SYLLABUS

Master of Computer Applications

3rd SEMESTER

Session 2020 - 2021

Mission of SCS&IT, DAVV

To produce world-class professionals who have excellent analytical skills, communication skills, team building spirit and ability to work in cross cultural environment.

To produce international quality IT professionals, who can independently design, develop and implement computer applications.

Professionals who dedicate themselves to mankind, who are environment conscious, follow social norms and ethics.

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

Course Name MCA 3rd Semester
Subject Code: CS 5123
Subject Name: Theory of Computation

Aim of the Subject

The theory of computation is the branch of computer science that deals with whether and how efficiently problems can be solved on a computer. In order to perform a rigorous study of computation, computer scientist's work with mathematical abstractions of

Objectives

1. Introduce students to the mathematical foundations of computation including automata theory; the theory of formal languages and grammars; the notions of algorithm, decidability, complexity, and computability.
2. Enhance/develop students' ability to understand and conduct mathematical proofs for computation and algorithms.

Learning Outcomes

Upon successful completion of this course, you will be able to

1. Discuss key notions of computation, such as algorithm, computability, decidability, reducibility, and complexity, through problem solving.
2. explain the models of computation, including formal languages, grammars and automata, and their connections.
3. Analyze and design finite automata, pushdown automata, Turing machines, formal languages, and grammars.
4. Solve computational problems regarding their computability and complexity and prove the basic results of the theory of computation.

Unit 1

Theory of Automata: String, Alphabet and Languages, Finite Automata, Finite State machine, Basic Definition. Description of a Finite Automaton, Deterministic Finite Accepters Transition Graphs, Languages, Non-deterministic Finite Acceptors-Definition, Finite Automata with ϵ-moves, Equivalence of Deterministic and Non-deterministic Finite Accepters, Conversion of NDFA to DFA, Removal of ϵ transition from ϵ – NDFA, Minimization of Finite Automata –Definition and Construction. Mealy and Moore models Definitions, Transformation of Mealy Machine into Moore Machine and vice-versa.

Unit 2

Properties of Regular Sets: Pumping lemma for regular set, Closure properties of regular set. Formal Language: Basic Definition, Chomsky Classification of languages, Initialization of Finite Automata Regular Expression and Language Regular Expressions, Connection between Regular Expressions and Regular Languages.

Unit 3

Regular Grammars – Right and Left Linear Grammars, Equivalence between Regular Languages and Regular Grammars. Context-Free Grammars: Leftmost and Rightmost Derivations, Derivation Trees, Parsing and Ambiguity, Simplification of CFGs. Chomsky Normal Form, Greibach Normal Form, Cocke-Kasami- Younger Algorithm, Properties of Context-Free Languages.

Unit 4

Pushdown Automata: Definition, Non-deterministic Pushdown Automata, Pushdown Automata for Context Free Languages Context-Free Grammars for Pushdown Automata. Deterministic Pushdown Automata and Deterministic Context-Free Languages.

Unit 5

Turing Machine: Definition of Standard Turing Machine, Turing Machine as Language Accepters and Transducers.

Text Book(s)

1. Mishra and Chandrasekaran, Theory of Computer Science (Automata, language and Computation), 2nd Ed. Prentice Hall of India.
2. J. E. Hopcroft, R. Motwani and J.D Ullman, Introduction to Theory, Languages and Computation; Second Edition, Addison-Wesley, 2001 Narosa Publishing House.

Reference Material(s)

1. Moll, Arbib and Kfoury, an Introduction to Formal Language Theory, Springer-Verlag.
2. Martin, J.C.: Introduction to Languages and the Theory of Computation, McGraw-Hill, Inc.,3rd ed., 2002. ISBN 0-072-32200-4.
3. Brookshear, J.G.: Theory of Computation: Formal Languages, Automata, andComplexity, Benjamin/Cummings Publishing Company, Inc, Redwood City, California, 1989. ISBN 0-805-30143-7.
4. Peter Linz, An Introduction to Formal Languages and Automata, Narosa

Course Name MCA 3rd Semester
Subject Code: IC-4917
Subject Name: Accounting and Financial System

Aim of the Subject

Development of understanding of basic concepts of Accounting

Objectives

To enable students to work in the Financial Domains required in corporate sector to perform effectively as technical experts

Learning Outcomes

Students learn to prepare Balance Sheets and Operate on Tally Software

Unit 1

Development of Basic Principles and rules of Accounting

Unit 2

Understanding of the Process of Accounting – Journal, Ledger, Subsidiary books, trial balance etc.

