



**DEPARTMENT OF COMPUTER SCIENCE  
KAKATIYA UNIVERSITY, WARANGAL  
MCA (2-Year) COURSE STRUCTURE UNDER CBCS  
WITH EFFECT FROM 2020-21**

**MCA I YEAR I SEMESTER:**

Paper No	Paper Title / Subject	Workload Per week (Theory : Lab)	M A R K S			Credits
			Internal	External	Total	
MCA111	C and Data Structures	T ( 4 )	20	80	100	4
MCA112	Operating Systems	T ( 4 )	20	80	100	4
MCA113	Java Programming	T ( 4 )	20	80	100	4
MCA114	Computer Networks	T ( 4 )	20	80	100	4
MCA115	Probability and Statistical Methods	T ( 4 )	20	80	100	4
MCA116	C and Data Structures Lab	L ( 4 )	--	50	50	2
MCA117	Operating Systems Lab	L ( 4 )	--	50	50	2
MCA118	Java Programming Lab	L ( 4 )	--	50	50	2
<b>Grand total (Marks and Credits)</b>					<b>650</b>	<b>26</b>



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**MCA I YEAR II SEMESTER:**

Paper No	Paper Title / Subject	Workload Per week (Theory : Lab)	M A R K S			Credits
			Internal	External	Total	
MCA121	Python Programming	T ( 4 )	20	80	100	4
MCA122	Database Management Systems	T ( 4 )	20	80	100	4
MCA123	Software Engineering	T ( 4 )	20	80	100	4
MCA124	Cryptography and Network Security	T ( 4 )	20	80	100	4
MCA125	Principles and Practice of Management	T ( 4 )	20	80	100	4
MCA126	Python Programming lab	L ( 4 )	--	50	50	2
MCA127	DBMS Lab	L ( 4 )	--	50	50	2
MCA128	Software Engineering Lab	L ( 4 )	--	50	50	2
<b>Grand total (marks and credits)</b>					<b>650</b>	<b>26</b>

<b>MCA111</b>	<b>C and Data Structures</b>		<b>CDS</b>
<b>WORK LOAD: 4 PPW</b>	<b>Credits:4</b>	<b>INTERNAL MARKS: 20</b>	<b>EXTERNAL MARKS: 80</b>

### UNIT-I

**Introduction to Computers:** Computer Systems, Computing Environments, Computer Languages, Creating and running programs, Algorithms, Pseudo code, flow charts, **Introduction to C Language:** Background, Simple C programs, Identifiers, Basic data types, Variables, Constants, Input / Output, Operators. Expressions, Precedence and Associativity, Expression Evaluation, Type conversions, operators.

**Statements:** if and switch statements, Repetition statements – while, for, do-while statements, Loop examples, other statements related to looping – break, continue, go to

### UNIT-II

**Designing Structured Programs:** Functions, basics, user defined functions, inter function communication, Scope, Storage classes-auto, register, static, extern, scope rules, recursion- recursive functions, Pre-processor commands

**Arrays and Strings:** Concepts, using arrays in C, inter function communication, array applications, two – dimensional arrays, C Strings, String Input / Output functions, arrays of strings, string manipulation functions.

**Pointers:** Introduction to Pointers, Pointers for inter function communication, pointers to pointers, memory allocation functions, array of pointers, command –line arguments.

**Derived Types:** Structures – Declaration, definition and initialization of structures, accessing structures, and nested structures, arrays of structures, structures and functions, pointers to structures, self-referential structures, unions, typedef, and enumerated types.

### UNIT-III

**Input and Output:** Concept of a file, streams, input / output functions, text files and binary files, file input / output operations.

**Sorting and Searching:** selection sort, bubble sort, insertion sort, linear and binary search methods.

**Data Structures:** Introduction to Data Structures, abstract data types, Linear list – singly linked list implementation, insertion, deletion and searching operations on linear list, Stacks-Operations, array and linked representations of stacks, stack applications,

### UNIT-IV

Queues-operations, array and linked representations, Introduction to Trees: Binary Trees – Binary Tree Traversals – Expression Trees – General Trees, Binary Search Tree-traversals Algorithms, Graphs : Graph Storage Structures – Graph Traversals.

