JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
KAKINADA – 533 003, Andhra Pradesh, India

MASTER OF COMPUTER APPLICATIONS (MCA)

(For Two-Year PG Programme)

II Semester		**L**	**T**	**P**	**C**
		3	0	0	3
DATABASE MANAGEMENT SYSTEMS (MCA2101)					

Course Objectives:

This Course will enable students to

- Explain the concept of databases, database management systems, database structures and how they work.
- Make use of Entity-Relationship Modeling and Relational Modeling for creating simple databases from the real world scenarios.
- Write relational algebra and structured query language (SQL) statements.
- Normalize a database using Normalization Rules.
- Discuss the issues associated with Transaction Management and Recovery, Tree Structured and Hash-Based Indexing

Course Outcomes (COs): At the end of the course the student will be able to

- Illustrate the concept of databases, database management systems, database languages, database structures and their work
- Apply ER modeling and Relational modeling for designing simple databases.
- Summarize the concepts related to relational model and SQL and Write database queries using relational algebra and structured query language.
- Design and develop databases from the real world by applying the concepts of Normalization.
- Outline the issues associated with Transaction Management and Recovery, Tree Structured and Hash-Based Indexing

UNIT I:

Introduction to Databases: Introduction, An Example, Characteristics of the Database Approach, Actors on Scene, Workers behind the scene, Advantages of Using the DBMS Approach, A Brief History of Database Applications, When Not to Use a DBMS **[Text book-3]**

Overview of Database Languages and Architectures: Data Models, Schemas and Instances, Three-Schema Architecture and Data Independence, Database Languages and Interfaces, The Database System Environment, Centralized and Client/Server Architecture for DBMSs, Classification of Database Management Systems **[Text book-3]**

UNIT II:

Introduction to Database Design: Database Design and ER Diagrams, Entities, Attributes and Entity Sets, Relationships and Relationship Sets, Additional Features of the ER Model, Conceptual Design with the ER Model, Conceptual Design for Large Enterprises

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Relational Model: Introduction to the Relational Model, Integrity Constraints over Relations, Enforcing Integrity Constraints, Querying Relational Data, Logical Database Design: ER to Relational, Introduction to Views, Destroying/Altering Tables and Views

UNIT III:

Relational Algebra: Selection and Projection, Set Operations, Renaming, Joins, Division, More Examples of Algebra Queries.

SQL: Queries, Constraints, Triggers: The Form of a Basic SQL Query, UNION, INTERSECT and EXCEPT, Nested Queries, Aggregate Operators, Null Values, Complex Integrity Constraints in SQL, Triggers and Active Databases, Designing Active Databases.

UNIT IV:

Introduction to Normalization Using Functional and Multivalued Dependencies: Informal Design Guidelines for Relation Schema, Functional Dependencies, Normal Forms Based on Primary Keys, General Definitions of Second and Third Normal Forms, Boyce-Codd Normal Form, Multivalued Dependency and Fourth Normal Form, Join Dependencies and Fifth Normal Form.

UNIT V:

Transaction Management and Concurrency Control: Transaction Concept, A Simple Transaction Model, Storage Structure, ACID Properties, Serializability, Transaction Isolation Levels, Concurrency Control, Lock-Based Protocols, Validation-Based Protocols **[Text Book-2]**

Note: For Practical Examples Please Go Through Reference 1

Text Books:

1) Database Management Systems, 3/e, Raghurama Krishnan, Johannes Gehrke, Mc Graw-Hill
2) Database System Concepts, 6/e, Abraham Silberschatz, Henry F. Korth, S. Sudarshan, Mc Graw-Hill
3) Database Systems, 6/e Ramez Elmasri, Shamkant B. Navathe, Pearson

Reference Books:

1) Database Systems, 9/e, Carlos Coronel, Steven Morris, Peter Rob, Cengage
2) Introduction to Database Systems, 8/e, C J Date, Pearson

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COMPUTER NETWORKS (MCA2102)					

Course Objectives:

At the end of the course, the students will be able to:

- Understands the fundamental concepts of computer networking and OSI Reference model.
- Familiarize the student with the basic taxonomy and terminology of the computer networking area.
- Learn and understand the advanced networking concepts, preparing the student for entry advanced courses in computer networking.
- Develop and gain expertise in some specific areas of networking such as the design and maintenance of individual networks.