Unit 3

Learning of Financial Systems

Unit 4

Tools of Financial Analysis and Break Even Analysis

Unit 5

Responsibility Accounting and Tally

Text Book(s)

1. Tulsian's Accountancy for Class XI
2. Financial Management by Khan & Jain

Reference Material(s)

1. Financial Accounting by T.S. Grewal.
2. NCERT Books on Accounting and Financial Management for Class XI and XII.

Course Name MCA 3rd Semester
Subject Code: CS 5613
Subject Name: Computer Network

Aim of the Subject

As a result of rapid technological progress, the old model of a single computer serving all the organization's computational needs has been replaced by a large number of separate but interconnected computers.

Objectives

1. Develop knowledge of the function of both hardware (basics) and software aspects of computer network systems.
2. Understand the fundamental principles of various networking architectures and their protocols.
3. Gain an understanding of the principles of operation of a wide variety of network technologies.
4. Develop an appreciation of how network services are developed and knowledge of their uses.
5. Apply knowledge of computers, software, networking technologies, and information assurance to an organization's management, operations, and requirements.
6. Prepare to continue their studies to obtain various industry certifications.
7. Computer networks is a rapidly evolving field, with new standards and improvements in data communication technology occurring, for this included the topics of CSMA/CA, wireless LANs, IPv6, new developments in application layer protocols etc.

Learning Outcomes

1. Familiarity with network terminologies, reference model, applications of network, design issues and how computer network works?
2. Knowledge of Data link layer design issues, Framing, Error correction and Detection techniques.
3. Meaning of flow control and its methods.
4. Problems associated with broadcast network and multiple access control protocols.
5. Knowledge of IEEE 802.3, 802.4 and 802.5, 802.11
6. Latest LAN examples.
7. Design issues related to Network layer like routing, addressing and their protocols.
8. Introductory knowledge of Transport layer protocols like TCP and UDP.
9. Idea about client server architecture and working of DNS, HTTP and E Mail.

10. Security issues in computer network and Introduction to Cryptographic algorithms and Digital Signature.

Unit 1

Introduction - Computer Network, Goals and Applications; Network Classification: Broadcast & point-to-point networks, LAN, MAN & WAN networks; protocol hierarchies; design issues for the layers. Connection Oriented and Connection less services, Service primitives, Relationship between Services and Protocols; Switching Techniques – Circuit Switching and Packet Switching; Reference models – OSI and TCP/IP, comparison and critique of OSI and TCP/IP reference models, Internet Concept.

Unit 2

Data Link Layer: Design issues – Services, Framing, Error Control and Flow Control; Error Detection Techniques - Parity Check and Cyclic Redundancy Check (CRC); Error Correction Technique - Hamming code; Elementary Data Link Protocols - Unrestricted Simplex Protocol, Simplex Stop-and-Wait Protocol, Sliding Window Protocols: One-Bit Sliding Window Protocol, protocol using Go Back N and Selective Repeat; HDLC protocol; Data link layer in the Internet - SLIP and PPP.

Unit 3

MAC Sublayer - Multiple access protocols: Aloha, CSMA Protocols; Collision-Free Protocols, IEEE MAC Sublayer protocols : Ethernet cabling, 802.3 protocol, 802.4 MAC sublayer protocol, 802.5 MAC sublayer protocol and their management. High speed LANs : Fast Ethernet, FDDI; Wireless LANs; Bluetooth; data link layer switching- Bridges and Switches, their difference with Repeaters, Hubs, Routers and Gateways.

Unit 4

Network Layer - Design issues; Routing Principles; Routing Algorithms: Optimality Principle, Shortest Path Routing, Flooding, Distance Vector Routing. Link State Routing, Hierarchical Routing, Broadcasting Routing, Multicast Routing; The Network Layer in the Internet: Internet Protocol, Internet addressing and Internet Control protocols.

Unit 5

Transport Layer - The transport Services; The Internet Transport Protocols: UDP and TCP; The TCP Service Model. Application layer - Client Server Architecture; DNS; WWW and HTTP; Proxy Server; E-mail Protocols; FTP; TELNET. Network Security - Cryptography, Symmetric- key Algorithms, Public- key Algorithms; Digital Signatures

Text Book(s)

Computer Networks, Andrew S. Tanenbaum, Pearson Education, 5th Edition.

