**JSS Mahavidyapeetha**

# JSS Science and Technology University Mysuru - 570 006.

# Department of Computer Applications



## Course Grid for I to IV Semesters

## Syllabus of I and II Semesters

## 2020-2022

# Scheme of Teaching and Examination
## First Semester MCA

| Sl.No. | Course Code | Course Title | Teaching hours/ Week | | Examination | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | L | P | CIE Marks | SEE Marks | Total Marks | Duration (in hrs) | Credits |
| 1 | MCA110 | Python Programming | 04 | - | 50 | 50 | 100 | 03 | 04 |
| 2 | MCA120 | Mathematical Foundation for Computer Applications | 04 | - | 50 | 50 | 100 | 03 | 04 |
| 3 | MCA130 | Data Structures using C ++ | 04 | - | 50 | 50 | 100 | 03 | 04 |
| 4 | MCA140 | Operating System | 04 | - | 50 | 50 | 100 | 03 | 04 |
| 5 | MCA150 | Computer Networks | 04 | - | 50 | 50 | 100 | 03 | 04 |
| 6 | MCA160 | Business Systems | 02 | - | 50 | 50 | 50 | 1½ | 02 |
| 7 | MCA17A | * Professional Communication and Ethics | 02 | - | 50 | 00 | 50 | 00 | 00 |
| 8 | MCA11L | Python Programming Laboratory | - | 02 | 50 | 00 | 50 | 00 | 01 |
| 9 | MCA12L | Mathematical Foundation Laboratory | - | 02 | 50 | 00 | 50 | 00 | 01 |
| 10 | MCA13L | Data Structures using C ++ Laboratory | - | 02 | 50 | 00 | 50 | 00 | 01 |
| | | **Total** | **24** | **06** | **500** | **300** | **750** | **16½** | **25** |

* Audit Course

# Scheme of Teaching and Examination
## Second Semester MCA

| Sl.No. | Course Code | Course Title | Teaching hours/ Week | | Examination | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | L | P | CIE Marks | SEE Marks | Total Marks | Duration (in hrs) | Credits |
| 1 | MCA210 | Relational Database Management System | 04 | - | 50 | 50 | 100 | 03 | 04 |
| 2 | MCA220 | Java and J2EE | 04 | - | 50 | 50 | 100 | 03 | 04 |
| 3 | MCA230 | Advanced Algorithms | 04 | - | 50 | 50 | 100 | 03 | 04 |
| 4 | MCA240 | Software Engineering | 04 | - | 50 | 50 | 100 | 03 | 04 |
| 5 | MCA25X | Elective-I | 03 | - | 50 | 50 | 100 | 03 | 03 |
| 6 | MCA26X | Elective-II | 03 | - | 50 | 50 | 100 | 03 | 03 |
| 7 | MCA21L | Relational Database Management System Laboratory | - | 02 | 50 | 50 | 100 | 03 | 01 |
| 8 | MCA22L | Java and J2EE Laboratory | - | 02 | 50 | 00 | 50 | 00 | 01 |
| | | Total | 22 | 04 | 400 | 300 | 700 | 18 | 24 |

| Elective - I | | Elective - II | |
|---|---|---|---|
| MCA251 | Cyber Security | MCA261 | Cryptography and Network Security |
| MCA252 | Software Architecture | MCA262 | Software Project Management |
| MCA253 | Mobile Applications | MCA263 | Digital Marketing |
| MCA254 | IP and PR | MCA264 | NoSQL |

# Scheme of Teaching and Examination
## Third Semester MCA

| Sl.No. | Course Code | Course Title | Teaching hours/ Week | | Examination | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | L | P | CIE Marks | SEE Marks | Total Marks | Duration (in hrs) | Credits |
| 1 | MCA310 | Web Technologies | 04 | - | 50 | 50 | 100 | 03 | 04 |
| 2 | MCA320 | .Net Technologies | 04 | - | 50 | 50 | 100 | 03 | 04 |
| 3 | MCA330 | Business Intelligence | 04 | - | 50 | 50 | 100 | 03 | 04 |
| 4 | MCA340 | Data Mining and Analytics | 04 | - | 50 | 50 | 100 | 03 | 04 |
| 5 | MCA350 | Elective - III | 03 | - | 50 | 50 | 100 | 03 | 03 |
| 6 | MCA360 | Elective - IV | 03 | - | 50 | 50 | 100 | 03 | 03 |
| 7 | MCA370 | Mini Project | - | - | 50 | 00 | 50 | 00 | 02 |
| 8 | MCA31L | Web Technologies Laboratory | - | 02 | 50 | 00 | 50 | 00 | 01 |
| 9 | MCA32L | .Net Technologies Laboratory | - | 02 | 50 | 00 | 50 | 00 | 01 |
| | | **Total** | **22** | **04** | **450** | **300** | **750** | **18** | **26** |

| Elective - I | | Elective - II | |
|---|---|---|---|
| MCA351 | Enterprise Resource Planning | MCA361 | Software Testing and Practices |
| MCA352 | Cloud Computing | MCA362 | Block chain Technology |
| MCA353 | Soft Computing | MCA363 | Big Data Analytics |
| MCA354 | Human Computer Interface | MCA364 | IOT |

# Scheme of Teaching and Examination
## Fourth Semester MCA

| Sl.No. | Course Code | Course Title | Teaching hours/ Week | | | Examination | | | | Credits |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | L | T | P | CIE Marks | SEE Marks | Final Evaluation | Total Marks | |
| 1 | MCA42P | Project (During 4th Semester- 16 weeks) | - | - | 100 | 100 | 50 | 100 | 250 | 15 |
| | | Total | | | | 100 | 50 | 100 | 250 | 15 |

| Semester | Credits |
|---|---|
| I | 25 |
| II | 24 |
| III | 26 |
| IV | 15 |
| **Total** | **90** |

| Department of Computer Applications, JSS Science and Technology University, Mysuru. | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Course Year** | **Course Semester** | **Course Type** | **Credits** | **Contact Hours/ Week** | | | **Total Hours/ Semester** |
| | | | | **Theory** | **Laboratory** | **Tutorials** | |
| I | I | Theory | 04 | 04 | 00 | 00 | 52 |

| **Course No** | **Course Title** | **Pre Requisites** |
|---|---|---|
| MCA110 | Python Programming | OOPS |

**COURSE ASSESSMENT METHOD:**

1. Internal Assessment [5 Events: 3 Written Tests, 2 Events] Marks: 50 [10* 5 Events]
2. Semester End Exam [ 100 Marks, 3 Hours]

**COURSE OUTCOMES:**

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

| COURSE OUTCOMES | |
|---|---|
| **CO1** | Understand and comprehend the basics of python programming. |
| **CO2** | Apply knowledge in real time applications. |
| **CO3** | Apply object-oriented programming concepts to develop dynamic interactive Python applications. |
| **CO4** | Understands about files and its applications. |
| **CO5** | Implementation of visualization techniques for interpretation of data |

**TOPICS COVERED:**

**UNIT 1 - Introduction to Python**                                      **10 Hours**

Python Basics: Data Types, Operators, Input/Output Statements, Creating Python Programs, Python Flow Control statements: Decision making statements, Indentation, Conditionals, loops, break, continue, and pass statements. Strings, lists, Tuples, Dictionaries

**UNIT2-PythonFunctions**                                                **10 Hours**

Defining functions, DOC strings, Function parameters: default, keyword required and variable length arguments, key-word only parameters, local and global variables, pass by reference versus value, Anonymous functions, Recursion. Functional Programming:
Mapping, Filtering and Reduction, Lambda Functions, List Comprehensions.

**UNIT 3 - Object Oriented Programming**                                  **10 Hours**

Definition and defining a class, Constructor, Destructor, self and del keywords, Access to Attributes and Methods, geattr and hasattr attributes, Data Attributes and Class Attributes, Data Hiding, Inheritance, Static Members. Regular Expressions: Defining Regular Expressions and String Processing.

**UNIT 4 - I/O and Error Handling and Python GUI Programming**     **12 Hours**

Introduction, Data Streams, Creating Your Own Data Streams, Access Modes,Writing Data to a File,Reading Data From a File, Additional File Methods ,Using Pipes as Data Streams, Handling IO Exceptions, Working with Directories, Metadata, Errors, Run Time Errors, The Exception Model,Introduction to Python GUI Programming, Tkinter Programming, Tkinter widgets, Events and Bindings.

**UNIT 5 Data Visualization and Case Studies**     **10 Hours**

Direct Plotting: Line Plot, Bar Plot, Pie Chart, Box Plot, Histogram Plot, Scatter Plot, Seaborn Plotting System: Strip Plot, Box Plot, Swarm Plot, Joint Plot, Matplotlib Plot: Line Plot, Bar Chart,Histogram Plot, Scatter Plot, Stack Plot,Pie Chart, and case studies..

## TEXT BOOKS / REFERENCES:

**Text books:**
1. Timothy A. Budd: Exploring Python, Tata McGraw-Hill, 2011.
2. Jeff Forcier, Paul Bissex, Wesley Chun: Python Web Development with Django, Addison-Wesley, 2008.
3. Data Analysis and Visualization Using Python: Dr. OssamaEmbarak, 2018, Apress.

**Reference books:**
1. Ascher, Lutz: Learning Python, 4th Edition, O'Reilly, 2009.
2. Wesley J Chun: Core Python Applications Programming, Pearson Education, 3rd Edition, 2013.
3. Paul Gries, Jennifer Campbell, Jason Montojo , Practical Programming: An introduction to Computer Science Using Python, second edition, Pragmatic Bookshelf.
4. Allen Downey , Jeffrey Elkner , Learning with Python: How to Think Like a Computer
5. Scientist Paperback, 2015
6. Dive into Python, Mike
7. Learning Python, 4 th Edition by Mark Lutz
8. Programming Python, 4 th Edition by Mark Lutz

## ADDITIONAL LEARNING SOURCES:

1. http://www.network-theory.co.uk/docs/pytut/
2. http://docs.python.org/tutorial/
3. http://zetcode.com/tutorials/pythontutorial/
4. http://www.sthurlow.com/python/ http://www.tutorialspoint.com/python/
5. http://www.djangoproject.com/
6. http://www.djangobook.com/

| JSS Science and Technology University, Mysuru, Department of Computer Applications [MCA] | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Course Year** | **Course Semester** | **Course Type** | **Credits** | **Contact Hours/ Week** | | | **Total Hours/ Semester** |
| | | | | **Theory** | **Laboratory** | **Tutorials** | |
| I | I | Theory | 04 | 04 | 00 | 00 | 52 |
| **Course No** | | **Course Title** | | | | **Pre Requisites** | |
| MCA120 | | Mathematical Foundation for Computer Applications | | | | -- | |

**COURSE ASSESSMENT METHOD:**

1. Internal Assessment [5 Events: 3 Written Tests, 2 Events ]   Marks: 50 [10* 5 Events]

2. Semester End Exam [ 100 Marks, 3 Hours]

**COURSE OUTCOMES:**

Upon successful completion of this course, students will be able to:

| COURSE OUTCOMES | |
|---|---|
| CO1 | Ability to analyze different statistical measures & probability and explore its applications |
| CO2 | Analysis of computational errors. Interpretation and design of algorithms to solve a set of linear equations. |
| CO3 | Ability to apply the knowledge to solve problems on vectors and matrices. |
| CO4 | Ability to define, understand and explain relations and functions, Sterling numbers of second kind and Pigeonhole principle in the context of Discrete Mathematics. |
| CO5 | Explore the techniques of Graph theory and its applications |

**TOPICS COVERED:**

**UNIT 1-  Introduction to Statistics and Probability**                                    **10 hours**

Univariate data – different measures of location, dispersion, relative dispersion, skewness and kurtosis, Moments, Measures based on them – comparison with moment measures, Correlation and Regression Analysis. Probability, Sample Spaces, Events, Conditional Probability, The Multiplication Rule.

**UNIT 2 – Number Systems and Vector & Matrix Algebra**                          **10 hours**

Errors in Numerical Computations, Types of Errors, Analysis and Estimation of Errors, Vector Algebra: Vector spaces with real field, Basis and dimension of a vector space, Orthogonal vectors, Properties of Matrices and Determinants: Matrix Operations, Elementary Matrices, Inverse Matrix, Diagonal Matrix, Symmetric Matrix, and Determinant Matrix. Numerical methods for Linear Systems, Direct Methods for Linear Systems: Cramer's Rule,  Gauss Elimination Method, Gauss Jordan Elimination Method, Pivoting Strategies, Gauss-Jordon Method, LU Decomposition Method,

**UNIT 3 - Linear Algebraic Systems**          **11 hours**

Tridiagonal Systems of Linear Equations, Iterative Methods for Solving Linear Systems, Jacobis Iteration Method, Gauss-Seidel Iterative Method, Convergence Criteria, Eigen Values and Eigen Vectors.

**UNIT 4 – Relations and Functions**          **10 hours**

Cartesian products and Relations, Properties of Relations, Functions: Plain and One-to-One, Onto Functions: Stirling Numbers and the Second Kind, Special functions, The Pigeon-hole principle, Function composition and inverse functions.

**UNIT 5 - Graph Theory**          **11 Hours**

Definitions and Examples, Subgraphs, Complements, and Graph Isomorphism, Vertex Degree: Euler Trails and Circuits, Planar Graphs, Hamilton Paths and Cycles, Graph Coloring and Chromatic Polynomials.

**TEXT BOOKS / REFERENCES:**

**TEXT BOOKS :**
1. Sant Sharan Mishra, "Computer Oriented Numerical and Statistical Methods", PHI Learning Private Limited, 2013.
2. Rizwan Butt, "Introduction to Numerical Analysis Using Matlab", Infinity Science Press LLC, 2008
3. Ralph P Grimaldi, B.V.Ramana, "Discrete & Combinatorial Mathematics, An Applied Introduction" 5$^{th}$ Edition, Pearson Education, 2009.
4. F.M. Dekking, C. Kraaikamp, H.P. Lopuhaa, L.E. Meester, "A Modern Introduction to Probability and Statistics: understanding why and how", Springer, 2005.

