing Data Services and Tools, Layer 4: Analytical Data Warehouses, Big Data Analytics, Big Data Applications.
Virtualization and How It Supports Distributed Computing: Understanding the Basics of Virtualization, Managing Virtualization with the Hypervisor, Abstraction and Virtualization, Implementing Virtualization to Work with Big Data.

Unit 3: Analytics and Big Data: (06 hours)
Using Big Data to Get Results, Modifying Business Intelligence Products to Handle Big Data, Studying Big Data Analytics Examples, Big Data Analytics Solutions.
Understanding Text Analytics and Big Data: Exploring Unstructured Data, Understanding Text Analytics, Analysis and Extraction Techniques, Putting Your Results Together with Structured Data, Putting Big Data to Use, Text Analytics Tools for Big Data.
NoSQL Data Management for Big Data: What is NoSQL?, "Schema-less Models": Increasing Flexibility for Data Manipulation, Key Value Stores, Document Stores, Tabular Stores, Object Data Stores, Graph Databases.

SECTION-B

Unit 4: Hadoop and Map Reduce: (07 hours)
1. Meet Hadoop, Data, Data Storage and Analysis, Comparison with Other Systems, A Brief History of Hadoop, Apache Hadoop and the Hadoop Ecosystem.
MapReduce: A Weather Dataset, Analyzing the Data with Unix Tools, Analyzing the Data with Hadoop, Scaling Out, Hadoop Streaming, Hadoop Pipes.

Unit 5: The Hadoop Distributed File system: (06 hours)
The Design of HDFS, HDFS Concepts, The Command-Line Interface, Hadoop Filesystems, The Java Interface, Data Flow, Parallel Copying with distcp, Hadoop Archives.

Unit 6: Framework: (07 hours)
Pig: Execution Types, Running Pig Programs, Grunt, Pig Latin Editors, An Example, Comparison with Database, Data Processing Operators.
Hive: Hive Services, HiveQL, Tables, Querying Data, Basics of HBase, Zookeeper, Case Studies: Hadoop Usage at Last.fm, Hadoop and Hive at Facebook.

Text Books:

1. Judith Hurwitz, Alan Nugen, "Big Data for Dummies" John Wiley & Sons, Inc, 2013.
2. David Loshin, Big Data Analytics, From Strategic Planning to Enterprise Integration with Tools, Techniques, NoSQL, and Graph, Morgan Kaufmann, 2013.
3. Tom White, Hadoop: The Definitive Guide. Oreilly, Second Edition, 2011.

Reference Books:

1. Paul C. Zikopoulos, Dirk deRoos, Krishnan Parasuraman, Thomas Deutsch, David Corrigan, James Giles, Harness the, Power of Big Data The IBM Big Data Platform, Mc Graw Hill, 2013
2. CHUCK LAM, Hadoop in Action, MANNING, Greenwich, 2011

Pattern of Question Paper:

Six units in the syllabus shall be divided in two equal parts i.e. 3 units in each part. Question paper shall be set having two sections A and B. Section A questions shall be set on first part and Section B questions on second part. Question paper should cover the entire syllabus.

For 80 marks Paper:

1. Minimum ten questions.
2. Five questions in each section
3. Question no. 1 from section A and Question no. 6 from section B, 10 marks each, will be compulsory.
4. From the remaining questions in section A and B students are supposed to solve any two questions from each section, 15 marks each.

Dr. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, AURANGABAD
FACULTY OF ENGINEERING AND TECHNOLOGY
Final Year Engineering (IT)
Semester – II
Course Code: ITD491,Title: Elective - II Image Processing & Pattern Recognition (IP&PR)

Teaching Scheme:
Theory: 4 Hours/Week

Examination Scheme:
Class Test: 20 Marks
Theory Examination (Marks): 80 Marks
Theory Examination (Duration): 03 Hours

Prerequisite:

The students should have knowledge of Elements of Visual Perception, Basic linear algebra, Fourier transforms, Probability and set theory.

Objectives:

1. Students should be able to understand fundamental concepts of digital image processing and pattern recognition.
2. To provide an introduction to methodologies for digital image processing
3. Student should understand basic image transforms.
4. Students should get acquainted with real world fields in which pattern recognition is widely used.