Reference Material(s)

1. Data Communications and Networking, B.A. Forouzan, McGraw-Hill, 5th Edition.
2.Computer Networking : James F. Kurose & Keith W. Rose , Pearson Education, Third Edition, 2005.
3.Communication Networks : Fundamentals Concepts and Key Architecture : Alberto Leon-Garcia and Indra Widjaja, , Tata McGraw-Hill Publishing Company Limited, ISBN 0-07-0402235-3.
4. Data and Network Communication : Michael A. Miller, Delmar Thomson Learning inc. ISBN 0-07668-1100-X.
5. Introduction to Computer Networks : Douglas E. Comer , Prentice-Hall.
6. Alberto Leon-Garcia and Indra Widjaja, Communication Networks –Fundamentals Concepts and Key Architecture , Tata McGraw-Hill Publishing Company Limited, ISBN 0-07-0402235-3.
7.Data and Computer Communications : W.Stallings, , Prentice-Hall, 5th Ed., 1997.

Course Name MCA 3rd Semester
Subject Code: CS- 4211
Subject Name: Object Oriented Programming Using JAVA

Aim of the Subject

To give students a good understanding of basic concepts of object-oriented program design using JAVA. To teach and enable students to develop object-oriented programming skills within the Java language; to enable students to develop object-oriented Java p

Objectives

Briefly describe any course development objectives that are being implemented. (eg increased use of IT or web based reference material, changes in content as a result of new research in the field)
As the technologies in Java are changing frequently so with the textbook, latest changes will also be incorporated in the course using web-based material. Students will also be given programming examples and exercises on every topic. The programming assignments will be checked every week in the computer-lab

Learning Outcomes

- Understand basic principles of object-oriented program design using Java.
- Understand the basic and some advanced issues related to writing classes and methods such as data, visibility, scope, method parameters, object references, and nested classes.
- Understand the basic ideas behind class hierarchies, polymorphism, and programming to interfaces.
- Get exposure to exceptions and basic I/O streams.
- Develop solid Java programming skills and the ability to put in practice the acquired knowledge and understanding of the Java language and object-oriented design in relatively simple case studies

Unit 1

Introduction to Java: Features of Java, Object-oriented Programming Overview, Introduction of Java Technologies, Java Applets and Applications, Java Platform, Java Program structure, Basic Building Blocks (comments, character set, constants), Data Types, Variables, Operators, Expressions, Typecasting, Control Structures, Loops, Memory concepts, Introduction to Class, Objects, Methods and Instance Variables, Naming Conventions, Constructors, Method Overloading, Static Method, Static Field, Math Class, this reference, Garbage collection and finalize method.

Unit 2

String Handling: The String Constructors, String Operations, Character Exaction, String Comparison, String Buffer. Arrays: Creating an array, Enhanced for Statement, Passing Multidimensional Arrays, Arrays to Method, Variable-Length Argument lists, Using Command-line Arguments. Wrapper Class : Introduction to wrapper classes. Inheritance: Relationship between Superclasses and Subclasses, Using super, Constructor in Subclasses, The Object Class, Object Copying in Java. Polymorphism: Method Overriding, Upcasting, Dynamic Method Dispatch, final Field, Method and classes, Abstract classes and Methods, instance of operator, Downcasting, Class class, Runtime type Identification

Unit 3

Packages and Interfaces: Defining a Package, Understanding CLASSPATH, Access Protection, Importing packages, Creating own Packages. Defining an Interface, Properties of Interface, Advantages of Interface Achieving Multiple Inheritance through Interfaces, Variables in Interfaces, Comparable Interface. Exception Handling: Introduction, keywords, Types of Exceptions, Java Exception Hierarchy, finally Block, Chained Exceptions, Declaring new Exception Types, Preconditions and Post-conditions. Streams and Files: Introduction, Data Hierarchy, Files and Streams, Sequential-access Text Files, Object Serialization, Random-Access files, Java Stream Class Hierarchy.

Unit 4

Multithreading: Introduction, Java Thread Model, Thread priorities, Thread life cycle, Creating Thread, Thread Execution, Thread Synchronization, Classes and Interfaces in java.util.concurrent, Monitor and Monitor Locks, Inter-Thread Communication. Introduction To GUI : Introduction, Overview of swing Components, Introduction to Event Handling, Common GUI Event Type and Listener Interfaces, Adapter Classes, Layout Managers Applets: Applet Basics, Applet Architecture, Applet Life Cycle Methods, Applet HTML Tag and Attributes, Executing Applet in Web Browser and in Appletviewer.

