SYLLABUS

Master of Computer Applications

5th SEMESTER

Session 2020 - 2021

School of Computer Science & IT,
Devi Ahilya Vishwa Vidyalaya, Indore
www.scs.dauniv.ac.in

Course Name MCA 5th Semester
Subject Code: CS-4409
Subject Name: Enterprise Resource Planning

Aim of the Subject

It helps students to acquire basic understanding of business processes, their integration through IT enabled applications and to develop a managerial perspective to leverage them for competitive advantage.

Objectives

1. Understand ERP and its benefits over legacy applications.
2. Develop conceptual clarity of ERP implementation strategies.
3. Understand ERP modules and their integration.
4. Analyse different organizational cases and how to use ERP to solve such cases.
5. Learn the steps in ERP project management.

Learning Outcomes

(I) A student completing course unit 1 should:
1. Develop an understanding of functional division of organizations.
2. Understand business processes.
3. Develop conceptual clarity of re-engineering.
4. Know re-engineering features.
5. Know about evolution of ERP applications.

(II) A student completing course unit 2 should:
1. Know about success factors in re-engineering projects.
2. Able to compare different re-engineering approaches.
3. Have essential knowledge on how to select ERP vendors.
4. Understand ERP life cycle.

(III) A student completing course unit 3 should:
1. Develop an understanding of different ERP packages.
2. Understand the features of sales and marketing module in ERP.
3. Understand integration of sales and distribution with other modules.
4. Understand CRM.

(IV) A student completing course unit 4 should:
1. Understand accounting and finance functions.
2. Understand management control functions of accounting.
3. Manage ERP projects.
4. Analyze different organizational cases.

(V) A student completing course unit 5 should:
1. Understand advanced planning systems.
2. Understand production planning and manufacturing processes.
3. Understand SCM applications.
4. Understand package architecture.

5. Get acquainted with CRM applications.
6. Have detailed knowledge of ERP application.

Unit 1

Process view of organization: Introduction to business process, problems of functional division, ERP-introduction. Evolution of Enterprise applications, Technology as process enabler, mapping an existing process, Process redesign, new process validation. Salient features of Re-engineering, Re-engineering initiatives, Managerial implications of process Re-engineering efforts.

Unit 2

Business Process Re-engineering: Critical success factors of re-engineering project, comparison of different re-engineering approaches, Introduction to Enterprise Resource Planning, Reasons for the growth of the ERP market, ERP packages role, Rationale for ERP, Enterprise architecture planning, Selection of an ERP vendor, Contracts with vendors, consultants and employees, Pitfalls of ERP packages, ERP implementation lifecycle, Implementation methodology, organizing the implementation, Re-engineering business cases.

Unit 3

Overview of ERP modules and ERP market place: SAP AG, PeopleSoft, Baan, JD Edwards world solutions company, Oracle Corporation, ERP and related technologies. Sales and Marketing processes, Management control processes in Sales and Marketing, Sales and Marketing modules in ERP systems, ERP and Customer Relationship Management, Integration of Sales and Distribution with other modules, ERP case studies.

Unit 4

ERP Accounting and Finance module: Accounting and Finance processes, Management Control processes in Accounting, Cash Management processes, Capital Budgeting Processes, Role of Management Accounting, Managing Large-scale ERP projects, Project related factors, user training, management reporting needs, ERP Accounting and Finance case studies.

Unit 5

ERP Production Planning and Materials Management module :Production planning and manufacturing processes, Management control processes in Production and Manufacturing, Materials Management module in ERP systems, Human Resource Management processes, Human Resource Information systems, Integration of HR modules with other modules, ERP HR and Production Planning / Materials Management case studies.

Text Book(s)

1. Mary Sumner, Enterprise Resource Planning, Fifth edition, Pearson Education.
2. Alexis Leon, Enterprise Resource Planning, Tata McGraw Hill publication.

Reference Material(s)

1. Brady, Monk and Wagner, Concepts in Enterprise Resource Planning, Thomson Learning.
2. Greenberg and Paul, CRM at the speed of Light, McGraw Hills Publication, Fourth Edition.
3. Warren D. Raisch, The E-Marketplace: Strategies for success in B2B commerce, McGraw-Hill inc. 2000.
4. Vinod Kumar Garg and Bharat Vakharia, ERP strategy, Jaico Book House.