CONTENTS

SECTION-A

Unit 1: Digital Image Fundamentals: (8 hrs)
Introduction: Image, Pixel, Digital Image, Fundamental steps and Components of Digital Image Processing, Image sensing and Acquisition, Image Sampling and Quantization: Basic concepts in Sampling and Quantization, Representing Digital images, Spatial and intensity resolution, Relationship between Pixels: Neighbors of a Pixel, Adjacency, Connectivity, Regions, and Boundaries, Distance Measures, Basic Intensity transformations: Image Negatives, Log Transformation, Power law Transformations. Piecewise-Linear Transformation Functions, Histogram Processing: Definition, Histogram Equalization

Unit 2-: Image Enhancement: (06 hrs)
Fundamentals of Spatial Filtering: The Mechanics of Spatial Filtering, Generating Spatial Filter Masks. Noise Model, Smoothing Spatial Filters: Linear filters: Mean filters, Non-linear (Order Statistic filters): Median, Mode, Max, Min filters, Sharpening Spatial Filters: Foundation, Using the Second Derivative for Image Sharpening: The Laplacian, Unsharp Masking Highboost

Filtering, Using First Order Derivative for (Nonlinear) Image sharpening: The Gradient Image Enhancement by Frequency Domain Methods: Basic steps for Filtering in Frequency Domain. Frequency Domain low pass (Smoothing) and high pass (Sharpening) Filters.

Unit 3: Image Transforms (06 hrs)
Introduction, Need for transform, Image transforms, Fourier transform, 2D Discrete Fourier transform, Walsh transform, Hadamard transform, Haar transform, Discrete Cosine transform, KL transform, Singular value decomposition, Comparison of different transforms.

SECTION-B

Unit 4: Image Segmentation: (08 hrs)
Fundamentals : Point , Line and Edge Detection, Detection of Isolated Points, Line Detection, Edge Models, Basic Edge detection, Canny edge detector classification of edges, edge detection, edge linking, Thresholding: Foundation, Basic Global Thresholding, Optimal global thresholding Multiple Thresholds, Variable , Multivariable Thresholding, Region-Based Segmentation Methods: Region Growing, Region Splitting and Merging, Morphology: Preliminaries, Erosion and Dilation, Opening and Closing. Segmentation Using Morphological Watersheds

Unit 5: Introduction to Pattern Recognition: **(06 hrs)**
Pattern recognition systems, the design cycle, learning and adaption Pattern recognition applications, Pattern Recognition Approaches: The statistical pattern recognition approach, The syntactic pattern recognition approach, the neural pattern recognition approach, Comparing and relating statistical, syntactic and neural approach, Bayes Decision Theory

Unit 6: Recognition of 2D objects: (06 hrs)
Image Representation and Description: Representation, Boundary Descriptors, Regional Descriptors, Object Recognition: Introduction, Need for object recognition system, automated object recognition system, Relationship between image processing and object recognition. Pattern and Pattern classes, Selection of measurement parameters, Template-matching based object recognition.

Text Books:

1. Rafael C Gonzalez, Richard E Woods, “Digital Image Processing”, Pearson Education.
2. S. Jayaraman, S Esakkirajan,T Veerakumar “Digital Image Processing”, Mc Graw Hill Publication.
3. Rafael C Gonzalez, Richard E Woods, Eddins, “Digital Image Processing using MATLAB”, Pearson Education
4. R.O. Duda, P.E. Hart, D.G. Stork. “Pattern Classification”, John Wiley and Sons, Second edition

5. Robert Schalkoff, “Pattern Recognition Statistical, Structural and Neural Approaches” Wiley.

Reference Books:

1. Anil K Jain, “Fundamentals of Digital Image Processing”, PHI
2. B Chanda & Dutta Majumdar, “Digital Image Processing and Analysis”, PHI
3. Earl Gose, Richard Johnsonbaugh, Steve Jost, “Pattern Recognition and Image Analysis”, PHI.