Unit 5

Generic and Collection API: Introduction, Motivation for Generic Methods, Generic Methods: Implementation and Compile- time Translation Issues, Overloading Generic Methods, Generic Classes, Raw Types, Generic and Inheritance Database connectivity: JDBC, The design of JDBC, Executing Queries. New Feature of Java: Java Reflection API, Auto boxing, Annotations, Regular Expressions.

Text Book(s)

1. Java 2: The Complete Reference by Herbert Schildt, Tata McGraw- Hill, 8th Edition,
2011.

Reference Material(s)

1. The Java Programming Language, Ken Arnold , James Gosling , David Holmes, 3rd Edition, Pearson Education, 2000.
2. Head First Java, Kathy Sierra, Bert Bates, O'Reilly Publication, 2nd Edition, 2005.

Course Name MCA 3rd Semester
Subject Code: CS-4408
Subject Name: Database Applications and Tools

Aim of the Subject

To present students with database designing and database project management, with an emphasis on how to approach, organize, maintain and retrieve - efficiently, and effectively - information from a DBMS and at the same time enabling students with an insig

Objectives

1. Understand the role of a database management system in an organization.
2. Understand basic database concepts, including the structure and operation of the relational data model.
3. Understand and successfully apply logical database design principles, including E-R diagrams and database normalization.
4. Design and implement a small database project using Project Management Tools.
5. Understanding the organizational approach towards any project using Information Technology Project Management concepts.
6. Describe and discuss selected advanced database topics, such as distributed database systems and the data warehouse.

Learning Outcomes

1. Describe the fundamental elements of relational database management systems
2. Explain the basic concepts of relational data model, entity-relationship model, relational database design, relational algebra and SQL.
3. Design ER-models to represent simple database application scenarios.
4. Understand the concept and elements of project management.
5. Convert the ER-model to relational tables, populate relational database and formulate SQL queries on data.
6. Improve the database design by normalization.

Unit 1

Database Environment: Data versus information, traditional file processing, disadvantages, database approach, range of database application, advantages of database approach. Cost and risk factors, components of database environment, evolution of database system.
Database Development Process: Information engineering, information architecture, enterprise data model, planning, SDLC, CASE etc. Steps of planning, strategic

planning factors, corporate planning objects. Developing preliminary data model, and use of planning matrices, SDLC steps, CASE role, people in database development, three-schema architecture for database development. Examples to demonstrate the development process.

Unit 2

Modeling Data in the Organization: Modeling of the rules of organization, data names and definitions, ER model constructs entities and its types, attributes, relationships, degree, unary, binary, ternary, n-ary, cardinalities constraints, ER modeling examples.Project Management: Introduction to Information Technology Project Management. Integration Management, Triple Constraint, Scope, Time and Cost Management.

Unit 3

Enhanced ER modeling: supertype, subtypes, specialization, generalization, specifying constraints in EER models, completeness, Disjointness, discriminators, defining super/sub type hierarchies, EER modeling examples, live demos modelling for few scenarios.

Unit 4

Logical database design: and relational model development, Relational model properties, keys, primary, secondary, composite, properties of relations. Codd's rules, integrity constraints, creating relational tables, Transform EER diagrams into relations, seven different steps for mapping EER model into relations. Introduction to normalization: steps, functional dependencies, basic normal forms, definition of first, second, third normal form and removing anomalies from the relations. De-normalization and merging relations.

Unit 5

Special Topics (Overview) :Data Warehousing, Data Mining, Distributed Databases.

Text Book(s)

1. Hoffer, Prescott, "Modern Database Management", Seventh Edition, McFadden Pearson Education.
2. Kathy Schwalbe, "INFORMATION TECHNOLOGY PROJECT MANAGEMENT", Course Technology Cengage Learning

Reference Material(s)

1. Thomas M. Connolly, Carolyn E. Begg, "Database Systems", Pearson Education.
2. Raghu R and Johannes G., "Database management Systems", Mc Hill 3rd Edition, 2002.
3. Elmasri R, Navathe S, "Fundamentals of Database Systems", Addison Wesley 4th Edition.