Course Outcomes (COs): At the end of the course, student will be able to

- Explain the network architecture, TCP/IP and OSI reference models
- Identify and understand various techniques and modes of transmission
- Demonstrate the data link protocols, multi-channel access protocols and IEEE 802 standards for LAN
- Describe routing and congestion in network layer with routing algorithms and classify IPV4 addressing scheme
- Discuss the elements and protocols of transport layer
- Develop network security and define various protocols such as FTP, HTTP, Telnet, DNS

UNIT I:

Introduction: Network Topologies WAN, LAN, MAN. Reference models- The OSI Reference Model-the TCP/IP Reference Model - A Comparison of the OSI and TCP/IP Reference Models. **Physical Layer –**Introduction to physical layer-Data and Signals, Periodic analog signals, digital signals, transmission impairment, ,Data rate limits, performance -Introduction to Guided Media- Twisted-pair cable, Coaxial cable and Fiber optic cable and Unguided media: Wireless-Radio waves, microwaves, infrared.

UNIT II:

The Data Link Layer - Services Provided to the Network Layer – Framing – Error Control – Flow Control, Error Detection and Correction – Error-Correcting Codes – Error Detecting Codes. **Elementary Data Link Protocols-** A Utopian Simplex Protocol-A Simplex Stop and Wait Protocol for an Error free channel-A Simplex Stop and Wait Protocol for a Noisy Channel, Sliding Window Protocols-A One Bit Sliding Window Protocol-A Protocol Using Go-Back-N- A Protocol Using Selective Repeat.

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UNIT III:

The Medium Access Control Sub layer-The Channel Allocation Problem-Static Channel Allocation-Assumptions for Dynamic Channel Allocation, Multiple Access Protocols-Aloha-Pure aloha- slotted aloha-Carrier Sense Multiple Access Protocols- Collision-Free Protocols-Limited Contention Protocols. **Wireless LAN Protocols**- Ethernet-Classic Ethernet Physical Layer-Classic Ethernet MAC Sub-layer Protocol-Ethernet Performance-Fast Ethernet- Wireless LANs-The 802.11 Architecture and Protocol Stack-The 802.11 Physical Layer-The802.11 MAC Sub-layer Protocol- The 805.11 Frame Structure-Services.

UNIT IV:

The Network Layer Design Issues – Store and Forward Packet Switching-Services Provided to the Transport layer- Implementation of Connectionless Service-Implementation of Connection Oriented Service- Comparison of Virtual Circuit and Datagram Networks, Routing Algorithms-The Optimality principle-Shortest path, Flooding, Distance vector, Link state, Hierarchical. **Congestion Control algorithms**-General principles of congestion control, Congestion prevention polices, Approaches to Congestion Control-Traffic Aware Routing- Admission Control-Traffic Throttling-Load Shedding. **Internet Working:** How networks differ- How networks can be connected- Tunneling, internetwork routing-, Fragmentation, network layer in the internet – IP protocols-IP Version 4 protocol-, IP addresses-, Subnets-IP Version 6-The main IPV6 header- Internet control protocols- ICMP-ARP-DHCP.

UNIT V:

The Transport Layer: Transport layer protocols: Introduction-services- port number-User data gram protocol-User datagram-UDP services-UDP applications-Transmission control protocol: TCP services-TCP features- Segment- A TCP connection- windows in TCP- flow control-Error control. **Application Layer –-** World Wide Web: HTTP , FTP-Two connections-control connection-Data connection-security of FTP-Electronic mail-Architecture- web based mail- email security- TELENET-local versus remote Logging. **Domain Name System:** Name Space, DNS in Internet, - Resolution-Caching- Resource Records- DNS messages- Registrars-security of DNS Name Servers.

Text Books:

1) Computer Networks: Andrew S Tanenbaum David J. Wetherall, 5/e, Pearson
2) Data communications and networking: Behrouz Forouzan, 5/e, McGraw Hill

Reference Books:

1) Computer Networks – A System Approach, Peterson, Bruce Davie,2/e , Harcourt Asia
2) Compute communications and networking technologies, Gallo, Hancock, Cengage
3) An Engineering approach to compute networking, Kesha, Pearson

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SOFTWARE ENGINEERING AND DESIGN PATTERNS (MCA2103)					

Course Objectives:

- To understand the nature of software development and software life cycle models
- To understand methods of capturing, specifying, visualizing and analyzing software requirements.
- Understand the concept of Design patterns and its importance.
- Understand the behavioral knowledge of the problem and solutions.
- Relate the Creational, Structural, behavioral Design patterns.
- Apply the suitable design patterns to refine the basic design for given context.

Course Outcomes(COs): At the end of the course, student will be able to

- Define various software application domains and remember different process model used in software development.
- Explain needs for software specifications also they can classify different types of software requirements and their gathering techniques.
- Convert the requirements model into the design model and demonstrate use of software and user interface design principles.
- Illustrate the appropriate design patterns to solve object-oriented design problems.
- Apply structural patterns to solve design problems.
- Evaluate the design solutions by using behavioral patterns.