**REFERENCES:**
1. D.S. Chandrasekharaiah, Discrete Mathematical Structures, 4$^{th}$ Edition, PRISM Pvt. Ltd. 2012.
2. Bondy and U.S.R.Murty: Graph Theory and Applications ( Freely downloadable from Bondy's website; Google-Bondy)
3. S. Kumarsean, "Linear Algebra A geometric approach", Prentice Hall of India Private Limited, 2001.
4. Kenneth H Rosen, "Discrete Mathematics & its Applications" 7th edition, McGraw-Hill, 2010.

**ADDITIONAL LEARNING SOURCES:**

1. http://www.personal.kent.edu/~rmuhamma/GraphTheory/graphTheory.htm
2. http://www.tutorialspoint.com/discrete_mathematics/
3. http://nptel.iitm.ac.in/
4. http://www.maths.lu.se/english/library/e-resource
5. https://www.math.ucdavis.edu/~linear/linear-guest.pds/
6. http://sunzi.lib.hku.hk/ER/detail/hkul/3743848

| JSS Science and Technology University, Mysuru<br>Department of Computer Applications [MCA] | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Course<br>Year** | **Course<br>Semester** | **Course<br>Type** | **Credits** | **Contact Hours/ Week** | | | **Total<br>Hours/<br>Semester** |
| | | | | **Theory** | **Laboratory** | **Tutorials** | |
| I | I | Theory | 04 | 04 | 00 | 00 | 52 |

| **Course No** | **Course Title** | **Prerequisites** |
|---|---|---|
| MCA130 | Data Structures using C++ | -- |

**COURSE ASSESSMENT METHOD:**

1. Internal Assessment [5 Events: 3 Written Tests, 2 Events] Marks: 50 [10* 5 Events].
2. Semester End Exam [ 100 Marks, 3 Hours]

**COURSE OUTCOMES:**

Upon successful completion of this course, the student will have the

| COURSE OUTCOMES | |
|---|---|
| CO1 | Ability to define, understand and explain concepts organization of data in computer systems |
| CO2 | Ability to apply the knowledge of various data types, define and use it. |
| CO3 | Ability to analyze the various data complex structures to use efficient way. |
| CO4 | Ability to design various programs using basic data types , linear and non linear data structure |
| CO5 | Ability to conduct experiments using various data structures  with respect to characteristics of real world entities |

**TOPICS COVERED:**

**UNIT:1 -  Introduction to OOPS:** **12 Hours**

Fundamentals: Tokens, Keywords, Identifiers and constants, Basic Data Types, User-defined data types, Derived data Types, Symbolic constants, Type compatibility, Declaration of variables, Dynamic initialization of variables, Reference variables, Operators in C++, Scope resolution operator, Member dereferencing operators, Memory management operators, Manipulators, Type cast operator, Expressions and their types, Special assignment expressions, Implicit conversions, Operator overloading, Operator precedence, Control structures, Friend function.

**UNIT 2 - Introduction to Data Structures** **8 Hours**

Information and its meaning: Abstract Data Types, Dynamic Memory Allocation - malloc, calloc, and realloc, free. Data Structures: Array as an ADT, Arrays as Parameters, String as an ADT, The stack as an ADT, Implementing the pop, push operations using function overloading, Recursion as application of stack, Properties of recursive definition or algorithm. Binary search, Towers of Hanoi problem.

**UNIT 3 - Queues and Linked Lists**                                    **12 Hours**

The queue as ADT, Basic operations using polymorphism and inheritance, Priority queue, Circular Queue, Linked lists, inserting and removing nodes from a list, Circular lists, Stack as circular lists, doubly linked lists. Application of linked lists: Stacks, Queues, double-ended queues, priority queues.

**UNIT 4 – Trees and Graphs**                                           **12 Hours**

Tree: Definition, Types of trees, Array and List Representations: Binary Tree, Binary Search Tree and Threaded Binary Tree. Balanced Trees: Weight Balanced Trees, Applications of WBTs,  Height Balanced Trees -AVL Trees, Red-Black Trees Binary Heaps: applications.
Graphs: Matrix and List Representation of Graphs, Breadth First Search, Applications of BFS, Depth First Search, Applications of DFS, Spanning Trees.

**UNIT 5 – Advanced Data Structure**                                    **8 Hours**

Dictionaries, linear list representation, skip list representation, Hashing techniques, hash table representation, hash functions, Disjoint Sets, List, Tree and Array based implementation– Union/Find.

**TEXT BOOKS/ REFERENCES :**

**Text Books:**

1. Object Oriented Programming with C++, Third Edition, E. Balaguruswamy. 6<sup>th</sup> Edition (2013).
2. Data Structures Using C  and C++ by Aaron.M. Tenenbaum, Yedidyah Langsam and Moshe J. Augustine, PHI, Edition, 2011.
3. Jean-Paul Tremblay and G. Sorenson, "*An introduction to Data Structures with Applications*", Second Edition, Tata McGraw-Hill, 2008.
4. Robert L.Kruse, Bruce P. Leung, Clovis.L. Tondo and ShasshiMogalla, "*Data Structure and Program Design in C*", Pearson Education, Second Edition, 1997.

**Reference Books :**
1. Data structures, Algorithms and Applications in C++, S. Sahani, University Press (India) Pvt Ltd, 2nd Edition.
2. The complete reference C, Herbert Schildt, Fifth Edition, Tata McGraw Hill.

**ADDITIONAL LEARNING SOURCES:**

1. http://www.tutorialspoint.com/Data-Structures-in-C++-Online-Training/classid=13
2. http://nptel.ac.in/datastructures_c++

| JSS Science and Technology University, Mysuru<br>Department of Computer Applications [MCA] | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Course<br>Year** | **Course<br>Semester** | **Course<br>Type** | **Credits** | **Contact Hours/ Week** | | | **Total<br>Hours/<br>Semester** |
| | | | | **Theory** | **Laboratory** | **Tutorials** | |
| I | II | Theory | 04 | 04 | 00 | 00 | 52 |

| **Course No** | **Course Title** | **Pre Requisites** |
|---|---|---|
| MCA140 | Operating System | -- |

**COURSE ASSESSMENT METHOD:**

1.Internal Assessment [5 Events: 3 Written Tests, 2 Events]     Marks: 50 [10* 5 Events]

2.Semester End Exam [ 100 Marks, 3 Hours]

**COURSE OUTCOMES:**

Upon successful completion of this course, the student will have the ,

| COURSE OUTCOMES | |
|---|---|
| **CO1** | Ability to define, understand and explain  structure of operating system, interaction of an operating system and application programs |
| **CO2** | Ability to apply the knowledge of various programming paradigms viz., multi-process, multi-threaded programming. |
| **CO3** | Ability to analyze the various issues in process  management, CPU  Scheduling memory management, file system and security |
| **CO4** | Ability to design simulation programs for , memory allocation  ,synchronization and memory management concepts |
| **CO5** | Ability to conduct experiments to demonstrate memory allocation, synchronization and file system. |

**TOPICS COVERED:**

**UNIT 1 Computer and Operating Systems Structure**                    **11 Hours**

Basic Elements, Processor Registers, Instruction Execution, The Memory Hierarchy, Cache Memory, I/O Communication Techniques, Introduction to Operating System, Mainframe Systems, Desktop Systems, Multiprocessor Systems, Distributed Systems, Clustered Systems, Real - Time Systems, Handheld Systems, Feature Migration, Computing Environments.
System Structures:System Components, Operating – System Services, System Calls, System Programs, System Structure, Virtual Machines, System Design and Implementation, System Generation

**UNIT 2 Process Management and Mutual Execution**                    **10 Hours**

Process, Process States, Process Description, Process Control, Execution of the Operating

System, Security Issues, Processes and Threads, Symmetric Multiprocessing(SMP), Micro kernels, CPU Scheduler and Scheduling. Principles of Concurrency, Mutual Exclusion: Hardware Support, Semaphores, Monitors, Message Passing, Readers/Writes Problem.

**UNIT 3 Deadlock and Memory Management**                                                  **11 Hours**

Principles of Deadlock, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, An Integrated Deadlock Strategy, Dining Philosophers Problem Memory Management: Swapping, Contiguous Memory Allocation, Paging, Segmentation, Segmentation with Paging, Demand Paging, Process Creation, Page Replacement, Allocation of Frames, Thrashing

**UNIT4  File System and Secondary Storage**                                               **10 Hours**

File Concept, Access Methods, Directory Structure, File System Mounting, File Sharing, Protection, File – System Structure, File – System Implementation, Directory Implementation, Allocation Methods, Free–Space Management**,** Disk Structure, Disk Scheduling, Disk Management.

**UNIT 5  Case study of Linux Operating system**                                          **10 Hours**
Linux System Linux history, Design Principles, Kernel modules, Process, management, scheduling, Memory management, File systems, Input and output, Inter-process communications.

**TEXT BOOKS/REFERENCES:**

**TEXT BOOKS :**
1. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne: Operating System Principles, 8th edition,  Wiley India,  2009.
2. William Stallings, "Operating System Internals and Design Principles" Pearson, 6thedition, 2012

**REFERENCES:**
1. Dhananjay M. Dhamdhere, "Operating Systems – A Concept – Based Approach", Tata McGraw – Hill, 3rd Edition, 2012.
2. Harvey M Deital: Operating systems, 3rd   Edition,  Pearson Education, 1990.
3. Chakraborty , "Operating Systems" Jaico Publishing House, 2011

**ADDITIONAL RESOURCES:**

1. https://www.tutorialspoint.com/operating_system/os_linux
2. https://www.cs.uic.edu/~jbell/CourseNotes/OperatingSystems.

| JSS Science and Technology University, Mysuru Department of Computer Applications [MCA] | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Course Year** | **Course Semester** | **Course Type** | **Credits** | **Contact Hours/ Week** | | | **Total Hours/ Semester** |
| | | | | **Theory** | **Laboratory** | **Tutorials** | |
| I | I | Theory | 04 | 04 | 00 | 00 | 52 |

| **Course No** | **Course Title** | **Pre Requisites** |
|---|---|---|
| MCA150 | Computer Networks | -- |

**COURSE ASSESSMENT METHOD:**

1. Internal Assessment [5 Events: 3 Written Tests, 2 Events] Marks: 50 [10* 5 Events]

2. Semester End Exam [ 100 Marks, 3 Hours]

**COURSE OUTCOMES:**

Upon successful completion of this course, students will be able to:

| COURSE OUTCOMES | |
|---|---|
| CO1 | Analyze and distinguish the basic concepts, principles and techniques of data Communication along with the layers of OSI and TCP/IP model. |
| CO2 | Independently understand and distinguish the concept of links, nodes and data Transmission issues in the network |
| CO3 | Capability to categorize wired LANs: Ethernet, IPv4 addresses and performance of The network-layer |
| CO4 | Design and demonstrate the services of TCP and UDP |
| CO5 | Ability to summarize and interpret the basic concepts of Application-Layer Paradigms and standard client-server protocols. |

**TOPICS COVERED:**

**UNIT 1 - Basics of Data Communications and Physical Layer        10 Hours**

Data Communications: Components, Data Representation, Data Flow, Networks; Network Criteria, Physical Structures, Network Types: LAN, WAN, Switching, Network Models: Protocol Layering: Principles of Protocol Layering, Logical Connections, TCP/IP Protocol Suite: Layered Architecture, Layers in the TCP/IP Protocol Suite, Encapsulation and Decapsulation, Addressing, Multiplexing and Demultiplexing, The OSI Model; OSI versus TCP/IP, Lack of OSI Model's Success, Introduction to Physical Layer, Data and Signals, Periodic Analog Signals, Digital Signals, Transmission Impairment, Data Rate Limits, Performance, Switching: Circuit-Switched Networks, Packet Switching, Datagram Networks, Virtual Circuit Networks.

**UNIT 2 - Data Link Layer        10 Hours**

Introduction to Data-Link Layer, Link-Layer Addressing: Address Resolution Protocol (ARP), Error Detection and Correction: Introduction, Types of Errors, Redundancy, Detection versus Correction, Coding, Block coding: Error Detection, Cyclic Code: Cyclic Redundancy Check, Polynomials, Cyclic Code Analysis and its Advantages, Checksum, Forward Error Correction:

Using Hamming Distance, Using XOR, Chunk Interleaving.

## UNIT 3 - LANs and Network Layer                                    10 Hours

Ethernet Protocol, Standard Ethernet: Characteristics, Addressing, Access Method, Efficiency of Standard Ethernet, Implementation, Changes in the Standard, Fast Ethernet (100 MBPS): Access Method, Physical Layer, 10 Gigabit Ethernet, Introduction to Network Layer, Network-Layer Services: Packetizing, Routing and Forwarding, Packet Switching: Datagram Approach, Virtual-Circuit Approach, Network Layer Performance: delay Throughput, Packet loss, Congestion Control, IPv4 addresses.

## UNIT 4 - Transport Layer                                            10 Hours

Introduction to Transport-Layer: Transport-Layer Services; Transport-Layer Protocols: Port Numbers, User Datagram Protocol: User Datagram, UDP Services, UDP Applications, Transmission Control Protocol: TCP Services, TCP Features, Segment, A TCP Connection, State Transition Diagram, Windows in TCP, Flow Control, Error Control, TCP Congestion Control, TCP Timers.

## UNIT 5 - Application Layerand Standard Client-Server Protocols        12 Hours

Introduction to Application Layer, Services, Application-Layer Paradigms, Client-Server Programming: Application Programming Interface, Using Services of the Transport Layer, Iterative Communication using UDP, Iterative Communication using TCP, Concurrent Communication, World Wide Web and HTTP: FTP: Two Connections, Control Connection, Data Connection, Security for FTP, E-Mail: Architecture, Web-Based Mail, TELNET: Local versus Remote Logging, Secure Shell (SSH): Components, Applications, Domain Name System (DNS): Name Space, DNS in the Internet, Resolution, Caching, Resource Records, DNS Messages, Registrars, DDNS, Security of DNS.

## TEXT BOOKS / REFERENCES:

**Text books:**
1. B. A. Forouzan, Data Communications and Networking, 5th Edition, McGraw Hill Education (India) Private Limited, 2016.

**Reference books:**
1. William Stallings, Data and Computer Communications, 10th Edition, Pearson, 2015.
2. Larry L. Peterson and Bruce S. David: Computer Networks – A Systems Approach, 5th Edition, Elsevier, 2014.
3. Andrew S. Tanenbaum, Computer Networks, Fourth Edition, PHI, 2014.
4. Fred Halsall, Data Communications, Computer Networks and Open Systems, 4th Edition, Pearson Education, 2015.