### TEXTBOOKS:

1. C Programming & Data Structures, B.A.Forouzan and R.F. Gilberg, Cengage Learning.
2. The C Programming Language, B.W. Kernighan and Dennis M.Ritchie, PHI/Pearson Education

### REFERENCES:

1. C for Engineers and Scientists, H.Cheng, Mc.Graw-Hill International Edition
2. Data Structures using C – A.M.Tanenbaum, Y.Langsam, and M.J. Augenstein, Pearson Education / PHI
3. C Programming & Data Structures, P. Dey, M Ghosh R Thereja, Oxford University Press
4. Problem Solving and Program Design in C, J.R. Hanly and E.B. Koffman, 5th Edition, Pearson Education

<b>MCA112</b>	<b>Operating Systems</b>		<b>OS</b>
<b>WORK LOAD: 4 PPW</b>	<b>Credits: 4</b>	<b>INTERNAL MARKS: 20</b>	<b>EXTERNAL MARKS: 80</b>

#### **UNIT -I**

**Introduction:** Operating System Structure- Layered structure, system components, operating system functions, Classification of Operating Systems- Batch, Time-sharing, Real-Time Systems, Multiuser Systems, Multi-Processor System, Distributed Systems , Operating System services, System Boot, System Calls, Kernels, Virtualization

**Process Management:** Process concepts, Process State, Process Control Block (PCB), Cooperating Processes, and Inter Process Communication: Shared Memory, Message Passing, and Multithreaded Programming.

**System call interface for process management:** fork, exit, wait, waitpid, exec

#### **UNIT- II**

**CPU Scheduling:** Scheduling Criteria, Scheduling Algorithms, Multiple-Processor Scheduling, **Process Synchronization:** Principle of Concurrency, Producer / Consumer Problem, Mutual Exclusion, Critical Section Problem, Peterson's solution, Semaphores, Classical Problem in Concurrency- Bounded-Buffer Problem, Readers-Writers Problem, Dining Philosopher Problem, Sleeping Barber Problem **Deadlock:** System model, Deadlock characterization, Prevention, Avoidance and detection, Recovery from deadlock

#### **UNIT -III**

**Memory Management:** Swapping, Multiprogramming with fixed partitions, dynamic partitions, Paging, Segmentation, Virtual Memory Concepts, Demand Paging, Page fault, Page Replacement Algorithms, Thrashing. Cache memory organization, Locality of reference

#### **UNIT- IV**

**Storage Management:** File System: File attributes, File operations, Access Methods, Directory Implementation, Allocation Methods, Free-Space Management, and Recovery

I/O Management and Disk Scheduling: I/O devices, and I/O subsystems, I/O buffering, Disk storage and disk scheduling, RAID

#### **TEXTBOOKS:**

1. Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 9th Edition, John Wiley
2. Advanced programming in the UNIX environment, W.R.Stevens, Pearson education.

#### **REFERENCES:**

1. Sibsankar Halder and Alex A Arvind, "Operating Systems", Pearson Education.
2. Harvey M Dietel, "An Introduction to Operating System", Pearson Education.
3. William Stallings, "Operating Systems: Internals and Design Principles", 6th Edition, Pearson Education.
4. Harris, Schaum's Outline Of Operating Systems, McGraw Hill
5. Operating Systems – Internals and Design Principles Stallings, 5th Edition–2005, Pearson Education/PHI
6. Operating System A Design Approach-Crowley, TMH.
7. Modern Operating Systems, Andrew S Tanenbaum 2nd edition, Pearson/PHI
8. Unix programming environment, Kernighan and Pike, PHI. / Pearson Education
9. Unix Internals The New Frontiers, U.Vahalia, Pearson Education.

MCA113	Java Programming			JPM
WORK LOAD: 4 PPW	Credits: 4	INTERNAL MARKS: 20	EXTERNAL MARKS: 80	

## UNIT –I

**Object-Oriented Programming:** Object Oriented Paradigm – Features of Object Oriented Programming Class Fundamentals, How Objects Are Created, Reference Variables and Assignment, Methods, Returning from a Method, Constructors, Parameterized Constructors, Adding a Constructor to the Vehicle Class, The new Operator Revisited, Garbage Collection and Finalizers, The finalize() Method, The this Keyword.