Pattern of Question Paper:

Six units in the syllabus shall be divided in two equal parts i.e. 3 units in each part. Question paper shall be set having two sections A and B. Section A questions shall be set on first part and Section B questions on second part. Question paper should cover the entire syllabus.

For 80 marks Paper:

1. Minimum ten questions
2. Five questions in each section
3. Question no. 1 from section A and Question no. 6 from section B, 10 marks each, will be compulsory.
4. from the remaining questions in section A and B students are supposed to solve any two questions from each section, 15 marks each.

Dr. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, AURANGABAD
FACULTY OF ENGINEERING AND TECHNOLOGY
Final Year Engineering (CSE/IT)
Semester – II

Course Code: CSE492 | **Title: Elective - II Green IT**

Teaching Scheme:
Theory: - 04 Hours/Week

Examination Scheme:
Class Test: 20 Marks
Theory Examination (Marks): 80 Marks
Theory Examination (Duration): 03 Hours

Prerequisite

1. Understanding of Environmental Science and Business Process

Objectives:

1. Learn to measure computer power usage, minimize power usage, procure sustainable hardware, design green data centers, and recycle computer equipment.
2. Acquire expertise for improving the energy efficiency of personal computers by reducing the power consumption requirements.
3. Evaluate the regulatory and governance issues surrounding IT.
4. Execute a virtualization plan.

CONTENTS

SECTION-A

UNIT 1: Green IT an Overview: (06 Hrs)
Introduction, Environmental Concerns and Sustainable Development, Environmental Impacts of IT, Green IT, Holistic Approach to Greening IT, Greening IT, Enterprise Green IT Strategy, Green IT Burden or opportunity, Life Cycle of a Device or hardware Reuse, Recycle and Dispose.

UNIT 2: Green Software & Sustainable software Development: (08 Hrs)
Energy- Saving Software Techniques- Computational Efficiency, Data Efficiency, Context Awareness, Idle Efficiency, Evaluating and Measuring Software Impact to Platform Power, Current practices, Sustainable Software, Software Sustainability Attributes, Software Sustainability Metrics, Sustainable Software methodology, Case Study.

UNIT 3: Green Data Centres and Data Storage: (06 Hrs)

Data centres and Associated Energy Challenges ,Data Centre IT Infrastructure, Data Centre Facility Infrastructure, IT Infrastructure Management, Green Data Centre Metrics, Case study on Data Centre Management Strategies, Storage Media Power Characteristics-Hard Disks, Magnetic Tapes, Solid-State Drives, Energy Management Techniques for Hard Disks-State Monitoring,Caching,Dynamic RPM,System- Level Energy Management.

SECTION-B

UNIT 4: Green Networks and Communication: (06 Hrs)

Introduction, Objectives of Green Network Protocols-Energy-Optimizing Protocol Design, Bit Costs Associated with Network Communication Protocol, Green Network Protocols and Standards-Strategies to Reduce Carbon Emissions, Contributions from the EMAN Working Group, Contributions from Standardization Bodies.

UNIT 5: Green Cloud Computing and environmental Sustainability: (06 Hrs)

Cloud Computing, Cloud Computing Energy usage Model, Features of Clouds Enabling Green Computing, Green Cloud Architecture, case Study: IaaS Provider.

UNIT 6: Green Enterprises and Role of IT and Green IT Outlook: (08 Hrs)

Organizational and Enterprise Greening, Information Systems in Greening Enterprises, Greening the Enterprise: IT Usage and hardware,Inter-organizational, Enterprise Activities and Green Issues, Enablers and Making the Case for IT and the green Enterprise, Awareness to implementation, Greening by IT, Green IT Megatrend, Seven-step approach to Creating Green IT Strategy, Research and Development Directions.

Text Books:

1. San Murugesan, and G. R. Gangadharan "Harnessing Green IT: Principles and Practices", IEEE Wiley publication.
2. Adrian Sobotta and Irene Sobotta ,"Greening IT - How Greener IT Can Form a Solid Base For a Low Carbon Society", Creative Commons Publication, 2009. (greening it_isbn - 9788791936029.pdf).

Pattern of Question Paper:

Six units in the syllabus shall be divided in two equal parts i.e. 3 units in each part. Question paper shall be set having two sections A and B. Section A questions shall be set on first part and Section B questions on second part. Question paper should cover the entire syllabus.