## ADDITIONAL LEARNING SOURCES:

1. www.nptel.ac.in/courses
2. http://freevideolectures.com/Course/2276/Computer-Networks

| JSS Science and Technology University, Mysuru<br>Department of Computer Applications(MCA) | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Course Year** | **Course Semester** | **Course Type** | **Credits** | **Contact Hours/ Week** | | | **Total Hours/ Semester** |
| | | | | **Theory** | **Laboratory** | **Tutorials** | |
| I | I | Theory | 02 | 02 | 00 | 00 | 26 |
| **Course No** | | **Course Title** | | | **Pre Requisites** | | |
| **MCA160** | | **BUSINESS SYSTEMS** | | | - | | |

## COURSE ASSESSMENT METHOD:

3. Internal Assessment [5 Events: 3 Written Tests, 2 Events ]   Marks: 50 [10* 5 Events]
4. Semester End Exam [ 100 Marks, 3 Hours]

## COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to,

| COURSE OUTCOMES | |
|---|---|
| CO1 | Understand the concepts of business, and information system for business. |
| CO2 | Adopt of Information Technology in business for effective management of activities. |
| CO3 | Develop Business and Corresponding IT strategies. |
| CO4 | Design appropriate Business / IT solutions as per the business requirement |
| CO5 | Understand the concepts and essential of e-business systems |

## TOPICS COVERED:

### Unit I     Information Systems in Business                                           05 Hrs

The Fundamental Roles of IS in Business, Trends in Information Systems, The Role of e-Business in Business, Types of Information Systems - Operations Support Systems, Management Support Systems, Other Classifications of Information Systems.

### Unit II     Information Technology in Business                                     05 Hrs

Managerial Challenges of Information Technology, Components of Information Systems, Information System Resources, Information System Activities, Recognizing Information Systems.

### Unit III     Developing Business/IT Strategies                                     06 Hrs

Planning Fundamentals, Organizational Planning- The Scenario Approach, SWOT Analysis, Business Models and Planning, Business/IT Architecture Planning, Identifying Business/IT Strategies, Business Application Planning, Change Management.

**Unit IV     Designing Business/IT Solutions**                                           **05 Hrs**

Introduction, Cross-Functional Enterprise Applications, Enterprise Application Integration, Transaction Processing Systems, Enterprise Collaboration Systems.

**Unit V       e-Business Systems**                                                        **05 Hrs**

Information Technology in Business, Marketing Systems, Manufacturing Systems, Human Resource Systems, Accounting Systems, Financial Management Systems.

**TEXT BOOKS / REFERENCES:**

**Text books:**

1. James A. O'Brien  and George M. Marakas, Management Information System, Tenth Edition, Tata McGraw Hill. 2013.

**Reference books:**

1. Jawadekar, W.S., "Management Information Systems", Tata McGraw Hill Private Limited, New Delhi, 2009.

**ADDITIONAL LEARNING SOURCES:**

1. https://freevideolectures.com/course/2687/management-information-system
2. https://www.tutorialspoint.com/management_information_system/index.htm

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|---|---|---|---|---|---|---|---|
| **JSS Science and Technology University,**<br>**Department of Computer Applications, Mysuru** | | | | | | | |

| Course<br>Year | Course<br>Semester | Course<br>Type | Credits | Contact Hours/ Week | | | Total<br>Hours/<br>Semester |
|---|---|---|---|---|---|---|---|
| | | | | **Theory** | **Laboratory** | **Tutorials** | |
| I | I | Laboratory | 01 | 00 | 02 | 00 | 32 |

| Course No | Course Title | Pre Requisites |
|---|---|---|
| MCA11L | Python Programming Laboratory | OOPS |

## COURSE ASSESSMENT METHOD:

Internal Assessment [Test-1 + Test-2 + Observation book + Record + Viva: 15 + 15 + 05 + 05 +10]  Marks: 50

## COURSE OUTCOMES:

Upon successful completion of this course, students will be able to:

| COURSE OUTCOMES | |
|---|---|
| CO1 | Understand and comprehend the basics of python programming. |
| CO2 | Apply knowledge in real time applications. |
| CO3 | Apply object-oriented programming concepts to develop dynamic interactive Python applications. |
| CO4 | Understands about files and its applications. |
| CO5 | Implementation of visualization techniques for interpretation of data |

## LIST OF EXPERIMENTS COVERED:

**1. Data Types and Data Structures :**
Introduction to Python: - using the Python interpreter, Python built-in types, Arithmetic in Python, Program input and Program output, Variables and assignment. Strings and string operations, List basics, List operations, Dictionaries, Dictionary basics and Tuples,
*Simple programs using elementary data items, lists, dictionaries and tuples.*

**2. Control Structures:**
Control Statements:-if statements, while statement, for statements, functions, formal arguments, variable-length arguments, Exceptions, detecting and handling exceptions.
  *(a) Programs using conditional branches, loops.*
  *(b) Programs using functions*
  *(c) Programs using exception handling*

**3. Classes ,files and modules**
Introduction to Classes and Objects:-classes, class attributes, instances, instance attributes, binding and method invocation, inheritance, polymorphism, Built-in functions for classes and instances.
Files and input/output, reading and writing files, methods of file objects, using standard library functions, dates and times
  *(a) Programs using classes and objects*

*(b) Programs using inheritance*
*(c) Programs using polymorphism*
*(d) Programs to implement file operations.*
*(e) Programs using modules.*

**4. Development of plotting graphs for data.**
   Create a random reading of any example and demonstrate types of plotting.
**5.Development of sample web applications using python**.
Sample applications may include
   *i) Web based polling*
   *ii) Social networking site*
   *iii) Online transaction system*
   *iv) Content management system*

## TEXT BOOKS / REFERENCES:

**Text books:**
1. Timothy A. Budd: Exploring Python, Tata McGraw-Hill, 2011.
2. Jeff Forcier, Paul Bissex, Wesley Chun: Python Web Development with Django, Addison-Wesley (e-book), 2008.
3. Data Analysis and Visualization Using Python: Dr. OssamaEmbarak, 2018, Apress.

**Reference books:**
1. Ascher, Lutz: Learning Python, 4th Edition, O'Reilly, 2009.
2. Wesley J Chun: Core Python Applications Programming, Pearson Education, 3$^{rd}$ Edition, 2013.
3. Paul Gries, Jennifer Campbell, Jason Montojo , Practical Programming: An introduction to Computer Science Using Python, second edition, Pragmatic Bookshelf.
4. Allen Downey , Jeffrey Elkner , Learning with Python: How to Think Like a Computer Scientist Paperback –, 2015

## ADDITIONAL LEARNING SOURCES:

1. http://www.network-theory.co.uk/docs/pytut/
2. http://docs.python.org/tutorial/
3. http://zetcode.com/tutorials/pythontutorial/
4. http://www.sthurlow.com/python/ http://www.tutorialspoint.com/python/
5. http://www.djangoproject.com/
6. http://www.djangobook.com/

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|---|---|---|---|---|---|---|---|
| **Course<br>Year** | **Course<br>Semester** | **Course Type** | **Credits** | **Contact Hours/ Week** | | | **Total<br>Hours/<br>Semester** |
| | | | | **Theory** | **Laboratory** | **Tutorials** | |
| I | I | Laboratory | 01 | 00 | 02 | 00 | 32 |
| **Course No** | | **Course Title** | | | **Pre Requisites** | | |
| MCA12L | | Mathematical Foundation Laboratory | | | -------- | | |

**COURSE ASSESSMENT METHOD:**

Internal Assessment [Test -1, Test-2, Observation book + Record + Viva-voce]
[15+15+05+05+10 = 50marks]

**COURSE OUTCOMES:**

Upon successful completion of this course, students will be able to:

| COURSE OUTCOMES | |
|---|---|
| CO1 | Implement and analyze statistical measures. |
| CO2 | Analyze and interpret the different types of computational errors and implement the algorithms to solve a set of linear equations. |
| CO3 | Implement and design the solutions for the various problems by using vectors, matrices, relations and functions. |

**TOPICS COVERED:**

Students ought to implement the algorithms using Scilab / Matlab tool.

1. To perform data analysis and modeling by writing the program to find I order, II order and III order statistical measure of varied forms of data set and understand its inference on the applications of data. [Write program using adequate data to infer the meaning of Mean, Median, Mode, SD, Variance, Kurtosis, Correlation and Regression Analysis]

2. Analyze different types of Errors and its sources. Explore the implementation of demonstrate the concepts in linear algebra: Viz Matrices, Vector space representation, Polynomials considering the real time data using Matlab.
   [Program to find the Inverse, Determinants of a matrix, Finding the Eigen value , Eigen Vector, Singular Value decomposition of a given matrix]

3. To implement the algorithms used to solve a set of linear equations (atleast any 3) and analyse the computational efficiency. [Write Program and cross validate the results using the tools to solve the set of linear equations using : Gauss Elimination, LU Decomposition, Gauss Jordon, Jacobis  Methods]

4. Implement the concepts of functions and relations.
   [Program to validate Relations and Functions, its different types. generate Stirling

Numbers, The Pigeon-hole principle considering the appropriate data for input and conclude the hypothesis involved in them to infer the results]

5. Implement to find the Hamiltonian, Euler, and isomorphic graphs.

**What does Scilab / Matlab / C do ?**
Includes hundreds of mathematical functions. It has a high level programming language allowing access to advanced data structures, 2-D and 3-D graphical functions.

A large number of functionalists is included in Scilab:
For usual engineering and science applications including mathematical operations and data analysis. 2-D&3-DVisualization graphics functions to visualize, annotate and export data andmany ways to create and customize various types of plots and charts.
**https://www.scilab.org/scilab/**

| TEXT BOOKS / REFERENCES: |

**TEXT BOOKS :**
1. Sant Sharan Mishra, "Computer Oriented Numerical and Statistical Methods", PHI Learning Private Limited, 2013.
2. Rizwan Butt, "Introduction to Numerical Analysis Using Matlab", Infinity Science Press LLC, 2008
3. Ralph P Grimaldi, B.V.Ramana, "Discrete & Combinatorial Mathematics, An Applied
    a. Introduction" 5th Edition, Pearson Education, 2009.
4. F.M. Dekking, C. Kraaikamp, H.P. Lopuhaa, L.E. Meester, "A Modern Introduction to Probability and Statistics: understanding why and how", Springer, 2005.

**REFERENCES:**
1. D.S. Chandrasekharaiah, Discrete Mathematical Structures, 4th Edition, PRISM Pvt. Ltd. 2012.
2. Bondy and U.S.R.Murty: Graph Theory and Applications ( Freely downloadable from Bondy's website; Google-Bondy)
3. S. Kumarsean, "Linear Algebra A geometric approach", Prentice Hall of India Private Limited, 2001.
4. Kenneth H Rosen, "Discrete Mathematics & its Applications" 7th edition, McGraw-Hill, 2010.

| ADDITIONAL LEARNING SOURCES: |

1. http://www.personal.kent.edu/~rmuhamma/GraphTheory/graphTheory.htm
2. http://www.tutorialspoint.com/discrete_mathematics/
3. http://www.maths.lu.se/english/library/e-resources/
4. http://sunzi.lib.hku.hk/ER/detail/hkul/3743848
5. https://www.math.ucdavis.edu/~linear/linear-guest.pdf

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| **Course Year** | **Course Semester** | **Course Type** | **Credits** | **Contact Hours/ Week** | | | **Total Hours/ Semester** |
| | | | | **Theory** | **Laboratory** | **Tutorials** | |
| I | I | Laboratory | 01 | 00 | 02 | 00 | 32 |
| **Course No** | | **Course Title** | | | | **Prerequisites** | |
| MCA13L | | Data Structures using C++ Laboratory | | | | -- | |

## COURSE ASSESSMENT METHOD:

Internal Assessment [Test-1+Test-2+Observation book + Record + Viva : 15 + 15 + 05 + 05 +10=50 marks]

## COURSE OUTCOMES:

Upon successful completion of this course, the student will have the,

| COURSE OUTCOMES | |
|---|---|
| **CO1:** | Ability to conduct experiments to applying concepts related to primitive data types |
| **CO2:** | Ability to conduct experiments using Linear & Non-Linear data structure & Explore its applications |
| **CO3:** | Ability to conduct experiments searching and sorting techniques and analyze them. |

## LIST OF EXPERIMENTS COVERED:

### PROGRAMS ON C++
1. Programs to learn and explore C++ data types, looping and decision making structures.
2. Write a C++ program to Calculate the salary of an employee given his basic pay, HRA = 10% of basic pay, TA=5% of his basic pay and deductions IT = 2.5% of his basic pay.
3. Write a C++ program to Solve quadratic equations to find the roots of the equation.
4. Write a C++ program to implement arrays and structures.{Ex: Students marks calculation, matrix operations}
5. Write a C++ program to Calculate the average marks of the student test marks and display the result using structure.

### STACK
7. Write a C++  program to evaluate the validity of an expression
8. Write a C++  program to evaluate a postfix expression.
9. Write a C++   program to convert an expression from infix to postfix.
10. Write a C++ program to implement multiple stack of integers.

### QUEUES
11. Write a C++  program to perform basic operations on queue of integers, the program should provide the appropriate message to handle all concerned conditions
12. Write a C++ program to perform basic operations on list of students information stored in

circular queue.

Let student information include regno, course title, year of study

13. Write a C++ program to implement dual queue.

## LINKED LIST

14. Write a C++ program to implement stack operations using linked list.

15. Write a C++ program to implement queue operations using linked list.

16. Write a C++ program to create the students mark list based on the rank. Let the student record contain student-id, name, total marks.

17. Write a C++ program to perform operations.
    a. Creation of list.
    b. Insertion of new element [At Front, from rear, based on the position]
    c. Deletion of a node [At Front, from rear, based on the position]
    d. Display the list.
    e. Replace the content of one element by another element.
    f. Swap two nodes

18. Write a C++ program to perform the following operations on doubly linked list.
    a. Creation of list by :
    Insertion [ At beginning, At end, In between ]
    Deletion [ At beginning, At end, In between ]
    b. Display all the nodes.
    c. Swap two nodes based on specific criteria.