UNIT I:

Introduction to Software Engineering: The evolving role of software, Changing Nature of Software, Software myths. (Text Book 3), **The software problem:** Cost, schedule and quality, Scale and change. **Software Process:** Process and project, component software process, **Software development process models :** Waterfall model, prototyping, iterative development, relational unified process, time boxing model, Extreme programming and agile process, using process models in a project, Project management process.

UNIT II:

Software requirement analysis and specification: Value of good SRS, requirement process, requirement specification, functional specifications with use-cases, other approaches for analysis, validation, **Planning a software project:** Effort estimation, project schedule and staffing, quality planning, risk management planning, project monitoring plan, detailed scheduling.

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UNIT III:

Software Architecture: Role of software architecture, architecture views, components and connector view, architecture styles for C & C view, documenting architecture design, evaluating architectures, **Design:** Design concepts, function-oriented design, object oriented design, detailed design, verification, metrics.

Software Testing: Introduction, verification and validation, White box and black box techniques

UNIT IV:

Introduction: History and Origin of Patterns, Design Patterns in MVC, Describing Design Patterns, How Design Patterns Solve Design Problems, selecting a Design Pattern, Using a Design Pattern

Design Patterns-1: Creational, Abstract Factory-Builder, Factory Method, Prototype-Singleton

UNIT V:

Design Patterns-2: Structural Patterns: Adapter, Bridge, Composite, Decorator, Façade, Flyweight, Proxy

Design Patterns-3: Behavioural Patterns, Chain of Responsibility, Command-Interpreter, Iterator-Mediator, Memento, Observer, State, Strategy, Template Method, Visitor

Text Books:

1) Software Engineering: A Practitioner's Approach, Roger S. Pressman, 10th ed, Mc Graw Hill.
2) Erich Gamma, Richard Helm, Ralph Johnson, John Vlissides, Design patterns: Elements of Reusable object-oriented software, Addison-Wesley, 1995.
3) James W Cooper, Java Design Patterns - A Tutorial, Addison-Wesley

Reference Books:

1) Software Engineering, 8/e, Sommerville, Pearson
2) Software Engineering principles and practice, W S Jawadekar, TMH
3) Craig Larman, Applying UML and Patterns: An Introduction to object- Oriented Analysis and Design and iterative development,3rd Edition, Pearson,2005.
4) Thomas J Mowbray and Raphael Malveau, CORBA and Design Patterns, John Wiley, 1997.
5) William J Brown, Anti-Patterns: Refactoring Software, Architectures and Projects in Crisis, John Wiley, 1998.

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DATA WAREHOUSING AND MINING (MCA2104)					

Course Objectives:

- Be familiar with mathematical foundations of data mining tools..
- Understand and implement classical models and algorithms in data warehouses and data mining
- Characterize the kinds of patterns that can be discovered by association rule mining, classification and clustering.
- Develop skill in selecting the appropriate data mining algorithm for solving practical problems.

Course Outcomes (COs): At the end of the course, student will be able to

- Understand the basics of types of data, quality of data, suitable techniques required for preprocessing and measures required to perform data analysis
- Describe the need of classification, identify suitable technique(s) to perform classification, model building and evaluation
- Identify the requirements and usage of association rule mining on categorical and continuous data.
- Compare and Identify suitable clustering algorithm(s) (apply with open source tools), interpret, evaluate and report the result
- Describe the requirements and the need of web mining

UNIT I:

Introduction to Data mining, types of Data, Data Quality, Data Processing, Measures of Similarity and Dissimilarity, Exploring Data: Data Set, Summary Statistics, Visualization, Data Warehouse, OLAP and multi dimensional data analysis.

UNIT II:

Classification: Basic Concepts, Decision Trees and model evaluation: General approach for solving a classification problem, Decision Tree induction, Model over fitting: due to presence of noise, due to lack of representation samples, Evaluating the performance of classifier. Nearest Neighborhood classifier, Bayesian Classifier, Support vector Machines: Linear SVM, Separable and Non Separable case.

UNIT III:

Association Analysis: Problem Definition, Frequent Item-set generation, rule generation, compact representation of frequent item sets, FP-Growth Algorithms. Handling Categorical, Continuous attributes, Concept hierarchy, Sequential, Sub graph patterns

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UNIT IV:

Clustering: Over view, K-means, Agglomerative Hierarchical clustering, DBSCAN, Cluster evaluation: overview, Unsupervised Cluster Evaluation using cohesion and separation, using proximity matrix, Scalable Clustering algorithm

UNIT V:

Web data mining: Introduction, Web terminology and characteristics, Web content mining, Web usage mining, web structure mining, Search Engines: Characteristics, Functionality, Architecture, Ranking of WebPages, Enterprise search

Text Books:

1) Introduction to Data Mining, Tan, Steinbach and Vipin Kumar, Pearson Education, 2016
2) Data Mining: Concepts and Techniques, 2nd Edition, Jiawei Han and Micheline Kamber, ELSEVIER

Reference Books:

1) Data Mining: The Textbook, Springer, May 2015, Charu C. Aggarwal.