For 80 marks Paper:

1. Minimum ten questions

2. Five questions in each section
3. Question no. 1 from section A and Question no. 6 from section B, 10 marks each, will be compulsory.
4. from the remaining questions in section A and B students are supposed to solve any two questions from each section, 15 marks each.

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FACULTY OF ENGINEERING AND TECHNOLOGY
Final Year Engineering (CSE/IT)
Semester – II

Course Code: CSE493 **Title: Elective - II Agile Methodology (AM)**

Teaching Scheme:
Theory: 04 Hours/Week

Examination Scheme:
Class Test: 20 Marks
Theory Examination (Marks):80 Marks
Theory Examination (Duration):03 Hours

Prerequisite:

- Awareness of basics of software engineering concepts and waterfall methodology.
- Exposure to any object oriented programming language such as Java, C#.

Objectives:

1. To understand the background and driving forces for taking an Agile approach to software development.
2. To understand the business value of adopting agile approaches.
3. To understand the Agile development practices.
4. To drive development with unit tests using Test Driven Development.
5. To Apply design principles and refactoring to achieve Agility.
6. To deploy automated build tools, version control and continuous integration.

CONTENTS

SECTION-A

Unit 1: Fundamentals of Agile: (6 hours)
The Genesis of Agile, Introduction and background, Agile Manifesto and Principles, Overview of Scrum, Extreme Programming, Feature Driven development, Lean Software Development, Agile project management, Design and development practices in Agile projects, Test Driven Development, Continuous Integration, Refactoring, Pair Programming, Simple Design, User Stories, Agile Testing, Agile Tools.

Unit 2: Agile Scrum Framework: (6 hours)
Introduction to Scrum, Project phases, Agile Estimation, Planning game, Product backlog, Sprint backlog, Iteration planning, User story definition, Characteristics and content of user stories, Acceptance tests and Verifying stories, Project velocity, Burn down chart, Sprint planning and

retrospective, Daily scrum, Scrum roles – Product Owner, Scrum Master, Scrum Team, Scrum case study, Tools for Agile project management.

Unit 3: Agile Testing: (8 hours)
The Agile lifecycle and its impact on testing, Test-Driven Development (TDD), x Unit framework and tools for TDD, Testing user stories - acceptance tests and scenarios, Planning and managing testing cycle, Exploratory testing, Risk based testing, Regression tests, Test Automation, Tools to support the Agile tester.

SECTION-B

Unit 4: Agile Software Design and Development: (6 hours)
Agile design practices, Role of design Principles including Single Responsibility Principle, Open Closed Principle, Liskov Substitution Principle, Interface Segregation Principles,

Unit 5: Agile Software Design Principles: (6 hours)
Dependency Inversion Principle in Agile Design, Need and significance of Refactoring, Refactoring Techniques, Continuous Integration, Automated build tools, Version control.

Unit 6: Industry Trends (8 hours)
Market scenario and adoption of Agile, Agile ALM, Roles in an Agile project, Agile applicability, Agile in Distributed teams, Business benefits, Challenges in Agile, Risks and Mitigation, Agile projects on Cloud, Balancing Agility with Discipline, Agile rapid development technologies.

Text Books:

1. Agile Software Development with Scrum by Ken Schawber, Mike Beedle Publisher: Pearson Published: 21 Mar 2008.
2. Agile Testing: A Practical Guide for Testers and Agile Teams by Lisa Crispin, Janet Gregory Publisher: Addison Wesley Published: 30 Dec 2008.

Reference Books

1. Agile Software Development, Principles, Patterns and Practices by Robert C. Martin Publisher: Prentice Hall Published: 25 Oct 2002.

Pattern of Question Paper:

Six units in the syllabus shall be divided in two equal parts i.e. 3 units in each part. Question paper shall be set having two sections A and B. Section A questions shall be set on first part and Section B questions on second part. Question paper should cover the entire syllabus.

For 80 marks Paper:

1. Minimum ten questions
2. Five questions in each section
3. Question no. 1 from section A and Question no. 6 from section B, 10 marks each, will be compulsory.
4. From the remaining questions in section A and B students are supposed to solve any two questions from each section, 15 marks each.