## TREES

19. Write a C++ program to perform / implement the binary tree using array and hence perform the following
    a. To print the left and right child of specified node
    b. To print all the ancestors of a specified node
    c. To print all the node in a specific level
    d. To print only the leaf node

20. Write a C++ program to perform / implement the binary tree using linked list and hence perform the
following
    a. To print the left and right child of specified node
    b. To print all the ancestors of a specified node
    c. To print all the node in a specific level
    d. To print only the leaf node

21. Write a C++ program with recursive routines to traverse the binary tree in all possible orders
    a. Create a tree
    b. Pre-Order traversal
    c. In-Order traversal
    d. Post-Order traversal

22. Write a C++ program to construct a heap of n integers and hence sort them using heap sort algorithm

23. Implement the search techniques
    a. Linear Search
    b. Binary Search

| TEXT BOOKS/ REFERENCES : |
|---|
| **Text Books :**<br>   1.  Object Oriented Programming with C++, Third Edition, E. Balaguruswamy. 6$^{th}$ Edition (2013).<br>   2.  Data Structures Using C  and C++ by Aaron.M. Tenenbaum, Yedidyah Langsam and Moshe J.   Augustine , PHI, Edition, 2011.<br><br>**Reference Books :**<br>   1.  Data structures, Algorithms and Applications in C++, S. Sahani, University Press (India) Pvt Ltd, 2nd Edition.<br>   2.  The complete reference C, Herbert Schildt, Fifth Edition, Tata McGraw Hill. |
| **ADDITIONAL LEARNING SOURCES:** |
|    1.  http://www.tutorialspoint.com/Data-Structures-in-C -Online-Training/classid=13<br><br>   2.  http://nptel.ac.in/datastructures_c |

| JSS Science and Technology University, Mysuru Department of Computer Applications [MCA] | | | | | | | |
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| **Course Year** | **Course Semester** | **Course Type** | **Credits** | **Contact Hours/ Week** | | | **Total Hours/ Semester** |
| | | | | **Theory** | **Laboratory** | **Tutorials** | |
| I | I | Theory | 02 | 02 | 00 | 00 | 26 |

| **Course No** | **Course Title** | **Pre Requisites** |
|---|---|---|
| MCA17A | Professional Communication and Ethics | -- |

**COURSE ASSESSMENT METHOD:**

Internal Assessment [5 Events: 3 Written Tests, 2 Events] Marks: 50 [10* 5 Events]

**COURSE OUTCOMES:**

Upon successful completion of this course, students will be able to:

CO1 : Enhance the qualities of technical communication and remove barriers.
CO2 : Apply technology for improvement of Communication.
CO3 : Advances the effective presentation strategies using various tools
CO4 : Acquire the importance of Ethics in professional life.
CO5:  Practice and support ethics as IT users

**TOPICS COVERED:**

**Unit:1:INTRODUCTION                                                          05  Hours**

Introduction, Process of Communication, Language as a Tool, Levels of Communication, Communication Networks, Importance of Technical Communication. Definition of Noise, Classification of Barriers.

**Unit:2:IMPACT OF TECHNOLOGY                                         05 Hours**

Impact of Technology, Software for Creating Messages, Software for Writing Documents, Software for Presenting Documents, Transmitting Documents, Effective use of Available Technology.

**Unit:3: EFFECTIVE PRESENTATION                                     06 Hours**

Effective Presentation: Introduction, Defining purpose, Analyzing Audience and Locale, Organizing Contents, preparing outline, Visual Aids, Understanding Nuances of Delivery, Kinesics, Proxemics, Paralinguistic, Chronemics, Sample speech.

**Unit:4:ETHICS INTRODCUTION                                          05 Hours**

**What are Ethics:** Definition of ethics, Importance of Integrity, Ethics in the Business world, and Ethics in Information Technology (IT).

| Unit:5: PROFESSIONAL ETHICS -  IT PREFESSIONALS & USERS | 05 Hours |
|---|---|

Professional, The ethics behavior of IT professionals, IT users: Common ethical issues for IT users, Supporting the ethical practices of IT users.

## TEXT BOOKS / REFERENCES:

**Text books:**
1. Meenakshi Raman and Sangeeta Sharma: Technical Communication - Principles and Practices, Oxford University Press, 2010.
2. George Reynolds: Ethics in Information Technology, CENAGE Learning, 2014

**Reference books:**
1. Mike W Martin, Roland Schinzinger, Ethics in Engineering, Tata McGraw Hill Edition2007
2. M.Ashraf Rizivi: Effective Technical Communication, Tata McGraw Hill, 2009

## ADDITIONAL LEARNING SOURCES:
1. www.coursehero.com.
2. www.studocu.com.
3. http://www2.ece.ohio-state.edu/~passino/ee481.html.
4. https://nptel.ac.in/courses/110105097/.

| JSS Science and Technology University, Mysuru, Department of Computer Applications [MCA]. | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Course Year** | **Course Semester** | **Course Type** | **Credits** | **Contact Hours/ Week** | | | **Total Hours/ Semester** |
| | | | | **Theory** | **Laboratory** | **Tutorials** | |
| I | II | Theory | 04 | 04 | 00 | 00 | 52 |
| **Course No** | | **Course Title** | | | | **Pre Requisites** | |
| MCA210 | | Relational Database Management System | | | | Data Structures | |

**COURSE ASSESSMENT METHOD:**

1. Internal Assessment [5 Events: 3 Written Tests, 2 Events ]  Marks: 50 [10* 5 Events]
2. Semester End Exam [ 100 Marks, 3 Hours]

**COURSE OUTCOMES:**

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

| Course Objectives | |
|---|---|
| CO1 | Master the basic concepts of data models, modeling notations and have a broad understanding of database concepts and database management system software. |
| CO2 | Explore the relation with Algebraic expressions, operations, transactions in Relational Database Systems. |
| CO3 | Model an application's data requirements using conceptual modeling tools like ER-diagrams and design database schemas based on the conceptual model. |
| CO4 | Write SQL commands to create tables and indexes in a relational DBMS and to design the queries to handle all the operations of RDBMS on an application. |
| CO5 | Design and build a simple database system and demonstrate the competence with the fundamental tasks involved with Modeling, Design and Implementing a RDBMS. |

**TOPICS COVERED:**

**UNIT1 – Introduction**  **10 Hours**

Database-System Applications, Purpose of Database Systems, View of Data, Database Languages, Relational Databases, Database Design, Data Storage and Querying, Transaction Management, Database Architecture, Data Mining and Information Retrieval, Specialty Databases, Database Users and Administrators, History of Database Systems.
**Introduction to the Relational Model:**
Structure of Relational Databases, Database Schema, Keys, Schema Diagrams, Relational Query Languages, Relational Operations.

**UNIT 2 - Database Design and the E-R Model**  **10 Hours**

Overview of the Design Process, The Entity-Relationship Model, Constraints, Removing Redundant Attributes in Entity Sets, Entity-Relationship Diagrams, Reduction to Relational Schemas, Entity-Relationship Design Issues, Extended E-R Features, Alternative Notations for

Modeling Data, Other Aspects of Database Design.

**UNIT3 – Introduction to SQL**                                    **10 Hours**

Overview of the SQL Query Language, SQL Data Definition, Basic Structure of SQL Queries, Additional Basic Operations, Set Operations, Null Values, Aggregate Functions, Nested Subqueries, Modification of the Database.
**Intermediate SQL:**
Join Expressions, Views, Transactions, Integrity Constraints, SQL Data Types and Schemas, Authorization.

**UNIT 4 - Advanced SQL**                                          **10 Hours**

Accessing SQL From a Programming Language, Functions and Procedures, Triggers, Recursive Queries, Advanced Aggregation Features, OLAP.
**Formal Relational Query Languages:**
The Relational Algebra, The Tuple Relational Calculus, The Domain Relational Calculus.

**UNIT 5 – Relational Database Design**                            **12 Hours**

Features of Good Relational Design, Atomic Domains and First Normal Form, Decomposition Using Functional Dependencies, Functional Dependency Theory, Algorithm for Decomposition, Decomposition Using Multivalued Dependencies, More Normal Forms, Database-Design Process, Modeling Temporal Data.

## TEXT BOOKS / REFERENCES:

**Text Books :**

1.  Database System Concepts, A.Silberschatz, Henry.F.Korth, S.Sudharshan, 6th Edition.
2.  Database Systems,  Ramez Elmasri, Shamkant.B.Navathe, 6th Edition.

**Reference Books:**

1.  "Database Management Systems", Raghu Ramakrishnan and J Gehrke 3rd Edition
2.  "An Introduction to Database System" C.J.Date , AKannan, S..Swamynathan 8th Edition

## ADDITIONAL LEARNING SOURCES:

1.  www.tutorialspoint.com/sql/sql-rdbms-concepts.htm
2.  nptel.ac.in/courses/106106093/6
3.  msdis.missouri.edu/resources/gis_advanced/pdf/relational.pdf

<table>
<tr><td colspan="8" align="center"><strong>JSS Science and Technology University, Mysuru<br>Department of Computer Applications [MCA]</strong></td></tr>
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<td rowspan="2" align="center"><strong>Course Year</strong></td>
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<td colspan="2" align="center"><strong>Course No</strong></td>
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<td colspan="2" align="center"><strong>Pre Requisites</strong></td>
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<tr>
<td colspan="2" align="center">MCA220</td>
<td colspan="4" align="center">Java and J2EE</td>
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**COURSE ASSESSMENT METHOD:**

1. Internal Assessment [5 Events: 3 Written Tests, 2 Events ]   Marks: 50 [10* 5 Events]
2. Semester End Exam [ 100 Marks, 3 Hours]

**COURSE OUTCOMES:**

At the end of the course, the student will have the ability to,

| Course Outcomes | |
|---|---|
| CO1 | Define, understand and explain Java programming principles with OOP Concepts. |
| CO2 | Understand and implement error free and efficient Java programs using exceptions and multithreading |
| CO3 | Apply the concepts of J2EE and JDBC in enterprise application development |
| CO4 | Write Server side applications using Servlets by demonstrating different concepts of Servlets |
| CO5 | Design and develop web applications using JSP. |

**TOPICS COVERED:**

**Unit 1 – Java basics and OOP concepts**                                         **12 Hours**

History of Java, Java buzzwords, concepts of classes, objects, constructors, methods, access control, this keyword, garbage collection, overloading methods and constructors, parameter passing, recursion. Hierarchical abstractions, Base class object, subclass, subtype, substitutability, forms of inheritance- specialization, specification, construction, extension, limitation, combination, benefits of inheritance, costs of inheritance. Member access rules, super uses, using final with inheritance, polymorphism- method overriding, abstract classes, the Object class, defining an interface, implementing. interface, applying interfaces, variables in interface and extending interfaces.

**Unit 2 – Exception handling and Multithreading**                                 **10 Hours**

Concepts of exception handling, benefits of exception handling, Termination or presumptive models, exception hierarchy, usage of try, catch, throw, throws and finally, built in exceptions, creating own exception sub classes. String handling, Exploring java.util.
Differences between multi-threading and multitasking, thread life cycle, creating threads, thread priorities, synchronizing threads; inter thread communication, thread groups, daemon threads.

**Unit 3 – J2EE Basics, Java Database Connectivity (JDBC)**                     **10 Hours**

Introduction to J2EE, Different architectures for application development, advantages of multi tier architecture for over other architectures, Different components and technologies of J2EE.
Introduction on JDBC, Talking to database, Essential JDBC program, Using Prepared Statement Object, Interactive SQL tool, JDBC in action result sets, Batch Updates, Mapping, Basic JDBC data types and Advanced data types.

**Unit 4 –  Server Side Scripting using Servlets**                     **10 Hours**

CGI Technologies, Limitations, Advantages of  Servlet over CGI , Servlet Structure, Servlet packaging, HTML building utilities, Lifecycle, Single Thread model interface, Handling Client Request: Form Data, Handling Client Request: HTTP Request Headers. Generating server Response: HTTP Status codes, Generating server Response: HTTP Response Headers, Handling Cookies, Session Tracking.

**Unit 5 -  Java Server Pages (JSP)**                     **10 Hours**

Overview of JSP technology, Need of JSP, Benefits of JSP, Advantages of JSP, Basic syntax, Invoking java code with JSP scripting elements,  Creating template text , invoking java code from JSP,  Limiting java code in JSP, Using JSP expressions, Comparing servlets and JSP, writing scriplets, for example using scriplets to make parts of JSP conditional, Using declarations, declaration example. Controlling the structure of generated servlets.
The JSP page directive, import attribute, session attribute, isElignore attribute, Buffer and auto flush attributes, Info attribute, errorpage and iserrorpage attributes, isThreadsafe attribute, extends attribute, language attribute, Including files and applets in JSP pages, Using java beans component in JSP documents.

| **TEXT BOOKS / REFERENCES:** |
| --- |

**Text Books:**

1. Herbert Schildt. Java - The Complete Reference, Ninth Edition. Oracle Press, McGraw Hill Education (India) Edition- 2014.

2. Java 6 Programming Black Book, Dreamtech Press. 2012 (Chapter 17,18,19,20,21,22,27,28, 29,30).

3. Marty Hall, Larry Brown. Core Servlets and Java Server Pages. Volume 1: Core Technologies. Second Edition. (Chapter 3,4,5,6,7,8,9,10,11,12,13,14).