**A Closer Look at Methods and Classes:** Controlling Access to Class Members, Pass Objects to Methods, Returning Objects, Method Overloading, Overloading Constructors, Recursion, understanding static, Introducing Nested and Inner Classes, Varargs: Variable-Length Arguments

**Inheritance:** Inheritance Basics, Member Access and Inheritance, Constructors and Inheritance, Using super to Call Superclass Constructors, Using super to Access Superclass Members, Creating a Multilevel Hierarchy, Superclass References and Subclass Objects, Method Overriding, Overridden Methods Support Polymorphism, Using Abstract Classes & final. (*Chapter 4, Chapter 6, Chapter 7*)

## UNIT –II

**Packages and Interfaces:** Packages, Packages and Member Access, Understanding Protected Members, Importing Packages, Implementing Interfaces, Using Interface, References, Variables in Interfaces, Interfaces Can Be Extended.

**Exception Handling:** The Exception Hierarchy, Exception Handling, Fundamentals, The Consequences of an Uncaught Exception, Using Multiple catch Statements, Catching Subclass Exceptions, Nested Try Blocks, Throwing an Exception, Using finally, Using throws, New Exception Features Added by JDK 7, Java's Built-in Exceptions, Creating Exception Subclasses.

**Multithreaded Programming:** Multithreading Fundamentals, The Thread Class and Runnable Interface, Creating Multiple Threads, Thread Priorities, Synchronization, The synchronized Statement, Thread Communication Using notify( ), wait( ), and notifyAll( ), Suspending, Resuming, and Stopping Threads. (*Chapter 8, Chapter 9, Chapter 11*)

## UNIT - III

**Enumerations, Autoboxing, Static Import, and Annotations:** Java Enumerations, The values()&valueOf() Methods, Instance Variables and Enumerations, Auto boxing, Type Wrappers, Auto boxing and Methods, Autoboxing/Unboxing Occurs in Expressions, Static Import, Annotations.

**Using I/O:** Java's I/O Is Built upon Streams, Byte Streams and Character, Streams, The Byte Stream Classes, The Character Stream Classes, The Predefined Streams, Reading and Writing Files Using Byte Streams, Automatically Closing a File, Reading and Writing Binary Data. Random-Access Files, File I/O Using Character Streams, Using Java's Type Wrappers to Convert Numeric Strings.

**Generics:** Generics Fundamentals, Bounded Types, Using Wildcard Arguments, Bounded Wildcards, Generic Methods, Generic Constructors, Generic Interfaces, Raw Types and Legacy Code, Type Inference with the Diamond Operator, Erasure, Ambiguity Errors, Some Generic Restrictions, Continuing Your Study of Generics. (*Chapter 12, Chapter 10, Chapter 13*)

## UNIT – IV

**Applets, Events, and Miscellaneous Topics:** Applet Basics, Applet Organization and Essential Elements, The Applet Architecture, A Complete Applet Skeleton, Applet Initialization and Termination, Requesting Repainting, Using the Status Window, Passing Parameters to Applets, The Applet Class, Event Handling, The Delegation Event Model, Events, Using the Delegation Event Model, More Java Keywords.

**Introducing Swing:** The Origins and Design Philosophy of Swing, Components and Containers, Layout Managers, a First Simple Swing Program, Use JButton , Work with JTextField, Create a JCheckBox, Work with JList, and Use Anonymous Inner Classes to Handle Events, Create a Swing Applet. (*Chapter 14, Chapter 15*)

### Text Book:

1. Java, A Beginner's Guide, 5th Edition, by Herbert Schildt, 2011, Oracle Press, Tata McGRAW-HILL

### References:

1. Beginning Java, Java 7th Edition, Ivor Horton's, Wiley India Edition. Java,
2. A Beginner's Guide, 8th Edition, by Herbert Schildt, 2018, Oracle Press
3. Java the Complete Reference 8th Edition, Herbert Schildt, Tata McGrawHill Edition.