Course Name MCA 5th Semester
Subject Code: CS-6623
Subject Name: Mobile and Wireless Systems

Aim of the Subject

To introduce the theory, architecture, protocols, techniques and applications in wireless and mobile networks.

Objectives

1. To familiarize students with wireless and mobile terminology.
2. To focus on several areas of wireless and mobile technologies including; Wireless LAN, Cellular Network, Ad-hoc Network and Satellite Communication.
3. To explain architecture and infrastructure for wireless and mobile systems.
4. To familiarize students how mobile phone systems work.
5. To make student understand the influence of mobility, security or IP networks.
6. To make student understand the design decisions of higher layer communication protocols and applications.
7. To expose students to emerging wireless technologies and their potential impact

Learning Outcomes

1 Acquaintance with communication systems & their applications.
2. Understanding of Wireless transmission techniques, infrastructure and devices.
3. Understanding of GSM Architecture, its working and concepts of cellular systems.
4. Understanding of Modulation Techniques, Multiplexing techniques, CDMA
4. Knowledge of channel allocation and co-channel Interference in cellular networks.
5. Application and uses of protocol and developing wireless LAN infrastructure.
6. Understanding of Mobile Ad-hoc network and Sensor networks, issues in efficient routing in MANET.
7. Developing concepts on Characteristics, classification of routing algorithms in MANET, Mobile operating System and applications.
8. Administration & management of mobile systems, security issues.

Unit 1

Overview of the emerging field of mobile computing: Historical perspectives (mainly from the perspective of radio), Land mobile vs. Satellite vs. In-building communications systems, RF vs. IR, Mobile applications, Limitations.

Mobile Radio Propagation: Introduction, Propagation mechanism, Path loss, Slow Fading, Fast Fading, Delay Spread, Inter-symbol Interference, Co-channel Interference.

Cellular Concept: Characteristic of Cellular Systems, Cell area, Capacity of a cell, frequency reuse, Reducing Co-channel Interference, Cell Splitting, Cell Sectoring.

Unit 2

Mobile communication: Fiber or wire based transmission, Wireless Transmission: Frequencies, Antennas and Signal Propagation, Modulation Techniques, Multiplexing techniques, Coding techniques.

Channel Allocation: Fixed Channel Allocation, Dynamic channel Allocation, Hybrid Channel Allocation, Allocation in Specialized System Structure.

Mobile Communication Systems: Cellular System Infrastructure, Registration, Handoff in cellular Systems, Roaming support, Mobile IP, Multicasting, Generation of Mobile Systems, Existing Wireless Systems, Case Study on GSM and CDMA.

Unit 3

Satellite Systems: Types of Satellite Systems, Characteristic of Satellite Systems, Satellite System Infrastructure, Call Setup, Global Positioning System, limitations and beneficiaries of GPS.

Unit 4

Ad Hoc and Sensor Networks: Characteristic of MANETs, Applications, Need of Routing, Routing Classification, Wireless Sensor Networks.

Unit 5

Wireless LANs and PANs: IEEE802.11, HIPERLAN, Bluetooth. Case Study on Wireless LAN infrastructure, Wireless security.

Text Book(s)

1. Jochen Schiller, Mobile Communications, John Willy & Sons, Ltd.
2. D. P. Agrawal and Qing-An zeng, Introduction to Wireless and Mobile Systems, Thomson publication.

Reference Material(s)

1. P. Nicopotidis, Wireless Networks, Addision –Wesley publication.
2. Raj Kamal, Mobile Computing, Oxford University press, 2007.
3. U. Hansmann, L. Merk, M.S. Nicklons and T. Stober, Principles of Mobile Computing, Springer, 2003.
4. R. Behravanfar, Mobile Computing Principles⬜Designing and Developing Mobile Applications with UML and XML, Cambridge University Press, 2005.