**Reference Books:**

1. Timothy Budd, "Understanding Object-oriented programming with Java", Updated Edition, Pearson Education, 2000.

2. Cay S. Horstmann, Gary Cornell. Core Java, Core Java Volume-1 – Fundamentals, 9th edition, Pearson Education, 2014.

| **ADDITIONAL LEARNING SOURCES:** |
| --- |

1. http://www.javaworld.com/
2. http://www.learnjavaonline.org/
3. https://www.codecademy.com/learn/learn-java

4. http://www.tutorialspoint.com/java/

5. www.j2eetutorials.50webs.com

6. www.docs.oracle.com/javaee/6/tutorial/doc/

7. www.tutorialspoint.com/listtutorials/java/j2ee/1

8. www.coderanch.com/t/534906/EJB-JEE/java/Tutorial-EE-Beginners

9. http://w3schools.invisionzone.com/index.php?showforum=52

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| **Department of Computer Applications [MCA]** |||||||
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| | | | | **Theory** | **Laboratory** | **Tutorials** | |
| I | II | Theory | 04 | 04 | 00 | 00 | 52 |

| **Course No** | **Course Title** || **Pre Requisites** |
|---|---|---|---|
| MCA230 | Advanced Algorithms || Data Structures |

## COURSE ASSESSMENT METHOD:

1. Internal Assessment [5 Events: 3 Written Tests, 2 Events ]   Marks: 50 [10* 5 Events]
2. Semester End Exam [ 100 Marks, 3 Hours]

## COURSE OUTCOMES:

Upon successful completion of this course students will be able to:

| COURSE OUTCOMES ||
|---|---|
| CO1 | Analyze the efficiency of variety of algorithms with practical applications. |
| CO2 | Apply various design techniques to solve problems from various domains. |
| CO3 | Analyze various string matching and dynamic approach of designing algorithms and explore their applications. |
| CO4 | Explore the basic elements graph based problems and its applications. |
| CO5 | Analyze, Implement and Evaluate the Randomized algorithms. |

## TOPICS COVERED:

**UNIT: 1 - Review of Analysis Techniques**                                    **09 Hours**

Introduction: Notion of Algorithm, Fundamentals of Algorithmic Problem Solving, Fundamentals of the Analysis of Algorithm Efficiency: Analysis Framework, Asymptotic Notations and Basic efficiency classes, Mathematical analysis of Recursive and Non-recursive algorithms, Examples.

**UNIT: 2 – Design Techniques**                                    **13 Hours**

Brute Force:-  Selection Sort and Bubble Sort, Sequential Search and String Matching, Exhaustive Search; Divide-and-Conquer Method:- Merge sort, Quick sort. Binary Search, Binary tree Traversals and related properties. Decrease-and-Conquer:- Insertion Sort, Depth First and Breadth First Search, Topological Sorting. Transform-and-Conquer:-Presorting, Heaps and Heap sort, Problem Reduction.

**UNIT: 3** - **Space and Time Tradeoffs & Dynamic Programming**                    **10 Hours**

Sorting by Counting, Input Enhancement in String Matching, Hashing. Dynamic Programming: Computing binomial coefficient, Warshall's Algorithm, Floyd's Algorithms, The Knapsack Problem and Memory Functions. Greedy Technique Prim's Algorithm, Kruskal's Algorithm, Dijkstra's

Algorithm, Huffman Trees.

**UNIT: 4 – Graph Algorithms:**         **10 Hours**

Bellman - Ford Algorithm; Single source shortest paths in a DAG; Johnson's Algorithm for sparse graphs; Flow networks and Ford-Fulkerson method; Maximum bipartite matching.

**UNIT: 5** - **String-Matching Algorithms and Randomized Algorithms:**     **10 Hours**

Naïve string Matching; Rabin - Karp algorithm; String matching with finite automata; Knuth-Morris-Pratt algorithm; Boyer – Moore algorithms. Randomizing deterministic algorithms, Monte Carlo and Las Vegas algorithms.

## Text Book/References

**Text Books:**

1. Anany Levitin, Introduction to The Design and Analysis of Algorithms, 3rd Edition, Pearson Education, 2012.
2. Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, Fundamentals of Computer Algorithms, 2nd Edition, University press, 2014.
3. T. H Cormen, C E Leiserson, R L Rivest and C Stein: Introduction to Algorithms, $2^{nd}$ Edition, Prentice-Hall of India, 2002.

**Reference Books:**

1. Kenneth A. Berman, Jerome L. Paul: Algorithms, Cengage Learning, 2002.
2. Haralambos Marmanis and Dmitry Babenko, Algorithms of the Intelligent Web, Manning Publications, 2009.
3. R.C.T. Lee, S.S. Tseng, R.C. Chang & Y.T.Tsai, Introduction to the Design and Analysis of Algorithms A Strategic Approach, 1st Edition, Tata McGraw Hill, 2005.

## Additional Learning Resources

1. https://www.classcentral.com/course/nptel-design-and-analysis-of-algorithms-3984.

<table>
<tr><td colspan="8"><strong>JSS Science and Technology University, Mysuru,<br>Department of Computer Applications [MCA]</strong></td></tr>
<tr><td rowspan="2"><strong>Course Year</strong></td><td rowspan="2"><strong>Course Semester</strong></td><td rowspan="2"><strong>Course Type</strong></td><td rowspan="2"><strong>Credits</strong></td><td colspan="3"><strong>Contact Hours/ Week</strong></td><td rowspan="2"><strong>Total Hours/ Semester</strong></td></tr>
<tr><td><strong>Theory</strong></td><td><strong>Laboratory</strong></td><td><strong>Tutorials</strong></td></tr>
<tr><td>I</td><td>II</td><td>Theory</td><td>04</td><td>04</td><td>00</td><td>00</td><td>52</td></tr>
<tr><td colspan="3"><strong>Course No</strong></td><td colspan="3"><strong>Course Title</strong></td><td colspan="2"><strong>Pre Requisites</strong></td></tr>
<tr><td colspan="3">MCA240</td><td colspan="3">Software Engineering</td><td colspan="2">Business Systems</td></tr>
</table>

**COURSE ASSESSMENT METHOD:**

1. Internal Assessment [5 Events: 3 Written Tests, 2 Events ]   Marks: 50 [10* 5 Events]
2. Semester End Exam [ 100 Marks, 3 Hours]

**COURSE OUTCOMES:**

Upon successful completion of this course, students will be able to:

<table>
<tr><td colspan="2"><strong>Course outcomes</strong></td></tr>
<tr><td>CO1</td><td>Elicit, analyze and specify software requirements through a productive working relationship with project stakeholders.</td></tr>
<tr><td>CO2</td><td>Make judgment about applicability of techniques in projects.</td></tr>
<tr><td>CO3</td><td>Use agile and techniques in application development.</td></tr>
<tr><td>CO4</td><td>Apply software testing and quality assurance techniques at the module level, and incorporate these techniques at the system and organization level.</td></tr>
<tr><td>CO5</td><td>Apply agile concepts to different case studies.</td></tr>
</table>

**TOPICS COVERED:**

**UNIT 1** - **Introduction to Agile software Development:**                    **12 Hours**

Overview, Objectives ,Three Perspectives on Software Engineering , The Agile Manifesto , Individuals and Interactions over Processes and Tools, Working Software over Comprehensive Documentation, Customer Collaboration over Contract, Negotiation, Responding to Change over Following a Plan, Application of Agile Software Development , Data About Agile Software Development, Agile Software Development in Learning Environments University Course Structure, Teaching and Learning Principles, The Studio Environment, The Academic Coach Role ,Overview of the Studio Meetings. Teamwork: Overview, Objectives, A Role Scheme in Agile Teams, Remarks on the Implementation of the Role Scheme, Human Perspective on the Role Scheme, Using the Role Scheme to Scale Agile Projects, Dilemmas in Teamwork, Teamwork in Learning Environments, Teaching and Learning Principles, Role Activities, Student Evaluation. Customers and Users: Overview, Objectives, The Customer, Customer Role, Customer Collaboration, The User, Combining UCD with Agile Development, Customers and Users in Learning Environments, Teaching and Learning Principles, Customer Stories.

**UNIT 2 - Time**                                                                          **10 Hours**

Overview, Objectives, Time-Related Problems in Software Projects, List of Time-Related

Problems of Software Projects. the Time Perspective, Tightness of Software Development Methods, Sustainable Pace, Time Management of Agile Projects, Time Measurements, Prioritizing Development Tasks, Time in Learning Environments, The Planning Activity, Teaching and Learning Principles, Students' Reflections on Time-Related Issues, The Academic Coach's Perspective. Measures: Overview, Objectives, Why Are Measures Needed, Who Decides What Is Measured? What Should Be Measured, When Are Measures Taken? How Are Measures Taken? Who Takes the Measures? How Are Measures Used? Case Study, Monitoring a Large-Scale Project by Measures, Measure Definition, Measure Illustration, Measures in Learning Environments,  Teaching and Learning Principles, Measurement Activities.

**UNIT 3–Quality**                                                      **10 Hours**

Overview, Objectives, The Agile Approach to Quality Assurance, Process Quality, Product Quality, Test-Driven Development, How Does TDD Help to Overcome Some of the Problems Inherent in Testing, Learning: Overview, Objectives, Study Questions, How Does Agile Software Development Support Learning Processes, Agile Software Development from the Constructivist Perspective, The Role of Short Releases and Iterations in Learning Processes, Learning in Learning Environments, Gradual Learning Process of Agile Software Engineering, Learning and Teaching Principle, The Studio Meeting, End of the First Iteration, Intermediate Course Review and Reflection, Abstraction: Overview, Objectives, Study Questions, Abstraction Levels in Agile Software Development, Roles in Agile Teams.

**UNIT 4 - Planning:**                                                     **10 Hours**

The Stand-Up Meeting, Design and Refactoring, Abstraction in Learning Environments, Teaching and Learning Principles. Trust: Overview, Objectives, Software Intangibility and Process Transparency, Game Theory Perspective in Software Development, Ethics in Agile Teams, Diversity, Trust in Learning Environments, Teaching and Learning Principle. Globalization: Overview, Objectives, Study Questions, The Agile Approach in Global Software Development, Communication in Distributed Agile Teams, Planning in Distributed Agile Projects, Case Study, Tracking Agile Distributed Projects, Reflective Processes in Agile Distributed Teams, Organizational Culture and Agile Distributed Teams, Application of Agile Principles in Non-Software Projects.

**UNIT 5–Reflection**                                                     **10 Hours**

Overview, Objectives, Case Study, Reflection on Learning in Agile Software Development, Reflective Practitioner Perspective, Retrospective, The Retrospective Facilitator, Case Study, Guidelines for a Retrospective Session, Application of Agile Practices in Retrospective Sessions, End of the Release Retrospective, Reflection in Learning Environments. Change: Overview, Objectives, A Conceptual Framework for Change Introduction, Changes in Software Requirements, Organizational Changes, Transition to an Agile Software Development Environment. Leadership: Overview, Objectives, Leaders, Leadership Styles, Case Study, The Agile Change Leader, Coaches, Leadership in Learning Environments, Teaching and Learning Principles. Delivery and Cyclicality: Overview, Objectives, Delivery, Towards the End of the Release, Release Celebration, Reflective Session Between Releases, Cyclicality ,Delivery and Cyclicality in Learning Environments, The Delivery in the Studio, Teaching and Learning Principles.

**TEXT BOOKS / REFERENCES:**

**Text books:**
1.Orit Hazzan and Yael Dubinsky, Agile Software Engineering, Springer, 2009

**Reference books:**
1. Cockburn, Agile Software Development, Pearson Education India
2. Mike Cohn, Agile Estimating and Planning, Pearson Education, 2005
3. Michele Sliger, Stacia Broderick, The Software Project Manager's Bridge to Agility, Addison-Wesley Professional, 2008

**ADDITIONAL LEARNING RESOURCES:**

1. www.allaboutagile.com/what-is-agile-10-key-principles/
2..https://www.versionone.com/agile

| JSS Science and Technology University, Mysuru<br>Department of Computer Applications [MCA] | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Course Year** | **Course Semester** | **Course Type** | **Credits** | **Contact Hours/ Week** | | | **Total Hours/ Semester** |
| | | | | **Theory** | **Laboratory** | **Tutorials** | |
| I | II | Elective | 03 | 03 | 00 | 00 | 42 |
| **Course No** | | **Course Title** | | | | **Pre-Requisites** | |
| MCA251 | | Cyber Security | | | | | |

**COURSE ASSESSMENT METHOD:**

1. Internal Assessment [5 Events: 3 Written Tests, 2 Events ]   Marks: 50 [10* 5 Events]
2. Semester End Exam [ 100 Marks, 3 Hours]

**COURSE OUTCOMES:**

At the end of the course, the student will have the,

| Course Outcomes | |
|---|---|
| CO1 | Ability to understand the broad set of technical, social & political aspects of Cyber Security. |
| CO2 | Appreciate the vulnerabilities and threats posed by criminals, terrorist and nation states to national infrastructure. |
| CO3 | Ability to understand the nature of secure software development, operating systems and data base design. |
| CO4 | Ability to understand the security management methods to maintain security protection. |
| CO5 | Ability to understand and implement different business modules in ERP for the effective management of enterprise resources and to the legal and social issues at play in developing solutions. |

**TOPICS COVERED:**

**UNIT 1 – Introduction** **9 Hours**

Introduction: Computer Security, Threats, Harm, Vulnerabilities, Controls. Toolbox: Authentication, Access Control, Authentication, Access Control.

**UNIT 2 – Malicious code, Web and E-Mail attacks** **8 Hours**

Malicious Code—Malware, Countermeasures. The Web—User Side, Browser Attacks , Web Attacks Targeting Users ,Obtaining User or Website Data, Email Attacks.

**UNIT 3 – Threads to Network Communication** **9 Hours**

Networks : Network Concepts , Threats to Network Communications , Wireless Network Security, Denial of Service , Distributed Denial-of-Service Strategic Defenses: Security Countermeasures,

Cryptography in Network Security , Firewalls , Intrusion Detection and Prevention Systems, Network Management.

**UNIT 4 – Management and Incidents**                                                **8 Hours**

Security Planning, Business Continuity Planning, Handling Incidents, Risk Analysis, Dealing with Disaster.

**UNIT 5 – Legal issues and Ethics**                                                **8 Hours**

Legal Issues and Ethics: Protecting Programs and Data, Information and the Law, Rights of Employees and Employers, Redress for Software Failures, Computer Crime, Ethical Issues in Computer Security, and Incident Analysis with Ethics.