MCA114	Computer Networks			CN
WORK LOAD: 4 PPW	Credits:4	INTERNAL MARKS: 20	EXTERNAL MARKS: 80	

### UNIT - I

**Computer Networks and the Internet:** What is the Internet? What is a Protocol? The Network Edge, The Network Core, Access Networks and Physical Media, ISPs and Internet Backbones, Delay and Loss in Packet-Switched Networks, Protocol Layers and Their Service Models, A Brief History of Computer Networking and the Internet.

**Application Layer:** Principles of Application Layer Protocols, The World Wide Web: HTTP, File Transfer: FTP, Electronic Mail in the Internet, SMTP, DNS - The Internet's Directory Service, Socket Programming with TCP and UDP

### UNIT - II

**Transport Layer:** Transport-Layer Services and Principles, Multiplexing and De-multiplexing, Connectionless Transport: UDP, Principles of Reliable Data Transfer, Connection-Oriented Transport: TCP, Principles of Congestion Control.

### UNIT - III

**Network Layer And Routing:** Network-Layer Services and Principles, Introduction and Network Service Models, Routing Principles and Routing Algorithms, Hierarchical Routing, Inter Protocol (IP) - IPv4 Addressing, Datagram Format, IPv6 Addressing and Format, Routing in the Internet, What's Inside a Router?

### UNIT - IV

**Link Layer And Local Area Networks:** Data Link-Layer Services and Principles, Introduction, Error-Detection and Correction Techniques, Multiple Access Protocols, LAN Addresses and ARP, Ethernet, Hubs, Bridges, Switches, wireless Links: IEEE 802.11, Bluetooth, PPP: The Point-to-Point Protocol, Asynchronous Transfer Mode (ATM), X.25 and Frame Relay.

### Text Book:

1. Computer Networking A Top-Down Approach Featuring The Internet By –James F. Kurose And Keith W. Ross (Pearson)
2. Computer Networks By- Andrew S. Tanenbaum (Prentice Hall India)

### Reference books:

1. Business Data Communication & Networks By - Fitz Gerald (John Wiley)
2. Data & Computer Communications - W Stallings (Pearson, Phi)
3. Computer Communications&Networking Topologies-Magallo, V.M.Hancock (Thomson)
4. Data Communication & Computer Networks - R. Agarwal, Bb Tiwari (Vikas)
5. Computer Networks - As Tanenbaum (Phi)
6. Computer Networks - Black (Phi)
7. Under Standing Communications & Networks - Wa Shay (Thomson)

MCA115	Probability and Statistical Methods		PSM
WORK LOAD: 4 PPW	Credits : 4	INTERNAL MARKS: 20	EXTERNAL MARKS: 80

## UNIT - I

**Introduction to Statistics:** Data Collection and Tabulation, Graphical Representation of Data Measures of Central Tendency and Dispersion, Moments, Skewness and Kurtosis.

**Probability:** Basic concepts and Basic terms of probability, Addition, Multiplication and Baye's theorem, Random variables, Definition of Mathematical Expectation and moment generating function.

**Probability Distributions:** Statement, mean, variance and applications of Binomial, Poisson and Normal distributions.

## UNIT – II

**Correlation and Regression:** Concept of correlation, computation of Karl-Pearson correlation coefficient, Spearman's rank correlation coefficient, multiple correlations and partial correlation with simple applications. Simple linear regression, regression coefficient, lines of regression with simple applications.

## UNIT - III

**Testing of Statistical Hypothesis:** Concepts of Population, Sample, Parameter, Statistic, Null and Alternative hypotheses, Critical region, two types of errors, Level of significance. Chi-Square ( $\chi^2$ ) tests for single variance, goodness of fit and independent of two attributes, t-test for single mean, difference of two sample means (independent and paired samples) F- test for difference of two independent sample variances.