5. Andrew S. Tanenbaum, Computer Networks, Addison-Wesley, 4th Edition, 2008.
6. James F. Kurore and Keith W. Rose, Computer Networking, Pearson Education, 3rd Edition, 2005.

Course Name MCA 5th Semester

Subject Code: CS-5309

Subject Name: Object Oriented Analysis & Design

Aim of the Subject

To understand the object oriented development software development approach for developing complex and real life problems.

Objectives

1. Understand the basic concepts of object orientation.
2. Understand the object oriented software development approach.
3. Understand best practices of software engineering.
4. Understand design patterns

Learning Outcomes

1. Object oriented concepts
2. UML diagrams
3. RUP for object oriented software development
4. Design patterns

Unit 1

Review of object oriented concepts, potential benefits and drawbacks of object oriented, Compare object oriented paradigm with structural/procedural paradigm. Elements of Object model, what is class, how to identify them, relationship among objects, relationship among classes.
Relationships: Associations, Multiplicity, Inheritance and Generalizations, Dependencies.

Unit 2

UML: Introduction, UML basics, UML Modeling, Requirement, Architecture, Design, Implementation, Deployment process.
Class diagrams – relationships, association, generalization, dependence, constraints.

Unit 3

Object diagrams, behavioral Modeling: modeling interaction, use cases, Representing Use Case Diagram, use of Use Case diagram in analysis process, Use Case relationships and its examples, Interaction diagrams.

Unit 4

Activity diagrams, Decisions, Concurrent path, Signals, Swim lanes, events, signals, State Machines, process, threads, time, space, state chart diagrams. Interaction view- collaboration,
Interaction, sequence diagrams, Best practices of software engineering.

Unit 5

Introduction to Rational Unified Process, Architecture centric process, Use-case driven process. Design Patterns.
Case study and minor project.

Text Book(s)

1. Booch, Object Oriented Analysis and Design with Applications, Addision Wesley.
2. Schach, Stephen R., An introduction to Object Oriented Systems Analysis and Design with UML and unified process, 2003, TMH.

Reference Material(s)

1. G Booch, J Rambaugh. Ivar Jacobson, The UML User guide, Pearson Education.
2. Eric Brande, Software Design, John Wiley & Sons.
3. David William Brown, An Introduction to Object Oriented Analys is", John Wiley

Course Name MCA 5th Semester

Subject Code: CS-5512

Subject Name: Compiler Design

Aim of the Subject

The aim of this course is to provide students with the knowledge and abilities to design and implement compilers.

Objectives

1. To introduce the major concept areas of language translation and compiler design.

2. To develop an awareness of the function and complexity of modern compilers.

3. To provide practical, hands-on experience in compiler design, writing and modification.

4. The symbol table management, syntax-Directed definition and translations along with the code optimization and generation and error handling have to be covered to complete the aim.

Learning Outcomes

1) Basic knowledge of compilation steps; ability to apply automata theory and knowledge on formal languages.

2) Ability to design and implement scanner modules in compilers.

3) Ability to identify and select suitable parsing strategies for a compiler for various cases. Knowledge in alternative methods (top-down or bottom-up, etc).

4) Knowledge and ability to devise, select, and use modern techniques and tools needed to design and implement compilers.

Unit 1

Introduction to compiling & Lexical Analysis:

Introduction of Compiler, Major data Structure in compiler, BOOT Strapping & Porting, Compiler structure: analysis-synthesis model of compilation, various phases of a compiler, Lexical analysis: Input buffering, Specification & Recognition of Tokens, LEX.

Unit 2

Syntax Analysis &Syntax Directed Translation: Syntax analysis: CFGs, Top down parsing, Brute force approach, recursive descent parsing, transformation on the grammars, predictive parsing, bottom up parsing, operator precedence parsing, LR parsers (SLR, LALR, LR), Parser generation. Syntax directed definitions: Construction of Syntax trees, Bottom up evaluation of S-attributed definition, L-attribute

definition, Top down translation, Bottom Up evaluation of inherited attributes. Recursive Evaluation, Analysis of Syntax directed definition.