**TEXT BOOKS / REFERENCES:**

**Text books:**
1. Pfleeger, C.P., Security in Computing 5th Edition, Prentice Hall, Copyright 2010ISBN 0-13-239077-9

**Reference books:**
1. Schneier, Bruce. Applied Cryptography, Second Edition, John Wiley & Sons, 1996.

**ADDITIONAL LEARNING SOURCES:**

1. https://digitalguardian.com/blog/what-cyber-security
2. https://www.forcepoint.com/cyber-edu/cybersecurity
3. https://www.youtube.com/watch?v=inWWhr5tnEA

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| I | II | Elective | 03 | 03 | 00 | 00 | 42 |

| Course No | Course Title | Pre Requisites |
|---|---|---|
| MCA252 | **Software Architecture** | Software Engineering |

**COURSE ASSESSMENT METHOD:**

1. Internal Assessment [5 Events: 3 Written Tests, 2 Events ]   Marks: 50 [10* 5 Events]
2. Semester End Exam [ 100 Marks, 3 Hours]

**COURSE OUTCOMES:**

At the end of the course, the student will be able to,

| Course outcomes | |
|---|---|
| **CO1** | Recognize major software architectural styles, design patterns and frameworks. |
| **CO2** | Identify and assess the quality attributes of a system at the architectural level. |
| **CO3** | Analyze and distinguish different architectural patterns. |
| **CO4** | Design and motivate software architecture for large scale software systems. |
| **CO5** | Generate architectural alternatives for a problem and selection among them. |

**TOPICS COVERED:**

**UNIT:1 - Introduction**                                                                                      **10 Hours**

The Architecture Business Cycle: Software processes and the architecture business cycle; Architectural patterns, reference models and reference architectures; Importance of software architecture; Architectural structures and views.
Architectural styles: Architectural styles; Data abstraction and object-oriented organization; Event-based, implicit invocation; Repositories; Interpreters; Process control.

**UNIT:2 - Understanding Quality**                                                                      **06 Hours**

 Functionality and architecture; Architecture and quality attributes; System quality attributes; Quality attribute scenarios in practice; Other system quality attributes; Business qualities; Architecture qualities.

**UNIT:3 - Achieving Quality**                                                                            **06 Hours**

 Achieving Quality: Introducing tactics; Availability tactics; Modifiability tactics; Performance tactics; Security tactics; Testability tactics; Usability tactics; Relationship of tactics to architectural patterns;

Architectural patterns and styles.

.

**UNIT:4 - Architectural patterns** **10 Hours**

Introduction; from mud to structure: Layers, Pipes and Filters, Blackboard. Distributed Systems: Broker; Interactive Systems: MVC, Presentation-Abstraction-Control.

**UNIT:5 - Adaptable Systems** **10 Hours**

Adaptable Systems: Microkernel; Reflection some design patterns: Structural decomposition: Whole – Part; Organization of work: Master – Slave; Access Control: Proxy.

## TEXT BOOKS / REFERENCES:

**TEXT BOOKS:**

1. Software Architecture in Practice - Len Bass, Paul Clements, Rick Kazman, 2nd Edition, Pearson Education, 2003.

2. Pattern-Oriented Software Architecture A System of Patterns, Volume 1 - Frank Buschmann, RegineMeunier, Hans Rohnert, Peter Sommerlad, Michael Stal, John Wiley and Sons, 2006.

3. Software Architecture- Perspectives on an Emerging Discipline - Mary Shaw and David Garlan, Prentice-Hall of India, 2007.

## ADDITIONAL LEARNING RESOURCES:

1. http://www.ibm.com/developerworks/websphere/library/techarticles/0306_perks/perks2.html
2. https://hedleyproctor.com/software-development-best-practices/
3. http://www.comentum.com/guide-to-web-application-development.html
4. http://www.tutorialspoint.com/developers_best_practices/
5. https://www.sans.org/reading-room/whitepapers/application/framework-secure-application-design-development-842
6. https://msdn.microsoft.com/en-us/library/aa260844(v=vs.60).aspx
7. https://www.owasp.org/index.php/OWASP_Secure_Coding_Practices

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<td colspan="2" align="center"><strong>Pre Requisites</strong></td>
</tr>
<tr>
<td colspan="3" align="center">MCA253</td>
<td colspan="3" align="center">Mobile Applications</td>
<td colspan="2" align="center">Java Programming</td>
</tr>
</table>

**COURSE ASSESSMENT METHOD:**

1. Internal Assessment [5 Events: 3 Written Tests, 2 Events ]   Marks: 50 [10* 5 Events]
2. Semester End Exam [ 100 Marks, 3 Hours]

**COURSE OUTCOMES:**

At the end of the course, the student will have the ability to,

<table>
<tr>
<td colspan="2" align="center"><strong>Course Outcomes</strong></td>
</tr>
<tr>
<td>CO1</td>
<td>Understand the Mobile Application architecture</td>
</tr>
<tr>
<td>CO2</td>
<td>Analyze the requirements for developing a mobile application.</td>
</tr>
<tr>
<td>CO3</td>
<td>Ability to design layouts, UI components and data persistence for mobile applications.</td>
</tr>
<tr>
<td>CO4</td>
<td>Ability to understand the complexity and design applications with data persistence.</td>
</tr>
<tr>
<td>CO5</td>
<td>Ability to implement mobile applications as per the requirement using Android SDK and Swift for iOS</td>
</tr>
</table>

**TOPICS COVERED:**

**Unit 1 – Android: Introduction, Activities, Fragments, Intents                08 Hours.**

<u>Getting started with Android</u>: What Is Android?  Android Versions, Features of Android, Architecture of Android,  Android Devices in the Market, The Android Market,  Obtaining the Required Tools,  Android Studio, Android SDK, Creating Android Virtual Devices (AVDs),  The Android Developer Community, Launching Your First Android Application.
<u>Understanding Activities</u>: Applying Styles and Themes to an Activity, Hiding the Activity Title, Displaying a Dialog Window, Displaying a Progress Dialog, <u>Linking Activities Using Intents</u> : Returning Results from an Intent, Passing Data Using an Intent Object, <u>Fragments</u>: Adding Fragments Dynamically, Life Cycle of a Fragment, Interactions Between Fragments, Understanding the Intent Object, Using Intent Filters, Displaying Notifications

**Unit 2 -  Android UI  Design                08 Hours.**

<u>Understanding the Components of a Screen</u>:  Views and ViewGroups, FrameLayout, LinearLayout (Horizontal) and LinearLayout (Vertical), TableLayout, RelativeLayout, FrameLayout, ScrollView. <u>Adapting to Display Orientation</u>: Anchoring Views. <u>Managing Changes to Screen Orientation</u>: Persisting State Information During Changes in Configuration, Detecting Orientation Changes, Controlling the Orientation of the Activity. <u>Utilizing the Action Bar</u>:  Adding Action Items to the Action Bar.  Creating the User Interface Programmatically, Listening for UI Notifications. <u>Using Basic Views</u>: TextView View, Button, ImageButton, EditText, CheckBox, ToggleButton,
RadioButton, and RadioGroup Views, ProgressBar View, AutoCompleteTextView View, <u>Using</u>

Picker Views: TimePicker View, DatePicker View. Using List Views to Display Long Lists: ListView View, Using the Spinner View. Understanding Specialized Fragments: Using a ListFragment, Using a DialogFragment, Using a PreferenceFragment.

**Unit 3 –Displaying Pictures & Menus with Views, Data Persistence          10 Hours**

Using Image Views to Display Pictures: ImageView View, ImageSwitcher, GridView. Using Menus with Views: Creating the Helper Methods, Options Menu, Context Menu, Using WebView, WebView. Saving and Loading User Preferences: Accessing Preferences Using an Activity, Programmatically Retrieving and Modifying the Preferences Values. Persisting Data to Files: Saving to Internal Storage, Saving to External Storage (SD Card), Choosing the Best Storage Option. Creating and Using Databases: Creating the DBAdapter Helper Class, Using the Database Programmatically. Sharing Data in Android. Using a Content Provider: Predefined Query String Constants, Projections, Filtering, Sorting. Creating Your Own Content Providers, Using the Content Provider.

**Unit 4 –SMS Messaging & Integration with other applications          08 Hours**

SMS Messaging: Sending SMS Messages Programmatically, Sending SMS Messages Using Intent, Receiving SMS Messages, Caveats and Warnings, Sending Email. Displaying Maps: Creating the Project, Obtaining the Maps API Key, Displaying the Map, Displaying the Zoom Control, Changing Views, Navigating to a Specific Location, Getting the Location That Was Touched, Geocoding and Reverse Geocoding, Getting Location Data, Monitoring a Location.

**Unit 5 - Introduction to IOS          08 Hours**

Introduction to iOS – iOS features – UI implementation – Touch frameworks – Data persistence using Core Data and SQLite – Location aware applications using Core Location and Map Kit – Integrating calendar and address book with social media application – Using Wi-Fi - iPhone marketplace. Swift Basics: Data types, constants, variables, expressions, functions and methods, Object oriented programming concepts.

| **TEXT BOOKS / REFERENCES:** |
| --- |

**Text Books:**
1. James Keogh. J2ME. The Complete Reference, Tata McGraw-Hill, 2003.
2. J. F. DiMarzio. Beginning Android® Programming with Android Studio, 4th Edition, Wrox Publications, 2017.
3. Neil Smyth. iOS 12 App Development Essentials – First Edition, Payload Media, Inc. 2018.

**Reference Books:**
1. Ian F. Darwin.  Android Cookbook - Problems and Solutions  for Android developers. 2nd Edition, O'Reilly Publications, 2017.
2. Neil Smyth.  Android Studio 3.0 Development Essentials Android 8 Edition, Payload Media, Inc. 2017.
3. Development: Exploring the iOS SDK", Apress, 2013.

| **ADDITIONAL LEARNING SOURCES:** |
| --- |

1.  http://developer.android.com/develop/index.html.
2.  https://www.w3adda.com/android-tutorial
3.  https://developer.apple.com/library/archive/referencelibrary/GettingStarted/DevelopiOSAppsSwift/
4.  https://www.w3schools.in/swift-tutorial/

| JSS Science and Technology University, Mysuru |||||||
|:---:|:---:|:---:|:---:|:---:|:---:|:---:|
| **Department of  Computer Applications [MCA]** |||||||
| **Course Year** | **Course Semester** | **Course Type** | **Credits** | **Contact Hours/ Week** || | **Total Hours/ Semester** |
| | | | | **Theory** | **Laboratory** | **Tutorials** | |
| I | II | Theory | 03 | 03 | 00 | 00 | 42 |
| **Course No** | | **Course Title** || | **Pre Requisites** |||
| MCA254 | | Image processing and Pattern Recognition ||| Mathematical Foundation |||

**COURSE ASSESSMENT METHOD:**

1.  Internal Assessment [5 Events: 3 Written Tests, 2 Events ]   Marks: 50 [10* 5 Events]

2.  Semester End Exam [ 100 Marks, 3 Hours]

**COURSE OUTCOMES:**

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

| Course outcomes ||
|:---:|:---|
| CO1 | Understand Basics of Image formation and transformation using sampling and quantization |
| CO2 | Understand different types signal processing techniques used for image sharpening and smoothing. |
| CO3 | Perform and apply compression and coding techniques used for image data |
| CO4 | Understand the nature and inherent difficulties of the pattern recognition problems. |
| CO5 | Understand concepts, trade-offs, and appropriateness of the different feature types and classification techniques such as Bayesian, maximum-likelihood, etc. |

**TOPICS COVERED:**

**Unit I: Introduction to Image Processing                                              8 Hours**

Fundamental Steps in Digital Image Processing, Elements of Visual Perception, Structure of the Human Eye, Image Formation in the Eye, Brightness Adaptation and Discrimination, Image Sensing and Acquisition, Image Sampling and Quantization, Some Basic Relationships Between Pixels, Linear and Nonlinear Operations.

**Unit II: Image Enhancement and Restoration                                      8 Hours**

Background image, Some Basic Gray Level Transformations, Histogram Processing, Enhancement Using Arithmetic/Logic Operations, Basics of Spatial Filtering, Smoothing Spatial Filters, Sharpening Spatial Filters, Combining Spatial Enhancement Methods, Image Restoration-Constrained and unconstrained restoration, Restoration in the Presence of Noise Only–Spatial Filtering.

**Unit III:  Color Image processing and  Segmentation                            9 Hours**

Color Fundamentals, Color Models, Pseudo color Image Processing **,** Basics of Full-Color Image Processing, Color Transformations, Smoothing and Sharpening, Color Segmentation, Noise in Color Images, Color Image Compression, Fundamental of segmentation, point, line and edge

detection, Thresholding, Region-based Segmentation.

**Unit IV:  Pattern Recognition** **8 hours**

Basics of pattern recognition, Design principles of pattern recognition system, Learning and adaptation, Pattern recognition approaches, Sensing, Segmentation and Grouping, Feature Extraction, Classification, Post Processing, Design Cycle, Learning and Adaptation.

**Unit V: Statistical Patten Recognition** **9 hours**

Bayesian Decision Theory, Classifiers, Normal density and discriminant functions, Parameter estimation methods: Maximum-Likelihood estimation, Bayesian Parameter estimation, Dimension reduction methods – Principal Component Analysis (PCA), Fisher Linear discriminate analysis, Expectation-maximization (EM), Hidden Markov Models (HMM),Gaussian mixture models.

**TEXT BOOKS / REFERENCES:**

**Text books:**

1. Digital Image Processing – Ganzalez and Wood, Addison Wesley, 1993.
2. Fundamental of Image Processing – Anil K.Jain, Prentice Hall of India.
3. Pattern Classification – R.O. Duda, P.E. Hart and D.G. Stork, Second Edition John Wiley, 2006

**Reference books:**

1. Digital Picture Processing – Rosenfeld and Kak, vol.I & vol.II, Academic,1982
2. An Introduction to Digital Image Processing – Wayne Niblack, Prentice Hall, 1986
3. Pattern Recognition and Machine Learning – C. M. Bishop, Springer, 2009.
4. Pattern Recognition – S. Theodoridis and K. Koutroumbas, 4th Edition, Academic Press,2009

**ADDITIONAL LEARNING SOURCES:**

1. Computer Vision – Ballard and Brown, Prentice Hall, 1982
2. Pattern Recognition – S. Theodoridis and K. Koutroumbas, 4th Edition, Academic Press,2009

| | JSS Science and Technology University, Mysuru<br>Department of Computer Applications [MCA] | | | | | | |
|---|---|---|---|---|---|---|---|

| Course<br>Year | Course<br>Semester | Course<br>Type | Credits | Contact Hours/ Week | | | Total<br>Hours/<br>Semester |
|---|---|---|---|---|---|---|---|
| | | | | Theory | Laboratory | Tutorials | |
| I | II | Theory | 03 | 03 | 00 | 00 | 42 |

| Course No | Course Title | Pre Requisites |
|---|---|---|
| MCA261 | Cryptography and Network Security | Computer Networks |

**COURSE ASSESSMENT METHOD:**

1. Internal Assessment [5 Events: 3 Written Tests, 2 Events] Marks: 50 [10* 5 Events]

2. Semester End Exam [ 100 Marks, 3 Hours]

**COURSE OUTCOMES:**

Upon successful completion of this course, the student will be able to:

| Course Outcomes | |
|---|---|
| CO1 | Understanding the fundamental concept of Cryptography. |
| CO2 | Apply various public key cryptography techniques. |
| CO3 | Implementation of Hashing and Digital Signature techniques. |
| CO4 | Understand the various Network Security Applications. |
| CO5 | Implementation of various system level security applications. |

**Topics Covered:**

**UNIT - I     Introduction                                                                                     9 hours**

OSI Security Architecture, Security attacks, ,Security Services, Security Mechanisms, Model for Network Security, Fundamentals of Abstract Algebra : Groups, Rings, Fields, Modular  Arithmetic, Euclidean Algorithm, Finite Fields of the form GF(p),Polynomial Arithmetic, Finite Fields of the form GF(2n),Classical Encryption techniques, Block Ciphers and Data Encryption Standard.