## UNIT - IV

**Analysis of Variance:** Analysis of variance one way and two way classified data with one observation per cell.

### Text Books

1. Fundamental of Mathematical Statistics-S.C.Gupta and V.K.Kapoor
2. Fundamentals of Applied Statistics -S.C.Gupta and V.K.Kapoor

### Reference books

1. Statistical Methods-S.P.Gupta.
2. Fundamental of mathematical statistics by - v k Kapoor and guptasc
3. Statistics (phi) by - Freud
4. Probability statistics and random process by - r veerarajan (tmh)
5. Introduction to probability & statistics by - j.s. Milton & jcarold (tmh)
6. Miller & ferunds probability & statistics froenginner by - johnson (pearson)
7. Probability & statistics fro engineers & statisticsts by - walpose (pearson)

<b>MCA116</b>	<b>C and Data Structures Lab</b>	
<b>WORK LOAD: 4 PPW</b>	<b>Credits : 2</b>	<b>EXTERNAL MARKS: 50</b>

1. Write a c-program to find the Reverse of a given number.
2. Write a C program to find the sum of individual digits of a positive integer.
3. Write a C-program to find the Fibonacci Series.
4. Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.
5. Write a C program to find the roots of a quadratic equation.
6. Write a C program to find the factorial of a given integer.
7. Write a C program to find the GCD (greatest common divisor) of two given integers.
8. Write a C program which takes two integer operands and one operator from the user , performs the operation and then prints the result. (Consider the operators +,-,\*, /, % and use Switch Statement)
9. Write a C program to find both the largest and smallest number in a list of integers.
10. Write a C program that uses functions to perform the following:
  - i) Addition of Two Matrices
  - ii) Multiplication of Two Matrices
11. Write a C program that uses functions to perform the following operations:
  - i) To insert a sub-string in to a given main string from a given position.
  - ii) To delete n Characters from a given position in a given string.
12. Write a C program to determine if the given string is a palindrome or not
13. Write a C program to count the lines, words and characters in a given text.
14. Write a C program to generate Pascal's triangle.
15. Write a C program that uses functions to perform the following operations:
  - i) Reading a complex number
  - ii) Writing a complex number
  - iii) Addition of two complex numbers
16. Write a C program which copies one file to another.
17. i) Write a C program to display the contents of a file.  
 ii) Write a C program to merge two files into a third file (i.e., the contents of the first file followed by those of the second are put in the third file)
18. Write a C program that uses functions to perform the following operations on singly linked list.
  - i) Creation
  - ii) Insertion
  - iii) Deletion
  - iv) Traversal
19. Write C programs that implement stack
20. Write C programs that implement Queue
21. Write a C program that implements the following sorting methods to sort a given list of integers in ascending order
  - i) Bubble sort
  - ii) Selection sort
  - iii) Insertion sort
22. Write C programs for Linear search and Binary search
23. Write C- program for binary search Tree implementation and Traversals
24. Write C-programs on to implement the Graph and Traversal of a Graph

**Note:**

- All the concepts of programs from Text Book including exercises must be practice, execute and write down in the practical record book.
- In the external lab examination student has to execute at least two programs
- External Viva-voce is compulsory.



<b>MCA117</b>	<b>Operating System Lab</b>	
<b>WORK LOAD: 4 PPW</b>	<b>Credits : 2</b>	<b>EXTERNAL MARKS: 50</b>

1. Use vi editor to create a file with some text and save the file.
2. Add and Delete content to the file created above.
3. Write programs that use the following processing utilities.
  - i. wc,od, cmp, comm, diff,head ,tail, cut ,paste, sort, grep, uniq
  - ii. Disk backup utilities
  - iii. du, df,tar ,cpio,ps ,who
4. Write a shell script to generate a multiplication table.
5. Write a shell script that copies multiple files to a directory.
6. Write a shell script which counts the number of lines and words present in a given file.
7. Write a shell script which displays the list of all files in the given directory.
8. Write a shell script (of small calculator) that adds, subtracts, multiplies and divides the given two integers.
9. Write a C program that counts the number of blanks in a text file.
  - i. Using standard I/O
  - ii. Using system calls.
10. Write a C program that illustrates how to execute two commands concurrently with a command pipe.
11. Write a C program that illustrates file locking using semaphores.
12. Write a C program that implements a producer-consumer system with two processes.(using semaphores)
13. Write a C program that illustrates inter process communication using shared memory system calls.
14. Write a C program that illustrates the following.
  - i. Creating a message queue
  - ii. Writing to a message queue.
  - iii. Reading from a message queue.
15. Write C programs to implement the various CPU Scheduling Algorithms
  - a. FCFS
  - b. SJF
  - c. Priority
  - d. Round Robin
16. Bankers Algorithm for Deadlock Avoidance
17. Implementation of Deadlock Detection Algorithm
18. Implementation of the following Memory Allocation Methods for fixed partition
  - a. First Fit
  - b. Worst Fit
  - c. Best Fit
19. Implementation of the following Page Replacement Algorithms
  - a. FIFO
  - b. LRU
  - c. LFU
20. Implementation of the following File Allocation Strategies
  - a. Sequential
  - b. Indexed
  - c. Linked

**NOTE:**

- All the concepts of programs from Text Book including exercises must be practice, execute and write down in the practical record book.
- In the external lab examination student has to execute at least two programs with compilation and deployment steps are necessary.
- External Viva-voce is compulsory.