Unit 3

Type Checking & Run Time Environment: Type checking: type system, specification of simple type checker, equivalence of expression, types, type conversion, overloading of functions and operations, polymorphic functions. Run time Environment: storage organization, Storage allocation strategies, parameter passing, dynamic storage allocation, Symbol table.

Unit 4

Code Optimization: Introduction to Code optimization: sources of optimization of basic blocks, loops in flow graphs, dead code elimination, loop optimization, Introduction to global data flow analysis, Code Improving transformations, Data flow analysis of structure flow graph Symbolic debugging of optimized code.

Unit 5

Code Generation: Intermediate code generation: Declarations, Assignment statements, Boolean expressions, Case statements, Back patching, Procedure calls Code Generation: Issues in the design of code generator, Basic block and flow graphs, Register allocation and assignment, DAG representation of basic blocks, peephole optimization, generating code from DAG.

Text Book(s)

A. V. Aho, R. Sethi, and J. D. Ullman. Compilers: Principles, Techniques and Tools, Pearson Education

Reference Material(s)

1. Raghavan, Compiler Design, TMH Pub.
2. Louden. Compiler Construction: Principles and Practice, Cengage Learning
3. A. C. Holub. Compiler Design in C , Prentice-Hall Inc., 1993.
4. Mak, writing compiler & Interpreters, Willey Pub.

Course Name MCA 5th Semester

Subject Code: CS-5216

Subject Name: Design and Analysis of Algorithms

Aim of the Subject

The aim is to teach the basic concepts of algorithms.

Objectives

The objective of the course is to teach techniques for effective problem solving in computing. The use of different paradigms of problem solving will be used to illustrate clever and efficient ways to solve a given problem. In each case emphasis will be placed on rigorously proving correctness of the algorithm. In addition, the analysis of the algorithm will be used to show the efficiency of the algorithm over the naive techniques.

Learning Outcomes

1. Argue the correctness of algorithms using inductive proofs and invariants.
2. Analyze worst-case running times of algorithms using asymptotic analysis.
3. Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize divide-and-conquer algorithms. Derive and solve recurrences describing the performance of divide-and-conquer algorithms.
4. Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize dynamic-programming algorithms, and analyze them.
5. Describe the greedy paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize greedy algorithms, and analyze them.
6. Explain the major graph algorithms and their analyses. Employ graphs to model engineering problems, when appropriate. Synthesize new graph algorithms and algorithms that employ graph computations as key components, and analyze them.

Unit 1

Recall of asymptotic notation, big-oh, theta, big-omega, and introduce little-oh and little-omega. Worst case and average case complexity

Unit 2

Divide and Conquer: Integer multiplication revisited with an efficient algorithm that motivates and leads into recurrences. Solving recurrences using recurrence trees, repeated substitution, statement of master theorem. Brief recall of merge sort and its recurrence. Median in worst case linear time.

Unit 3

Application of Graph Traversal Techniques: Recall representation of graphs, BFS (as a method for SSSP on unweighted graphs), DFS, connected components, topological sorting of DAGs, biconnected components, and strongly connected components in directed graphs Greedy Algorithms: Greedy choice, optimal substructure property, minimum spanning trees -- Prims and Kruskals, Dijkstra's shortest path using arrays and heaps, fractional knapsack, and Huffman coding (use of priority queue).

Unit 4

Dynamic Programming: Integral knapsack (contrasted with the fractional variant), longest increasing subsequence, Edit distance, matrix chain multiplication, and independent sets in trees. (The instructor may choose a subset that fits within the time frame.)

Unit 5

NP-completeness: reduction amongst problems, classes NP, P, NP-complete, and polynomial time reductions

Text Book(s)

[1] Introduction to Algorithms, by Cormen, Leiserson, Rivest, and Stein, MIT Press, Third Edition, 2009. [CLRS]

Reference Material(s)

[1] Algorithms, by Dasgupta, Papadimitrou and Vazirani, McGraw-Hill Education, 2006.
[2] Computer Algorithms, by Horowitz, Sahni, and Rajasekaran, Silicon Press, 2007.