Web resources:

1) NPTEL: https://nptel.ac.in/courses/106/105/106105174/
2) https://www.saedsayad.com/data_mining.htm

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II Semester		**L**	**T**	**P**	**C**
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NoSQL DATABASES (MCA2105)					

Course Objectives:

The objective of the course is to:

- Define, compare and use the four types of NoSQL Databases (Document-oriented, Key Value Pairs, Column oriented and Graph)
- Demonstrate an understanding of the detailed architecture, define objects, load data, query data and performance tune Column-oriented NoSQL databases
- Explain the detailed architecture, define objects, load data, query data and performance tune Document oriented NoSQL databases
- Ability to design entity relationship model and convert entity relationship diagrams into RDBMS and formulate SQL queries on the data

Course Outcomes:

After the completion of the course, student will be able to do the following

- Identify what type of NoSQL database to implement based on business requirements (key-value, document, full text, graph, etc.)
- Apply NoSQL data modeling from application specific queries
- Use Atomic Aggregates and denormalization as data modelling techniques to optimize query processing

UNIT I:

Introduction to NoSQL: Definition And Introduction, Sorted Ordered Column-Oriented Stores, Key/Value Stores, Document Databases, Graph Databases, Examining Two Simple Examples, Location Preferences Store, Car Make And Model Database, Working With Language Bindings.

UNIT II:

Interacting with NoSQL: If NoSql Then What, Language Bindings For NoSQL Data Stores, Performing Crud Operations, Creating Records, Accessing Data, Updating And Deleting Data

UNIT III:

NoSQL Storage Architecture: Working With Column-Oriented Databases, Hbase Distributed Storage Architecture, Document Store Internals, Understanding Key/Value Stores In Memcached And Redis, Eventually Consistent Non-Relational Databases.

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UNIT IV:

NoSQL Stores: Similarities Between Sql And Mongodb Query Features, Accessing Data From Column-Oriented Databases Like Hbase, Querying Redis Data Stores, Changing Document Databases, Schema Evolution In Column-Oriented Databases, Hbase Data Import And Export, Data Evolution In Key/Value Stores.

UNIT V

Indexing and Ordering Data Sets : Essential Concepts Behind A Database Index, Indexing And Ordering In Mongodb, Creating and Using Indexes In Mongodb, Indexing And Ordering In Couchdb, Indexing In Apache Cassandra.

Text Books:

1) Pramod Sadalage and Martin Fowler, NoSQL Distilled, Addison-Wesley Professional, 2012.
2) Dan McCreary and Ann Kelly, Making Sense of NoSQL, Manning Publications, 2013.

Reference Books:

1) Shashank Tiwari, Professional NoSQL, Wrox Press, Wiley, 2011, ISBN: 978-0-470-94224-6
2) Gaurav Vaish, Getting Started with NoSQL, Packt Publishing, 2013.

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DESIGN AND ANALYSIS OF ALGORITHMS (MCA2105)					

Course Objectives:

- To provide an introduction to formalisms to understand, analyze and denote time complexities of algorithms
- To introduce the different algorithmic approaches for problem solving through numerous example problems
- To provide some theoretical grounding in terms of finding the lower bounds of algorithms and the NP-completeness

Course Outcomes:

- Describe asymptotic notation used for denoting performance of algorithms
- Analyze the performance of a given algorithm and denote its time complexity using the asymptotic notation for recursive and non-recursive algorithms
- List and describe various algorithmic approaches
- Solve problems using divide and conquer, greedy, dynamic programming, backtracking and branch and bound algorithmic approaches
- Apply graph search algorithms to real world problems
- Demonstrate an understanding of NP- Completeness theory and lower bound theory

UNIT I:

Introduction: Algorithm, Pseudo code for expressing algorithms, performance Analysis-Space complexity, Time complexity, Asymptotic Notation- Big oh notation, Omega notation, Theta notation and Little oh notation, probabilistic analysis, Amortized analysis. Disjoint Sets- disjoint set operations, union and find algorithms, spanning trees, connected components and bi- connected components.

UNIT II:

Divide and conquer: General method, applications-Binary search, Quick sort, Merge sort, Stassen's matrix multiplication. Greedy method: General method, applications-Job sequencing with deadlines, 0/1 knapsack problem, Minimum cost spanning trees, Single source shortest path problem.

UNIT III:

Dynamic Programming: General method, applications-Matrix chain multiplication, Optimal binary search trees, 0/1 knapsack problem, All pairs shortest path problem, Travelling sales person problem, Reliability design.

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UNIT IV:

Backtracking: General method, applications-n-queen problem, sum of subsets problem, graph coloring, Hamiltonian cycles.