<b>MCA118</b>	<b>Java Programming Lab</b>	
<b>WORK LOAD: 4 PPW</b>	<b>Credits : 2</b>	<b>EXTERNAL MARKS: 50</b>

**Case study exercises:**

- Creating a Help Class
- Demonstrate Garbage Collection and Finalization
- Improving the Queue Class
- Overloading the Queue Constructor
- The Quicksort
- Extending the Vehicle Class
- Creating a Queue Interface
- Adding Exceptions to the Queue Class
- Extending Thread
- Using the Main Thread
- A Computer-Controlled Traffic Light
- A File Comparison Utility
- Creating a Disk-Based Help System
- Create a Generic Queue
- A Simple Banner Applet
- A Swing-Based File Comparison Utility

**NOTE:**

- All the concepts of programs from Text Book including exercises must be practice, execute and write down in the practical record book.
- In the external lab examination student has to execute at least two programs with compilation and deployment steps are necessary.
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MCA123	Software Engineering	T ( 4 )	20	80	100	4
MCA124	Cryptography and Network Security	T ( 4 )	20	80	100	4
MCA125	Principles and Practice of Management	T ( 4 )	20	80	100	4
MCA126	Python Programming lab	L ( 4 )	--	50	50	2
MCA127	DBMS Lab	L ( 4 )	--	50	50	2
MCA128	Software Engineering Lab	L ( 4 )	--	50	50	2
<b>Grand total (marks and credits)</b>					<b>650</b>	<b>26</b>

MCA121	Python Programming			PYP
WORK LOAD: 4 PPW	Credits: 4	INTERNAL MARKS: 20	EXTERNAL MARKS: 80	

### UNIT-1

History of Python Features of Python, Python Installation, Variables in Python, Keywords and their usage, Operators, members operators, Identity Operators, Input-Output Statements, Indentation, Expressions and order of evaluations.

**Conditional Statements:** if, elif, else; Loops: for, while; break, continue, pass.

**Functions:** Positional arguments, Keyword Arguments, Default Arguments, Variable-length arguments, Anonymous Functions.

### UNIT-2

**Modules:** Predefined modules along with the functions, importing modules, Creation of User defined modules, packages in python

**Exception Handling:** try, catch, except, finally, else, raise, Handling different types of Exceptions

**File handling:** Read and write operations on different types of files

### UNIT-3

**Object Oriented Programming in Python:** Classes, Methods, Constructors, Inheritance, Overriding Methods, Data hiding.

**Python data structures:** Strings, List, Tuples, Dictionaries, Sets (Creation, Access, Functions), Comprehensions.

**Packages:** Working with Numpy package, Pandas data structures: Series, Data Frames.

### UNIT-4

**Data Input:** Input from Text Files: Visual Inspection, Reading ASCII-Data into Python, Input from MS Excel.

**Data types:** Categorical, Numerical.

**Plotting data:** scalar plots, bar charts, pie charts, line graphs, error plots, box plots, 3D plots

**Statistics operations:** Mean, Median, Standard deviation, Web frame work for python- different stack frame works , Django package - introduction and applications.

#### Text Books :

1. Python Programming: A Modern Approach, VamsiKurama, Pearson
2. Python Data Science Handbook: Jake VanderPlas Orielly
3. Learning Python, Mark Lutz, Orielly

#### Reference Books:

1. Think Python, Allen Downey, Green Tea Press
2. Core Python Programming, W.Chun, Pearson.
3. Introduction to Python, Kenneth A. Lambert, Cengage

MCA122	Database Management Systems			DBMS
WORK LOAD: 4 PPW	Credits : 4	INTERNAL MARKS: 20	EXTERNAL MARKS: 80	

### UNIT – I

**The Relational Data Model and Relational Database Constraints-** Relational Model Concepts, Relational Model Constraints and Relational Database Schemas, update operations, Transactions and dealing with constraint violation.