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Final Year Engineering (CSE/IT)
Semester – II

Course Code: CSE471 **Title: LAB - V Computer System Security and Laws**

Teaching Scheme:

Practical: 2 Hours/Week

Examination Scheme:

Practical /Oral Examination: 50 Marks
Practical /Oral Examination (Duration): 03 Hours

List of Practical Assignments:

Minimum 08 assignments should be conducted.

1. Installation and demonstration of nmap tool.
2. Perform an experiment to demonstrate use of nmap tool for Port Scanning.
3. Installation and demonstration of Wireshark Network Analyzer tool.
4. Perform an experiment to demonstrate the use of wire shark network analyzer to sniff for router traffic.
5. Installation and demonstration of jcrypt tool.
6. Use jcrypt tool (or any other equivalent) to demonstrate asymmetric, symmetric crypto algorithm, hash and digital signatures
7. Case study: Kerberos.
8. Implementation of RSA algorithm using any appropriate Programming Language.
9. Demonstrate any tool for Intrusion Detection System (IDS)
10. Study of IT Act 2000.

Practical Examination:

Practical Examination should be conducted by internal examiner for three hours under the supervision of external examiner. External examiner should evaluate student by checking practical performance and conducting viva.

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Final Year Engineering (CSE/IT)
Semester – II

Course Code: CSE472 **Title: LAB - VI Mobile Computing**

Teaching Scheme:
Practical: 2 Hours/Week

Examination Scheme:
Practical /Oral Examination: 50 Marks
Practical /Oral Examination (Duration): 03 Hours

List of Practical Assignments:

Minimum 08 assignments should be conducted.

1. Write a program to show how to use UI elements, layouts by using ADT.
2. Write a program to show Linking of activities. Broadcast receiver in Android.
3. Write a Program to develop simple application to show activity life cycle.
4. Write a Program work with Google services
5. Write a program for Broadcast receiver in Android.
6. Write a program by using <p>,line braking, fonts and formatting of text in WML
7. Write a program for Navigation between cards, deck, and formatted text.
8. Write a program Displaying of Image, table using WML
9. Write a program for anchor links, variables.
10. Write a program Methods of acquiring user inputs in WML
11. Write a program WML scripts basics by using conditional or loop statement
12. Write an assignment on latest Open Source Operating Systems for Mobile.

Practical Examination:

Practical Examination should be conducted by internal examiner for three hours under the supervision of external examiner. External examiner should evaluate student by checking practical performance and conducting viva.

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Final Year Engineering (IT)
Semester – II

Course Code: ITD 473 **Title: LAB - VII Big Data Analytics**

Teaching Scheme:

Practical: 2 Hours/Week

Examination Scheme:

Practical /Oral Examination: 50 Marks
Practical /Oral Examination (Duration): 03 Hours

List of Practical Assignments:

Minimum 08 assignments should be conducted.

1: Hadoop: Installation of single node cluster.
2: Hadoop: Installation of multi node cluster.
3: Map Reduce: Write a java program to count a word from the given text.
4: Write a program for text analytics using any one big data analytic tool.
5: NoSQL using Hive Scripting.
6: NoSQL using Pig Scripting.
7: Data Modeling and Visualization.
8: Case study: Hadoop usage at last.fm.
9: Case study: Hadoop and Hive at Facebook.

Practical Examination:

Practical Examination should be conducted by internal examiner for three hours under the supervision of external examiner. External examiner should evaluate student by checking practical performance and conducting viva.

Dr. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, AURANGABAD
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Final Year Engineering (IT)
Semester – II

Course Code: ITD474
Title: LAB - VIII Elective - II Image Processing & Pattern Recognition

Teaching Scheme:
Practical: 2 Hours/Week

Examination Scheme:
Term Work: 50 Marks

List of experiments:

Minimum 08 assignments should be conducted.

Develop and implement following programs using C/C++/MATLAB/JAVA/.NET on LINUX/Windows environment.