UNIT V:

Branch and Bound: General method, applications - Travelling sales person problem, 0/1 knapsack problem- LC Branch and Bound solution, FIFO Branch and Bound solution. NP-Hard and NP-Complete problems: Basic concepts, non deterministic algorithms, NP - Hard and NP Complete classes, Cook's theorem.

Text Books:

1) Fundamentals of Computer Algorithms, Ellis Horowitz, Satraj Sahni and Rajasekharam, Universities Press
2) The Algorithm Design Manual, 2nd edition, Steven S. Skiena, Springer
3) Introduction to Algorithms, second edition, T.H.Cormen, C.E.Leiserson, R.L.Rivest and C.Stein, PHI Pvt. Ltd

Reference Books:

1) Introduction to the Design and Analysis of Algorithms, Anany Levitin, PEA
2) Design and Analysis of Algorithms, Pearson Education, Parag Himanshu Dave, Himansu Balachandra Dave
3) Introduction to Design and Analysis of Algorithms A strategic approach, R.C.T. Lee, S.S.Tseng, R.C.Chang and T.Tsai, Mc GrawHill.
4) Design and Analysis of algorithms, Pearson education, Aho, Ullman and Hopcroft

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MOBILE APPLICATION DEVELOPMENT (MCA2105)					

Course Objectives:

- To demonstrate the introduction and characteristics of mobile applications
- Application models of mobile application frameworks. Managing application data and User-interface design for mobile applications
- Integrating networking, the OS and hardware into mobile-applications
- Addressing enterprise requirements in mobile applications – performance, scalability, modifiability, availability and security
- Testing methodologies for mobile applications– Publishing, deployment, maintenance and management. To demonstrate their skills of using Android software development tools
- To demonstrate their ability to deploy software to mobile devices

Course Outcomes:

Upon completion of the course students should be able to:

- Install and configure Android application development tools
- Design and develop user Interfaces for the Android platform
- Save state information across important operating system events
- Apply Java programming concepts to Android application development

UNIT I:

Introduction to mobile devices: Introduction to Mobile Computing, Introduction to Android Development Environment, Mobile devices vs. desktop devices, ARM and Intel architectures, Screen resolution, Touch interfaces, Application deployment, App Store, Google Play, Windows Store.

Development environments: XCode, Eclipse, VS2012, PhoneGAP, etc.; Native vs. web applications.

Factors in Developing Mobile Applications: Mobile Software Engineering, Frameworks and Tools, Generic UI Development, Android User.

UNIT II:

Android User Interface: Measurements – Device and pixel density independent measuring units User Interface (UI) Components – Editable and non editable Text Views, Buttons, Radio and Toggle Buttons, Checkboxes, Spinners, Dialog and pickers Fragments – Creating fragments, Lifecycle of fragments, Fragment states, Adding fragments to Activity, adding, removing and replacing fragments with fragment transactions, interfacing between fragments and Activities, Multi-screen Activities.

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UNIT III:

Back Ground Running Process, Networking and Telephony Services: Services: Introduction to services – local service, remote service and binding the service, the communication between service and activity, Intent Service.

MultiThreading: Handlers, AsyncTask.

Broad cast receivers: Local Broadcast Manager, Dynamic broadcast receiver, System Broadcast. Pending Intent, Notifications.

UNIT IV:

Android: Introduction – Establishing the development environment – Android architecture – Activities and views – Interacting with UI – Persisting data using SQLite – Packaging and deployment – Interaction with server side applications – Using Google Maps, GPS and Wifi – Integration with social media applications. **Android network programming:** Http Url Connection, Connecting to REST-based and SOAP based Web services.

UNIT V:

Advanced Topics: Power Management: Wake locks and assertions, Low-level OS support, Writing power-smart applications.

Augmented Reality via GPS and other sensors: GPS, Accelerometer, Camera.

Mobile device security in depth: Mobile malware, Device protections, iOS "Jailbreaking", Android "rooting" and Windows' "defenestration"; Security and Hacking: Active Transactions, More on Security, Hacking Android.