**The Relational Algebra and Relational Calculus-** Unary Relational Operations: SELECT and PROJECT – Relational Algebra Operations from Set Theory – Binary Relational Operations: JOIN and DIVISION – Additional Relational Operation – The Tuple Relational Calculus – The Domain Relational Calculus. (Chapters 5, 6)

### UNIT – II

**Functional Dependencies and Normalization for Relational Databases-** Informal Design Guidelines for Relation Schemas, Functional Dependencies, Normal Forms Based on Primary Keys, General Definitions of Second and Third Normal Forms, Boyce-Codd Normal Form.

**Relational Database Design Algorithms and Further Dependencies-** Properties of Relational Decompositions, multivalued dependencies and fourth normal form, Join Dependencies and Fifth Normal Form. (Chapters 10 and 11)

### UNIT – III

**Introduction to Transaction Processing Concepts and Theory-** Introduction to Transaction Processing, Transaction and System Concept, Desirable Properties of Transactions, characterizing Schedules Based on Recoverability, Characterizing schedules Based on Serializability.

**Concurrency Control Techniques-** Two-Phase Locking Techniques for Concurrency Control, Concurrency Control Based on Timestamp Ordering.

**Database Recovery Techniques-** Recovery Concepts, Recovery Techniques Based on Deferred Update, Recovery Techniques Based on Immediate Update, Shadow paging. (Chapters 17.1 to 17.5, 18.1, 18.2, 19.1 to 19.4)

### UNIT – IV

**Database Security-** Introduction to Database Security Issues, Discretionary Access Control Based on Granting and Revoking Privileges, Mandatory Control and Role-based control for multilevel security, challenges to Database Security.

**Distributed Databases and client-Server Architecture-** Distributed Database Concepts, Data Fragmentation, replication, and allocation techniques for distributed database design, types of Distributed database system, query processing in Distributed Databases, overview of concurrency control and recovery in distributed databases, overview of 3-tier client-server architecture, Distributed databases in oracle.(Chapter 23, chapter 25)

#### Text Book:

1. Fundamentals of Database Systems by – Ramezelmari Shamkant b. Navathe v edition (Pearson)

#### Reference Books:

1. Database System Concepts (iv edition) by - Silber Schatz, Korth g. Sudarshan (tmh )

<b>MCA123</b>	<b>Software Engineering</b>			<b>SE</b>
<b>WORK LOAD: 4 PPW</b>	<b>Credits : 4</b>	<b>INTERNAL MARKS: 20</b>	<b>EXTERNAL MARKS: 80</b>	

**UNIT-I:**

Introduction to Software Engineering: The evolving role of software, changing nature of software, software myths. A Generic view of process: Software engineering- a layered technology, a process framework, the capability maturity model integration (CMMI), process patterns, process assessment, personal and team process models. Process models: The waterfall model, incremental process models, evolutionary process models, the unified process.

**UNIT-II:**

Software Requirements: Functional and non-functional requirements, user requirements, system requirements, interface specification, the software requirements document.

Requirements Engineering Process: Feasibility studies, requirements elicitation and analysis, requirements validation, requirements management.

System Models: Context models, behavioral models, data models, object models, structured methods.

**UNIT-III:**

Design Engineering: Design process and design quality, design concepts, the design model. Creating an Architectural Design: Software architecture, data design, architectural styles and patterns, architectural design, conceptual model of UML, basic structural modeling, class diagrams, sequence diagrams, collaboration diagrams, use case diagrams, component diagrams.

Testing Strategies: A strategic approach to software testing, test strategies for conventional software, black-box and white-box testing, validation testing, system testing, the art of debugging.

**UNIT-IV:**

Product Metrics: Software quality, metrics for analysis model, metrics for design model, metrics for source code, metrics for testing, metrics for maintenance.

Metrics for Process and Products: Software measurement, metrics for software quality.