1. Program for Image enhancement using basic intensity operations and Histogram processing.
2. Program to filter an image using averaging , median low pass filter in spatial domain
3. Program to sharpen an image using 2-D Laplacian high pass filter in spatial domain
4. Program for detecting edges in an image using Roberts cross-gradient operator and Sobel operator
5. Program to smooth an image using low pass filter in frequency domain
6. Program to sharpen an image using high pass filter in frequency domain
7. Program for Image transforms
8. Programs for Image segmentations using thresholding,
9. Programs for chain code.
10. Case study on Pattern Recognition Application.

Note: A group of two students will prepare case study and give presentation on any pattern recognition application.

Suggestive list for case study can be

1. Fingerprint Recognition
2. Face Recognition
3. Iris Recognition
4. Mammogram Analysis.
5. ECG Pattern Recognition.
6. EEG Pattern Recognition.
7. Crop forecasting
8. Cloud Pattern Recognition

Term Work:

The term work shall consist of at least 8 experiments/ assignments based on the syllabus above. Assessment of term work should be done as follows

- Continuous lab assessment
- Actual practical performance in Laboratory.

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Semester – II

Course Code: ITD474 **Title: LAB VIII Elective - II Green IT**

Teaching Scheme:
Practical: 2 Hours/Week

Examination Scheme:
Term work: 50 Marks

List of Practical Assignments:

Minimum 08 assignments should be conducted.

1. Case study on Climate change and low carbon society
2. Study types of Carbon Management Systems (CMS), their features and limitation.
3. Green IT and Disaster management
4. Green IT and Decision support system
5. Tools most useful in developing green software, developer perspective.
6. Case study on Data Center Management Strategies.
7. Cloud computing as Green IT initiative through visualization.
8. Case study on Smart Grid.

Term Work:

The term work shall consist of at least 8 experiments/ assignments based on the syllabus above. Assessment of term work should be done as follows

- Continuous lab assessment
- Actual practical performance in Laboratory.

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Semester – II

Course Code: ITD474 **Title: Lab - VIII Elective - II Agile Methodology**

Teaching Scheme:
Practical: 2 Hours/Week

Examination Scheme:
Term Work: 50 Marks

List of Practical Assignments:

Minimum 08 assignments should be conducted.

1: Understand the background and driving forces for taking an Agile approach to software development.
2: Understand the business value of adopting Agile approaches.
3: Understand the Agile development practices.
4: Drive development with unit tests using Test Driven Development.
5: Apply design principles and refactoring to achieve Agility.
6 & 7: Deploy automated build tools, version control and continuous integration.
8: Perform testing activities within an agile project.

Term Work:
The term work shall consist of at least 8 experiments/ assignments based on the syllabus above.
Assessment of term work should be done as follows

- Continuous lab assessment
- Actual practical performance in Laboratory.

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Semester – II

Course Code: ITD475 **Title: Project Part II**

Teaching Scheme:
Practical: 06 Hours/Week

Examination Scheme:
Term Work: 50 Marks
Practical /Oral Examination: 100 Marks
Practical /Oral Examination (Duration): 03 Hours

1. The guide should be internal examiner for oral examination.
2. The external examiner should be from the related area of the concerned project. He should have minimum of five years of experience at degree level / industry.
3. The evaluations at final oral examination should be done jointly by the internal and external examiner.
4. The same project group of Part I should continue the work in Part – II as well. The project group should complete the project work taken in Part I. It should complete the rest of the work from stage III onwards till the conclusion. The performance Analysis chapter should consist of various testing methods used along with sample test cases. It should also include how better the system is performing as compared to other similar systems. The final examination will consist of the demonstration of work which will be judged by two examiners (one internal and one external) and the marks will be given accordingly. The suggestive format of the report is as follows:

(Only one report should be submitted per group as a part of term work submission)

Title of the Project:

Names & Roll Numbers of the students:

Name of the guide:

Chapter 1: Introduction

Chapter 2: Literature Survey

Chapter 3: System Development

(This chapter will include the entire design process with necessary DFDs, other diagrams, design methodologies and other design and implementation details.)

Chapter 4: Performance Analysis

Chapter 5: Conclusions
(Detailed format of the project report is to be made available by the Dept.)