Text Books:

1) Bill Phillips, Chris Stewart, Brian Hardy, and Kristin Marsicano, Android Programming: The Big Nerd Ranch Guide, Big Nerd Ranch LLC, 2nd edition, 2015.
2) Valentino Lee, Heather Schneider, and Robbie Schell, Mobile Applications: Architecture, Design and Development, Prentice Hall, 2004.
3) Professional Android 4 Application Development, Reto Meier, Wiley India, (Wrox) , 2012
4) Android Application Development for Java Programmers, James C Sheusi, Cengage Learning, 2013
5) Dawn Griffiths, David Griffiths,*"Head First: Android Development" ,OReilly2015,ISBN*: 9781449362188
6) Jeff McWherter and Scott Gowell, "Professional Mobile Application Development", Wrox, 2012

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Reference Books:

1) Beginning Android 4 Application Development, Wei-Meng Lee, Wiley India (Wrox), 2013
2) Tomasz Nurkiewicz and Ben Christensen, Reactive Programming with RxJava, O'Reilly Media, 2016.
3) Brian Fling, Mobile Design and Development, O'Reilly Media, Inc., 2009.
4) Maximiliano Firtman, Programming the Mobile Web, O'Reilly Media, Inc., 2nd ed., 2013.
5) Cristian Crumlish and Erin Malone, Designing Social Interfaces, 2nd ed., O'Reilly Media, Inc., 2014.
6) Suzanne Ginsburg, Designing the iPhone User Experience: A User-Centered Approach to Sketching and Prototyping iPhone Apps, Addison-Wesley Professional, 2010.

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ARTIFICIAL INTELLIGENCE (MCA2105)					

Course Objectives:

- To have a basic proficiency in a traditional AI language including an ability to write simple to intermediate programs and an ability to understand code written in that language
- To have an understanding of the basic issues of knowledge representation and blind and heuristic search, as well as an understanding of other topics such as minimax, resolution that play an important role in AI programs
- To have a basic understanding of some of the more advanced topics of AI

Course Outcomes:

- Outline problems that are amenable to solution by AI methods, and which AI methods may be suited to solving a given problem
- Apply the language/framework of different AI methods for a given problem
- Implement basic AI algorithms
- Design and carry out an empirical evaluation of different algorithms on problem formalization and state the conclusions that the evaluation supports

UNIT I:

Introduction, history, intelligent systems, foundations of AI, applications, tic-tac-toe game playing, development of AI languages, current trends.

UNIT II:

Problem solving: state-space search and control strategies: Introduction, general problem solving, characteristics of problem, exhaustive searches, heuristic search techniques, iterative deepening A*, constraint satisfaction

Problem reduction and game playing: Introduction, problem reduction, game playing, alpha beta pruning, two-player perfect information games.

UNIT III:

Logic concepts: Introduction, propositional calculus, proportional logic, natural deduction system, axiomatic system, semantic tableau system in proportional logic, resolution refutation in proportional logic, predicate logic.

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UNIT IV:

Knowledge representation: Introduction, approaches to knowledge representation, knowledge representation using semantic network, extended semantic networks for KR, knowledge representation using frames Advanced knowledge representation techniques: Introduction, conceptual dependency theory, script structure, CYC theory, case grammars, semantic web.

UNIT V:

Expert system and applications: Introduction phases in building expert systems, expert system versus traditional systems

Uncertainty measure: probability theory: Introduction, probability theory, Bayesian belief networks, certainty factor theory, dempster-shafer theory.

Fuzzy sets and fuzzy logic: Introduction, fuzzy sets, fuzzy set operations, types of membership functions, multi valued logic, fuzzy logic, linguistic variables and hedges, fuzzy propositions, inference rules for fuzzy propositions, fuzzy systems.

Text Books:

1) Artificial Intelligence- Saroj Kaushik, CENGAGE Learning.
2) Artificial intelligence, A modern Approach , 2nded, Stuart Russel, Peter Norvig, PEA.

Reference Books:

1) Artificial Intelligence- Deepak Khemani, TMH, 2013.
2) Introduction to Artificial Intelligence, Patterson, PHI.
3) Artificial intelligence, structures and Strategies for Complex problem solving, George F Lugar, 5th ed, PEA.

e-Resources:

1)https://nptel.ac.in/courses/106/105/106105077/
2)http://aima.cs.berkeley.edu/

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ACCOUNTINGING FOR MANAGERS (MCA2105)					

Course Objectives:

- To learn different Accounting Systems, preparation of Financial Statement and uses of different tools for performance evaluation. GAAP Principles
- To understand the concept of financial management and financial interpretations cost and management accounting principles and applications of standard costing and marginal costing analysis

Course Outcomes:

- The Learner is able to prepare Financial Statements and the usage of various Accounting tools for Analysis and to evaluate various techniques for decision making.

UNIT I:

Accounting Generally Accepted Accounting Principles (GAAP) & Accounting standards, Characteristics and limitations of single entry system, double entry system of accounting, introduction of basis books of accounts, ledgers. Preparation of trail balance – Final accounts – company final accounts – Users of Accounting Information, Role of Accountant in modern Organizations.

UNIT II:

Financial Management – meaning and scope, role, objectives of time value of money – over vitalization – under capitalization – profit maximization – wealth maximization – EPS maximization.
Ration Analysis - advantages - limitations - Fund flow analysis – meaning, importance, preparation and interpretation of Funds flow and cash flow statements – statements of changes in working capital.