CS 4409 Enterprise Resource Planning
List of Assignments

Week	Topic	Reading
1	Discuss elaborately the 'evolution phases' of Enterprise Resource Planning (ERP) right from 1960s to till date.	Chapter 1 (Text Book)
2	Explain the various criteria to be met and possessed by an ERP system, when proposed for the small and medium enterprises.	Chapter 1 (Text Book)
3	Discuss manufacturing business process as regards to an enterprise.	Chapter 2 (Text Book)
4	Discuss accounting process as regards to an enterprise.	Chapter 5 (Text Book)
5	Discuss sales and distribution business process as regards to an enterprise.	Chapter 5 (Text Book)+ Lecture Notes
6	Discuss purchasing business process as regards to an enterprise.	Lecture Notes
7	Explain Fed-Ex e-Procurement journey.	Chapter 5 (Text Book)
8	Explain ERP implementation at BPCL	Chapter 6 (Text Book)
9	Explain the Supply Chain Applications– SCM Practices (A), Wal-Mart SCM Practices (B).	Lecture Notes
10	Explain the CRM Applications – CRM initiatives at 3M, Mobile CRM, Dow Chemical e-CRM Strategy.	Lecture Notes
11	Explain Sears Logistics Management Practices.	Lecture Notes
12	Discuss elaborately the 'evolution phases' of Enterprise Resource Planning (ERP) right from 1960s to till date.	Lecture Notes
13	Explain the various criteria to be met and possessed by an ERP system, when proposed for the small and medium enterprises.	Lecture Notes
14	Using a flow diagram, explain the various 'Phases' involved in the ERP implementation life cycle.	Lecture Notes
15	Explain with suitable examples, the eight areas in which the hidden costs are incurred leading to budget overrun, while implementing ERP.	Lecture Notes
16	With relevant points and suitable examples, describe the various factors and sub-factors that determine the success of ERP implementation.	Lecture Notes
17	Why the Demand Chain and Supply Chain have to be decoupled?	Lecture Notes
18	What is Business Analytics?	Lecture Notes
19	When an ERP system does is considered as an 'Ideal ERP System'?	Lecture Notes

20	List out the common sub-systems of a HR Module of an ERP system.	Lecture Notes
21	What is 'Business Logic' in ERP perspective?	Lecture Notes
22	What do you understand by 'Analytical Hierarchical Process'?	Lecture Notes
23	What is 'Data Migration' process of an ERP system?	Lecture Notes
24	List out the steps involved in the maintenance of the ERP Systems.	Lecture Notes
25	Learn working of a free ware ERP suite.	Lecture Notes
26	How you will model an enterprise with the help of an example ERP application. Explain in detail.	Lecture Notes

CS-5512: Compiler Design

Lab Assignments

1. Write a C program to generate strings up to length 15 with the indivisible symbols like {0,1}, {a, b}, {+,-}.
2. Write a program that copies a file, replacing each non-null sequence of white space by a single blank.
3. Write a C/C++ program which reads a program written in any programming language (say C/C++/Java) and then perform lexical analysis. The output of program should contain the tokens i.e. classification as identifier, special symbol, delimiter, operator, keyword or string. It should also display the number of identifiers, special symbol, delimiter, operator, keyword, strings and statements.
4. Develop a lexical analyzer to recognize a few patterns.
5. Write a program to implement Recursive Descent parser.
6. Write a program to implement Shift-Reduce parser using stack.
7. Develop LL (1) parser.
8. Develop an operator precedence parser.
9. Write a program for generating for various intermediate code forms
    i) Three address code ii) Polish notation
10. Write a program to simulate Heap storage allocation strategy.
11. Generate Lexical analyzer using LEX
12. Generate YACC specification for a few syntactic categories.
13. Study of an Object-Oriented Compiler.

CS-5216: Design and Analysis of Algorithms

(Assignments)

[1] Provide industrial strength implementation of fundamental algorithms and data structures.

[2] Explore the data structures and algorithms used in computer virus and antivirus.

[3] Write a term paper on theory of NP compete problems.

[4] Write a term paper on graph algorithms.

[5] Write a term paper on implementation of key sorting algorithms such as Merge sort.

[6] Write a term paper on recursion removal.

[7] Implement a very long integer class and write a term paper on it.