**UNIT - II     Advanced Encryption Standard                                              9 hours**

Multiple Encryption and Triple DES, Block Cipher Modes of operation, Stream Ciphers and RC4, Confidentiality using Symmetric Encryption, Introduction to Number Theory: Prime Numbers, Fermat's and Euler's Theorems, Testing for Primarily, The Chinese Remainder Theorem, Discrete Logarithms, Public-Key Cryptography and RSA.

**UNIT - III   Key Management                                                                      8 hours**

 Diffie-Hellman Key Exchange, Elliptic Curve Arithmetic, Elliptic Curve Cryptography, Message Authentication and Hash Functions, Hash and MAC Algorithms Digital Signatures and Authentication Protocols.

**UNIT IV   Network security                                                                       9 hours**

At application layer – Email, PGP, S/MIME. At transport layer – SSL architecture, handshake protocol, changecipherspec protocol, Alert protocol, Record protocol, SSL message format, Transport layer security. At network layer – modes, security protocols, security associations,

security policy, Internet key exchange, ISAKMP.

**UNIT V    System level security**                                                **7 hours**

Intrusion detection - password management - Viruses and related Threats - Firewall Design Principles - Trusted Systems, Authentication Tokens, Smart Cards, Biometrics, Digital cash.

**Text Books/ References:**

**Text Books:**

1. Behrouz A. Forouzan, "Cryptography and Network Security", Tata McGraw-Hill Publishing.
2. Manuel Mogollon, "Cryptography and Security Services – Mechanisms and Applications", Cybertech Publishing.
3. William R. Cheswick, Steven M. Bellovin, Aviel D. Rubin, "Firewalls and Internet Security",Addison-Wesley.

**Additional Resource :**

1. williamstallings.com/Extras/Security-Notes/.
2. www.cs.bilkent.edu.tr/~selcuk/teaching/cs519/.
3. http://freevideolectures.com/Course/3027/Cryptography-and-Network-Security
4. http://cs.brown.edu/courses/csci1510/2013_lectures.html.

| JSS Science and Technology University, Mysuru. Department of Master of Computer Applications [MCA] | | | | | | | |
|---|---|---|---|---|---|---|---|

<table>
<tr><td rowspan="2"><b>Course Year</b></td><td rowspan="2"><b>Course Semester</b></td><td rowspan="2"><b>Course Type</b></td><td rowspan="2"><b>Credits</b></td><td colspan="3"><b>Contact Hours/ Week</b></td><td rowspan="2"><b>Total Hours/ Semester</b></td></tr>
<tr><td><b>Theory</b></td><td><b>Laboratory</b></td><td><b>Tutorials</b></td></tr>
<tr><td>I</td><td>II</td><td>Elective</td><td>03</td><td>03</td><td>00</td><td>00</td><td>42</td></tr>
</table>

| Course No | Course Title | Pre Requisites |
|---|---|---|
| MCA262 | Software Project Management Practices | MIS,SE,ST,ERP,BI |

**COURSE ASSESSMENT METHOD:**

1. Internal Assessment [5 Events: 3 Written Tests, 2 Events ]   Marks: 50 [10* 5 Events]

2. Semester End Exam [ 100 Marks, 3 Hours]

**COURSE OUTCOMES:**

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

| COURSE OUTCOMES | |
|---|---|
| **CO1** | Understand software project basics & approaches. |
| **CO2** | Formulate to initiation techniques. |
| **CO3** | Implement effective project planning & scheduling. |
| **CO4** | Design Project execution & execution control strategies |
| **CO5** | Effective closure of the project & agile project management. |

**TOPICS COVERED:**

**UNIT 1 - Software Project Basics**                                                  **08 Hours**

Introduction, Types of Software Projects, Classifications of Software Projects, Based on Software Development Life Cycle, Approach Driven, Maintenance, Web Application, Agile Development, Conclusion
Approaches to Software Project Management: Alignment of Software Engineering Methodology with Project Management Methodology, The Ad Hoc Methods-Based Approach, The Process-Driven Approach, So, What Is the Right Approach?, The Ad Hoc Approach, The Process-Driven Approach, But Is a Process-Driven Approach the Right Choice?, In a Process-Driven Approach: What Process and How Much?
Software Project Acquisition: From an External Client, The Request for Proposal, The Proposal, Negotiation, Contract Acceptance, From an Internal Client, The Feasibility Study, Preparing the Proposal, Finalizing the Proposal, Reference.

**UNIT 2 - Software Project Initiation**                                              **09 Hours**

Introduction, Initiation Activities, Project Management Office-Level Activities, Identifying the Software Project Manager, Preparing/Handing Over the Project Dossier to the Software Project Manager, Coordinating Allocation of Project Resources, Assisting the Software Project Manager in Obtaining Necessary Service Level, Agreements from Departments in the Organization, Assisting the Software Project Manager with the Project Kickoff Meeting, Software Project Manager-Level Activities, Ensuring that Project Specifications Are Complete, Reviewing Estimates and Revisions/Updates of

Estimates, Identifying Necessary Resources and Raising Requests, Preparing Project Plans, Setting Up the Development Environment, Arranging for Project-Specific Skill Training, Organizing the Project Team, Training the Project Team on the Project Plans, Conducting a Project Kickoff Meeting, Arranging for a Phase-End Audit, Common Pitfalls in Project Initiation, Identifying the Wrong Software Project Mana, Identifying Inappropriate Resources, Incurring Delays in Software Project Initiation Activities.

## UNIT 3 - Software Project Planning                                    08 Hours

Introduction, Planning Defined, Plans Prepared in Software Project Management, The Project Management Plan, Resources, Skill Sets, Computer Systems, Project Management Method, The Configuration Management Plan, Naming Conventions, Change Management, The Quality Assurance Plan, The Schedule Plan, The Induction Training Plan, The Risk Management Plan, The Build Plan, The Deployment Plan, The User Training Plan, The Handover Plan, The Software Maintenance Plan, The Documentation Plan, Roles in Planning.
Scheduling: Introduction, The Initial Work Breakdown Structure, A Work Breakdown Structure with Predecessors Defined, A Work Breakdown Structure with Initial Dates, A Work Breakdown Structure with Resource Allocation, Scheduling in Practice, Graphic Representation of a Schedule

## UNIT 4 - Software Project Execution                                    08 Hours

Introduction, Work Management, Work Registers, De-allocation, Configuration Management, Information Artifacts, Code Artifacts, Configuration Registers, Configuration Management Tools, Quality Management, Verification Techniques, Validation Techniques, Product Testing, Allocation of Quality Assurance Activities, Productivity Management, Stakeholder Expectations Management, Product Integration Management.
Software Project Execution Control: Introduction, Aspects of Control in Project Execution, Scope Control, Cost Control, Schedule/Progress Control, Quality Control, Effort Control, Productivity Monitoring, Control Mechanisms, Progress Assessment: Earned Value Analysis.

## UNIT 5 - Software Project Closure                                    09 Hours

Introduction, Identifying Reusable Code Components, Documenting the Best Practices, Documenting the Lessons Learned, Collecting/Deriving and Depositing the Final Project Metrics in the Organizational, Knowledge Repository, Conducting Knowledge-Sharing Meetings with Peer Software Project Managers, Depositing Project Records with the Project Management Office, Depositing Code Artifacts in the Code Repository, Conducting the Project Postmortem, Releasing the Software Project Manager, Closing the Project, The Role of the Organization in Project Closure, The Project Management Office, The Configuration Control Board, The Systems Administration Department, Reference.
Agile Project Management: Introduction, Project Management Roles, Agile Project Management Characteristics, Metaphor,Teamwork and Collaboration, Guiding Principles, Open Information, Use a Light Touch, Monitoring and Adjustment, The Nuts and Bolts of Agile Project Management, Planning the Work, Controlling the Work, Process Improvement, Reference.

## TEXT BOOKS / REFERENCES:

**Text books:**

1. Mastering Software Project Management: Best Practices, Tools and Techniques, Murali Chemuturi, Thomas M. Cagley, J. Ross Publishing, 2010,

**Reference books:**

1. IT Project MAnagement – On track from Start to Finish", Book by Joseph Phillips, 2002.
2. Managing the unmanageable  by Mantle and Lichty, 2012.

3. Making Things Happen: Mastering Project Management by Scott Berkun, 2008.

**ADDITIONAL LEARNING SOURCES:**

1. https://www.tutorialspoint.com/software_engineering/software_project_management.htm
2. http://searchsoftwarequality.techtarget.com/tutorials/Software-Project-Management-Process

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|---|---|---|---|---|---|---|---|
| **Course Year** | **Course Semester** | **Course Type** | **Credits** | **Contact Hours/ Week** | | | **Total Hours/ Semester** |
| | | | | **Theory** | **Laboratory** | **Tutorials** | |
| I | II | Elective | 03 | 03 | 00 | 00 | 42 |

| **Course No** | **Course Title** | | **Pre Requisites** |
|---|---|---|---|
| MCA263 | Digital Marketing | | -- |

**COURSE ASSESSMENT METHOD:**

1. Internal Assessment [5 Events: 3 Written Tests, 2 Events ]   Marks: 50 [10* 5 Events]
2. Semester End Exam [ 100 Marks, 3 Hours]

**COURSE OUTCOMES:**

Upon successful completion of this course, students will be able to :

| Course Outcomes | |
|---|---|
| CO1 | Demonstrate the understanding marketing through the internet |
| CO2 | Demonstrate SEM and promotions using digital marketing communications |
| CO3 | Use of SWOT analysis and designing  digital marketing for Indian market |
| CO4 | Demonstrate competency in digital Entrepreneurship. |
| CO5 | Demonstrate digital business design , value proposition and competitive advantage |

**TOPICS COVERED:**

**UNIT 1 – Understanding marketing through the internet**      **10 Hours**

 Definition of digital marketing; origin of digital Marketing, Traditional VS Digital Marketing.  Digital marketing tools/e-tools; the online marketing matrix including business and Consumer markets; the online customer.  Interactive order processing: choosing a supplier; selecting a product; check stock Availability; placing order; authorization of payment; input of data; data transfer; Order processing; online confirmation and delivery information; tracking of order; Delivery; data integrity and security systems;

**UNIT2– Use the internet for promotion using digital marketing Communications**   **8 Hours**

 Search engine marketing (SEM): definition of SEM, definition of search engine Optimization (SEO); advantages and disadvantages of SEO; best practice in SEO. Paid search engine marketing, pay per click advertising (PPC); landing pages; long Tail concept; geo-targeting e.g. Google Ad Words; opt in email and email Marketing .

**UNIT 3 - Design a Digital Marketing plan**      **8 hours**

Design digital marketing plan, SWOT, situational analysis, key performance Indicators in internet marketing, Digital Landscape, P-O-E-M Framework.  Segmenting and Customizing Messages. Digital Advertising Market in India.

**UNIT 4 – Digital Entrepreneurship**                                              **8 Hours**

Definition of Digital Entrepreneurship and Digital Entrepreneurs. New Opportunities and Challenges. Reasons for entrepreneurs to turn into Digital Entrepreneurs. Entrepreneurship and Digital entrepreneurship – Difference and pillars of Digital Entrepreneurship. Reducing Barriers to Entrepreneurship in the digital era and the New entrepreneurial challenges in the digital era. The role of Market Orientation in Digital Entrepreneurship, Importance of Digital Entrepreneurship and ways Digital Entrepreneurship can be encouraged

**UNIT5  - Digital Business Design and Value Proposition**                          **8  Hours**

Definition of Digital Business Design, types of Digital Business and the importance of Digital Business Design for Digital Entrepreneurs. Preparing for the Digital Revolution.  Value Proposition, Describing the purpose of Digital Business and Competitive advantage versus alternatives. The ABC's of Digital Business Design ,   the Acquisition, Behavior Conversion Process

**TEXT BOOKS / REFERENCES:**

**TEXT BOOKS :**
  1. Digital Marketing  - Beema Gupta (IIM-B)
  2. Digital Marketing: Strategy, Implementation & Practice - Dave Chaffey & Fiona EllisChadwick
  3. Entrepreneurship & Small Business- Start –Up, Growth & Maturity, - Third Edition, Paul burns Palgrave Macmillan
  4. Product Management – Donald R.Lehaman, Russel.s. Winer, Tata McGrawhill edition

**REFERENCE BOOKS :**

  1. Understanding Digital Marketing: Marketing Strategies for Engaging the Digital Generation -Damian Ryan and Calvin Jones
  2. Entrepreneurship– Successfully launching new ventures – Third edition – Bruce R. Bar ringer, R. Duane Ireland – Pearson

**ADDITIONAL LEARNING SOURCES:**

  1. https://iide.co/blog/digital-marketing-course
  2. https://www.imarticus.org/Digital-Marketing

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|---|---|---|---|---|---|---|---|
| **Course Year** | **Course Semester** | **Course Type** | **Credits** | **Contact Hours/ Week** | | | **Total Hours/ Semester** |
| | | | | **Theory** | **Laboratory** | **Tutorials** | |
| I | II | Elective | 03 | 03 | 00 | 00 | 42 |

| **Course No** | **Course Title** | **Pre Requisites** |
|---|---|---|
| MCA264 | NoSQL | RDBMS |

## COURSE ASSESSMENT METHOD:

1. Internal Assessment [5 Events: 3 Written Tests, 2 Events ]   Marks: 50 [10* 5 Events]
2. Semester End Exam [ 100 Marks, 3 Hours]

## COURSE OUTCOMES:

Upon successful completion of this course, students will be able to :

| **Course Outcomes** | |
|---|---|
| **CO1** | Demonstrate competency in describing how NoSQL databases differ from relational databases from a theoretical perspective. |
| **CO2** | Demonstrate competency in designing NoSQL database management systems |
| **CO3** | Use of a number of NoSQL databases to store and retrieve data and perform aggregation functions |
| **CO4** | Demonstrate competency in selecting a particular NoSQL database for different applications. |
| **CO5** | Execute various CRUD operations with MongoDB. |

## TOPICS COVERED:

**UNIT 1 – An Overview and Characteristics of NoSQL**       **10 Hours**
Introduction to NoSQL : An Overview of NoSQL , Defining NoSQL, History, What NoSQL is and what it is not, Why NoSQL?, List of NoSQL Databases. Characteristics of NoSQL: Application, RDBMS approach, Challenges, NoSQL approach.