UNIT III:

Costing – nature and importance and basic principles. Elements of cost – Absorption costing Vs. Marginal costing – Financial accounting vs. cost accounting vs. management accounting.
Marginal costing and Break – even Analysis: nature, scope and importance– Practical applications of marginal costing, limitation and importance of cost – volume, profit analysis, short run decisions.

UNIT IV:

Standard costing and budgeting : nature, scope and computation and analysis – materials variance, labor variance and sales variance – cash budget, sales - budget – flexible Budgets, master budgets.

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UNIT V:

Introduction to computerized accounting system: coding logic and codes, master files, transaction files, introduction documents used for data collection, processing of different files and Outputs obtained.

Reference Books:

1) Accounting for Management, N.P.Srinivasan and M.Sakthivel Murugan
2) Financial Accounting, S.N Maheswari and S.K. Maheswari, Vikas.
3) Financial Accounting, A. Mukherjee and M. Heneef, TMH.
4) Basic Financial Accounting for Management, Ambaresh Gupta, Pearson.
5) Accounts And Finance for Non accounts, Chatterjee, D.K. Himalaya.
6) Financial Analysis and Accounting, P. Premchand Babu and M. Madan Mohan, Himalaya.
7) Essential of Financial Accounting, Ashish, K and Ballacharya, PHI.
8) Guide to Financial Management, John Tannent, Viva.

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II Semester		**L**	**T**	**P**	**C**
		0	0	3	1.5
DBMS LAB (MCA2106)					

Course Objectives:

1) This Course will enable students to
2) Populate and query a database using SQL DDL/DML Commands
3) Declare and enforce integrity constraints on a database
4) Writing Queries using advanced concepts of SQL
5) Programming PL/SQL including procedures, functions, cursors and triggers

Course Outcomes:

1) At the end of the course the student will be able to:
2) Utilize SQL to execute queries for creating database and performing data manipulation operations
3) Examine integrity constraints to build efficient databases
4) Apply Queries using Advanced Concepts of SQL
5) Build PL/SQL programs including stored procedures, functions, cursors and triggers

List of Experiments:

1) Execute all DDL, DML and DCL commands on sample tables.
2) Implementation of different types of operators and built-in functions with suitable examples
3) Implementation of different types of joins with suitable examples
4) Create views, partitions, Sequence, Indexes and locks for a particular DB
5) Implement different types of constraints on relations.
6) Implementation of sub queries and nested queries.
7) Implement Queries on Group By & Having Clauses, ALIAS, Sequence By, Order By
8) Control Structure
    a) Write a PL/SQL block for Addition of Two Numbers
    b) Write a PL/SQL block for IF, IF and else condition
    c) Write a PL/SQL block for implementation of loops
    d) Write a PL/SQL block for greatest of three numbers using IF and ELSEIF
9) Exception Handling- Implement the following with respect to exception handling. Raising Exceptions, User Defined Exceptions, Pre-Defined Exceptions
10) Write PL/SQL block for an application using exception handling *Procedures*
    a)Write a PL/SQL Procedure using Positional Parameters
    b) Write a PL/SQL Procedure using notational parameters
    c)Write a PL/SQL Procedure for GCD Numbers
    d) Write a PL/SQL Procedures for cursor implementation (explicit and implicit cursors)

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11) Functions:
    a) Write a PL/SQL block to implement factorial using functions
    b) Write a PL/SQL function to search an address from the given database
12) Write a DBMS program to prepare Pl/SQL reports for an application using functions.
13) Triggers:
    a) Write a Trigger to pop-up the DML operations
    b) Write a Trigger to check the age valid or not Using Message Alert.
    c) Create a Trigger to Raise appropriate error code and error message.
    d) Create a Trigger on a table so that it will update another table while inserting values
14) Write PL/SQL block for an application using cursors and all types of triggers.
15) Write a PL/SQL block for transaction operations of a typical application using package

Text Books:

1) Oracle: The Complete Reference by Oracle Press
2) Nilesh Shah, "Database Systems Using Oracle", PHI, 2007
3) Rick F Vander Lans, "Introduction to SQL", Fourth Edition, Pearson Education, 2007

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II Semester		**L**	**T**	**P**	**C**
		0	0	3	1.5
COMPUTER NETWORKS LAB (MCA2107)					

PART – A

1) Implement the data link layer farming methods such as character stuffing and bit stuffing.
2) Implement on a data set of characters the three CRC polynomials – CRC 12, CRC 16 and CRC CCIP.
3) Implement Dijkstra‘s algorithm to compute the Shortest path through a graph.
4) Take an example subnet graph with weights indicating delay between nodes. Now obtain Routing table art each node using distance vector routing algorithm
5) Take an example subnet of hosts. Obtain broadcast tree for it.