**UNIT 2 – NoSQL Storage Types**       **8 Hours**
Modifying and managing NOSQL, Data stores, Indexing and ordering datasets (MongoDB/ CouchDB / Cassandra) NoSQL Storage Types : Storage types, Column-oriented databases,

**UNIT 3 – NoSql  Databases**       **8 Hours**
Document store, key-value store, graph store, multi-storage type databases, comparing the models.

**UNIT 4 – CRUD operations and Applications**       **8 Hours**
Advantages and Drawbacks : Transactional application, Computational application, Web-scale application. Performing CURD operations : Creating records, accessing data, updating and deleting data.

**UNIT 5 - Querying NoSQL**                                                                8 Hours

Querying NoSQL stores : similarities between NoSQL and MongoDB query features. Managing data stores and managing evolutions.

**TEXT BOOKS / REFERENCES:**

**TEXT BOOKS :**
1. Shanshank Tiwari "Professional NOSQL", WROX Press, 2011
2. Pramod.J.Sadalage and Martin Fowler, "NoSQL Distilled : A Brief guide to the emerging world of polygot persistence", Pearson Education corporation, I Edition, 2014.

**REFERENCE BOOKS :**
1. The definitive guide to MONGODB, The NOSQL Database for cloud and desktop computing, Apress 2010.

**ADDITIONAL LEARNING SOURCES:**

1. https://www.mongodb.com/nosql-explained
2. http://www.dbta.com/Editorial/Trends-and-Applications/NoSQL-for-the-Enterprise-80198.aspx
3. http://www.oracle.com/technetwork/database/databasetechnologies/nosqldb/overview/index.html

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|---|---|---|---|---|---|---|---|
| **Course Year** | **Course Semester** | **Course Type** | **Credits** | **Contact Hours/ Week** | | | **Total Hours/ Semester** |
| | | | | **Theory** | **Laboratory** | **Tutorials** | |
| I | II | Laboratory | 01 | 00 | 02 | 00 | 32 |
| **Course No** | | **Course Title** | | | | **Pre Requisites** | |
| MCA21L | | Relational Database Management System Laboratory | | | | Data Structures | |

**COURSE ASSESSMENT METHOD:**

Internal Assessment [Test-1+ Test-2 + Observation book + Record + Viva: 15 + 15 + 05 + 05 +10 = 50 Marks]

**COURSE OUTCOMES:**

Upon successful completion of this course, students will be able to:

| **Course Outcomes** | |
|---|---|
| CO1 | Master the basic concepts of data models, modeling notations, SQL and construct queries in SQL. |
| CO2 | Design and implement a database schema for given problem. |
| CO3 | Formulate queries using SQL DML/DDL/DCL commands. |
| CO4 | Apply the normalization techniques for development of application software to realistic problems. |
| CO5 | Design and build a simple database system and demonstrate the competence with the fundamental tasks involved with Modeling, Design and Implementing a RDBMS. |

**List of Programs:**

1. Consider the following relations:
Student (snum: integer, sname: string, major: string, level: string, age: integer)
Class (name: string, meets at: string, room: string, d: integer)
Enrolled (snum: integer, cname: string)
Faculty (fid: integer, fname: string, deptid: integer)
The meaning of these relations is straightforward; for example, Enrolled has one record per student-class pair such that the student is enrolled in the class. Level is a two character code with 4 different values (example: Junior: JR etc)
Write the following queries in SQL. No duplicates should be printed in any of the answers.
- Find the names of all Juniors (level = JR) who are enrolled in a class taught by Prof. XYZ
- Find the names of all classes that either meet in room R128 or have five or more Students enrolled.
- Find the names of all students who are enrolled in two classes that meet at the same time.

- Find the names of faculty members who teach in every room in which some class is taught.
- Find the names of faculty members for whom the combined enrollment of the courses that

they teach is less than five.

2. The following relations keep track of airline flight information:
Flights (no: int, from: string, to: string, distance: int, Departs: time, arrives: time, price:real)
Aircraft (aid: integer, aname: string, cruisingrange: integer)
Certified (eid: integer, aid: integer)
Employees (eid: integer, ename: string, salary: integer)
Note that the Employees relation describes pilots and other kinds of employees as well; certified for some aircraft, and only pilots are certified to fly.
Write each of the following queries in SQL.
- Find the names of aircraft such that all pilots certified
- Find the names of aircraft such that all pilots certified to operate have salaries more than Rs.80, 000.
- For each pilot who is certified for more than three aircrafts, find the eidand the maximum cruising range of the aircraft for which she or he is certified.Find the names of pilots whose salary is less than the price of the cheapest route from Bengaluru to Frankfurt. For all aircraft with cruising range over 1000 Kms, .Find the name of the aircraft and the average salaryof all pilots certified for this aircraft.
- Find the names of pilots certified for some Boeing aircraft.
- Find the aids of all aircraft that can be used on routes from Bengaluru to New Delhi.

3. Consider the following database of student enrollment in courses & books adopted for each course.
STUDENT (regno: string, name: string, major: string, bdate:date)
COURSE (course #:int, cname:string, dept:string)
ENROLL ( regno:string, course#:int, sem:int, marks:int)
BOOK _ ADOPTION (course# :int, sem:int, book-ISBN:int)
TEXT (book-ISBN:int, book-title:string, publisher:string, author:string)

- Create the above tables by properly specifying the primary keys and the foreign keys.
- Enter at least five tuples for each relation.
- Demonstrate how you add a new text book to the database and make this book be adopted by some Department.
- Produce a list of text books (include Course #, Book-ISBN, Book-title) in the alphabetical order for Courses offered by the 'CS' department that use more than two books.
- List any department that has all its adopted books published by a specific publisher.
- Generate suitable reports.
- Create suitable front end for querying and displaying the results.

4. The following tables are maintained by a book dealer.
AUTHOR (author-id:int, name:string, city:string, country:string)
PUBLISHER (publisher-id:int, name:string, city:string, country:string)
CATALOG (book-id:int, title:string, author-id:int, publisher-id:int, category-id:int, year:int, price:int)
CATEGORY (category-id:int, description:string)
ORDER-DETAILS (order-no:int,book-id:int, quantity:int)
- Create the above tables by properly specifying the primary keys and the foreign keys.
- Enter at least five tuples for each relation.
- Give the details of the authors who have 2 or more books in the catalog and the price of the books is greater than the average price of the books in the catalog and the year of publication is after 2000.
- Find the author of the book which has maximum sales.
- Demonstrate how you increase the price of books published by a specific publisher by 10%.
- Generate suitable reports.
- Create suitable front end for querying and displaying the results.

5. Consider the following database for a banking enterprise
BRANCH(branch-name:string, branch-city:string, assets:real)
ACCOUNT(accno:int, branch-name:string, balance:real)
DEPOSITOR(customer-name:string, accno:int)
CUSTOMER(customer-name:string, customer-street:string, customer-city:s
LOAN(loan-number:int, branch-name:string, amount:real)
BORROWER(customer-name:string, loan-number:int)

- Create the above tables by properly specifying the primary keys and the foreign keys
- Enter at least five tuples for each relation
- Find all the customers who have at least two accounts at the Main branch.
- Find all the customers who have an account at all the branches located in a specific city.
- Demonstrate how you delete all account tuples at every branch located in a specific city.
- Generate suitable reports also suitable front end for querying and displaying the results.

## TEXT BOOKS / REFERECES

**TEXT BOOKS :**

1. "Database System Concepts", A.Silberschatz, Henry.F.Korth, S.Sudharshan, $6^{th}$ Edition.
2. "Database Systems", Ramez Elmasri, Shamkant.B.Navathe, $6^{th}$ Edition.

**REFERENCE BOOKS:**

1. "Database Management Systems", Raghu Ramakrishnan and J Gehrke $3^{rd}$ Edition
2. "An Introduction to Database System" C.J.Date , AKannan, S..Swamynathan $8^{th}$ Edition

## ADDITIONAL LEARNING SOURCES:

1. www.tutorialspoint.com/sql/sql-rdbms-concepts.htm

2. nptel.ac.in/courses/106106093/6

3. msdis.missouri.edu/resources/gis_advanced/pdf/relational.pdf

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## Department of Computer Applications [MCA]

| Course Year | Course Semester | Course Type | Credits | Contact Hours/ Week | | | Total Hours/ Semester |
|---|---|---|---|---|---|---|---|
| | | | | Theory | Laboratory | Tutorials | |
| I | II | Laboratory | 01 | 00 | 02 | 00 | 32 |

| Course No | Course Title | Pre Requisites |
|---|---|---|
| MCA22L | Java and J2EE Laboratory | |

**COURSE ASSESSMENT METHOD:**

1. Internal Assessment [5 Events: 2 Lab Tests, Viva-voce + Record + Observation]
   Marks: 50 [15+15+10+5+5]

**COURSE OUTCOMES:**

At the end of the course, the student will have the ability to,

| Course Outcomes | |
|---|---|
| CO1 | Understand and implement basic Java and OOP Concepts |
| CO2 | Understand and implement error free and efficient Java programs using exceptions and multithreading |
| CO3 | Implement database applications using JDBC |
| CO4 | Write Server side applications using Servlets by demonstrating different concepts of Servlets |
| CO5 | Design and develop web applications using different concepts of JSP. |

**CONCEPTS TO BE IMPLEMENTED:**

1. Different programs on basic constructs of Java using IF, Switch, While, For and Do While loops, access modifiers and their usage.
2. Programs on Class-objects, Constructors, Method and Constructor overloading, Pass by value and pass by reference, Static binding, Dynamic binding.
3. Programs on different OOP concepts like, inheritance and different types of inheritance, abstraction, polymorphism, interfaces and various ways of hiding implementation.
4. Writing effective programs in Java using exception handling, simple try-catch, single try and different catch, nested try catch statements, try-catch-finally etc.
5. Different programs of multithreading in Java with demonstration of thread life cycle.
6. Implementation of threads using Thread Class and Runnable interface.
7. Creating a static web page using HTML
8. Write a JDBC program to establish connection to a Database, INSERT, UPDATE, DELETE records to the Database using Statement Object
9. Write a JDBC program to INSERT, UPDATE, DELETE records to the Database using

PrepareStatement Object

10. Write a JDBC program to INSERT, UPDATE, DELETE records to the Database using Statement Object With Batch Insert

11. Write a JDBC program to INSERT, UPDATE, DELETE records to the Database using PrepareStatement Object with Batch Insert.

12. Write a servlet program to display hello world, to generate a plain text and HTML output.

13. Write a servlet program to generate lottery numbers, to demonstrate single thread model.

14. Write a servlet program to read three parameters from form Data , read all data from form data, demonstrate response header

15. Write a servlet program to show request header, display number of visitors visited the page.

16. Write a servlet program to handle cookies, demonstrate session tracking, simple Login application using HTML, MySQL, Servlet and Web-XML.

17. Create a simple User Registration application using HTML, MySQL, Servlet and Web-XML.

18. Write a Servlet program to generate a output in different MIMEs (Excel, HTML, PDF etc.)

19. Write a JSP program to read three parameters from another JSP page and display, display Sales entry information, test the background color of the page, generate access counter.

20. Write a JSP program which conditionally generates a spreadsheet, Plug in Applet, string bean

21. Write a program to create a Excel sheet using JSP, Bean sheet using, create a reusable footer using JSP

22. Write a program to count the shared counts using JSP, include files using JSP, generate the wishes for the day based on time.

23. Write a JSP program to generate random numbers, generate an order confirmation by taking the order details from the user.

24. Write a JSP program which should compute the speed.

25. Create a simple application using JSP, Servlets, JDBC, MIME, Java Bean and MySQL to accept the details from the student and display the marks list for the student with grade (Reference – your previous semester marks card)

26. Create a simple Sales force application, which should accept the details of Sales person and their target. Upon achieving the target issue a bonus to be added to their salary slip. Use JSP, Servlet and JDBC with MySQL Database.

## TEXT BOOKS / REFERENCES:

**Text Books:**

1. Herbert Schildt. Java - The Complete Reference, Ninth Edition. Oracle Press, McGraw Hill Education (India) Edition- 2014.

2. Java 6 Programming Black Book, Dreamtech Press. 2012 (Chapter 17,18,19,20,21,22,27,28, 29,30).

3. Marty Hall, Larry Brown. Core Servlets and Java Server Pages. Volume 1: Core Technologies.

Second Edition. (Chapter 3,4,5,6,7,8,9,10,11,12,13,14).

**Reference Books:**

1. Timothy Budd, "Understanding Object-oriented programming with Java", Updated Edition, Pearson Education, 2000.

2. Cay S. Horstmann, Gary Cornell. Core Java, Core Java Volume-1 – Fundamentals, 9$^{th}$ edition, Pearson Education, 2014.

**ADDITIONAL LEARNING SOURCES:**

1. http://www.javaworld.com/
2. http://www.learnjavaonline.org/
3. https://www.codecademy.com/learn/learn-java
4. http://www.tutorialspoint.com/java/
5. www.j2eetutorials.50webs.com
6. www.docs.oracle.com/javaee/6/tutorial/doc/
7. www.tutorialspoint.com/listtutorials/java/j2ee/1
8. www.coderanch.com/t/534906/EJB-JEE/java/Tutorial-EE-Beginners
9. http://w3schools.invisionzone.com/index.php?showforum=52