PART – B

1) Implement the following forms of IPC.
    a. a)Pipes b)FIFO
2) Implement file transfer using Message Queue form of IPC
3) Write a programme to create an integer variable using shared memory concept and increment the variable
4) Simultaneously by two processes. Use semaphores to avoid race conditions
5) Design TCP iterative Client and server application to reverse the given input sentence
6) Design TCP client and server application to transfer file
7) Design a TCP concurrent server to convert a given text into upper case using multiplexing system call “select”
8) Design a TCP concurrent server to echo given set of sentences using poll functions
9) Design UDP Client and server application to reverse the given input sentence
10) Design UDP Client server to transfer a file
11) Design using poll client server application to multiplex TCP and UDP requests for converting a given text into upper case.
12) Design a RPC application to add and subtract a given pair of integers

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II Semester		**L**	**T**	**P**	**C**
		0	0	3	1.5
SOFTWARE ENGINEERING AND DESIGN PATTERNS LAB (MCA2108)					

1) Take any real time problem and do the following experiments
   a. Write down the problem statement for a suggested system of relevance. Develop Flow-Charts to understand basic problem solving technique
   b. Do requirement analysis and develop Software Requirement Specification Sheet (SRS) for suggested system.
   c. Using COCOMO model estimate effort.
   d. Perform Estimation of effort using FP Estimation for chosen system
   e. Analyze the Risk related to the project and prepare RMMM plan.
   f. Develop Time-line chart and project table using PERT or CPM project scheduling methods.
   g. Draw E-R diagrams, DFD, CFD and structured charts for the project.
   h. Design of Test cases based on requirements and design.
   i. Prepare FTR
   j. Prepare Version control and change control for software configuration items.
2) Using UML/JAVA, design Abstract Factory design pattern
3) Using UML/JAVA, design Builder design pattern
4) Using UML/JAVA, design Façade design pattern
5) Using UML/JAVA, design Bridge design pattern
6) Using UML/JAVA, design Decorator design pattern
7) User gives a print command from a word document. Design to represent this chain of responsibility design pattern

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II Semester		**L**	**T**	**P**	**C**
		0	0	1	0.5
EMPLOYABILITY SKILLS (MCA2109)					

Course Objectives:

The main of this course is

- To learn how to make effective presentations and impressive interviews
- To learn skills for discussing and resolving problems on the work site
- To assess and improve personal grooming
- To promote safety awareness including rules and procedures on the work site
- To develop and practice self management skills for the work site

Course Outcomes:

By the end of this course, the student

- Recite the soft skills
- Make presentations effectively with appropriate body language
- Be composed with positive attitude
- Apply their core competencies to succeed in professional and personal life

A list of vital employability skills from the standpoint of engineering students with discussion how to potentially develop such skills through campus life.

1) Soft Skills: An Introduction – Definition and Significance of Soft Skills; Process, Importance and Measurement of Soft Skill Development.
2) Self-Discovery: Discovering the Self; Setting Goals; Beliefs, Values, Attitude, Virtue.
3) Positivity and Motivation: Developing Positive Thinking and Attitude; Driving out Negativity; Meaning and Theories of Motivation; Enhancing Motivation Levels.
4) Time Management – Concept, Essentials, Tips.
5) Personality Development – Meaning, Nature, Features, Stages, Models; Learning Skills; Adaptability Skills.
6) Decision-Making and Problem-Solving Skills: Meaning, Types and Models, Group and Ethical Decision-Making, Problems and Dilemmas in application of these skills.
7) Conflict Management: Conflict - Definition, Nature, Types and Causes; Methods of Conflict Resoultion.
8) Stress Management: Stress - Definition, Nature, Types, Symptoms and Causes; Stress Analysis Models and Impact of Stress; Measurement and Managemet of Stress
9) Leadership and Assertiveness Skills: A Good Leader; Leaders and Managers; Leadership Theories; Types of Leaders; Leadership Behaviour; Assertivness Skills.

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Note: The student shall be instructed to Record a 2 min video and add to profile before and after taking the course. Students are to be involved in Role Play, Team dynamics, Group Discussion and outcomes are to be recorded.

Reference Books:

1) Barun K. Mitra, Personality Development and Soft Skills, Oxford University Press, 2011.
2) S.P. Dhanavel, English and Soft Skills, Orient Blackswan, 2010.
3) R.S.Aggarwal, A Modern Approach to Verbal & Non-Verbal Reasoning, S.Chand & Company Ltd., 2018.
4) Raman, Meenakshi & Sharma, Sangeeta, Technical Communication Principles and Practice, Oxford University Press, 2011.
5) Managing Soft Skills for Personality Development – edited by B.N.Ghosh, McGraw Hill India, 2012.
6) English and Soft Skills – S.P.Dhanavel, Orient Blackswan India, 2010.