Risk Management: Reactive Vs proactive risk strategies, software risks, risk identification, risk projection, risk refinement, RMMM, RMMM plan.

Quality Management: Quality concepts, software quality assurance, software reviews, formal technical reviews, statistical software quality assurance, software reliability, the ISO 9000 quality standards.

**TEXTBOOKS:**

1. Software Engineering, A practitioner's Approach- Roger S. Pressman, 6th edition, Mc GrawHill International Edition.
2. Software Engineering- Sommerville, 7th edition, Pearson Education.
3. The unified modeling language user guide Grady Booch, James Rumbaugh, Ivar Jacobson, Pearson Education.

**REFERENCES:**

1. Software Engineering, an Engineering approach- James F. Peters, WitoldPedrycz, John Wiley.
2. Software Engineering principles and practice- Waman S Jawadekar, The Mc Graw-Hill Companies.
3. Fundamentals of object oriented design using UML Meiler page-Jones: Pearson Education.

MCA124	Cryptography and Network Security			CNS
<b>WORK LOAD: 4 PPW</b>	<b>Credits : 4</b>	<b>INTERNAL MARKS: 20</b>	<b>EXTERNAL MARKS: 80</b>	

### UNIT - I

**Introduction:** Attacks, security Services, Mechanisms, A Model for Network Security

Introduction to Number Theory: Divisibility and the Division Algorithm, the Euclidean Algorithm, Modular Arithmetic, Fermat's and Euler's Theorem, the Chinese Remainder Theorem, Discrete Logarithms.

**Symmetric Cipher:** Classical Encryption Techniques, Symmetric Cipher Model, Substitution Techniques, Transposition Techniques, Steganography.

### UNIT - II

Block Cipher and the Data Encryption: Block Cipher Principles, the Data Encryption Standard, Multiple Encryption and Triple DES, Stream Cipher-RC4, Block Cipher Modes of Operation, Advanced Encryption Standard.

**Asymmetric Cipher:** Principles of Public-Key Cryptosystems, the RSA Algorithm, Diffie-Hellman Key Exchange, Elgamal cryptographic system, Elliptic Curve Cryptography, Traffic Confidentiality: link encryption, end to end encryption.

### UNIT - III

**Cryptographic Data Integrity Algorithms and Message Authentication:** Message Authentication Requirements, Message Authentication Function, Message Authentication Codes, Hash Functions, simple Hash functions, Hash function properties, Secure Hash Algorithm, SHA-512, HMAC, Digital Signatures: Properties, Attacks and forgeries, Digital signature Requirements, Kerberos

### UNIT - IV

**Electronic Mail Security:** Email Components, email format, Email Threats and security, S/MIME, **IP Security:** IP Security Overview, IP Security Architecture, Encapsulating Security Payload.

**Web and System Security:** malicious software, Intruders, Viruses, firewalls, Secure Electronic Transaction, HTTPS

### TEXT BOOK:

1. Cryptography and Network Security principles and Practice 7th Edition By William Stallings (Pearson Asia)

### REFERENCE BOOKS:

1. Davies & Price: Security for Computer Networks - Wiley
2. Mayer & Matyas: Cryptography - Wiley B. Schneider: Applied Cryptography - (John Wiley)

<b>MCA125</b>	<b>Principles and Practice of Management</b>			<b>PPM</b>
<b>WORK LOAD: 4 PPW</b>	<b>Credits : 4</b>	<b>INTERNAL MARKS: 20</b>	<b>EXTERNAL MARKS: 80</b>	

## UNIT – I

**Management:** Meaning - Nature - Significance of Management Principles of Management - Approaches to Management, Development of Management Thought, Management Process and Skills, Managers and Environment, Social Responsibilities of Management.

**Planning:** Concept, Characteristics - Importance and Limitations Steps in Planning Process - Strategic Planning - Decision Making.

## UNIT – II

**Organising:** Concept - Importance - Steps in Organizing Process Base and Problems of Departmentation - Delegation of Authority - Centralization and Decentralization - Line and Staff Relations - Span of Management.

## UNIT – III

**Directing:** Nature and Importance - Communication - Concept Elements - Process - Patterns of Communication Barriers to Communication.

**Motivation:** Nature and Significance - Types of Motivation, Determinants of Motivation - A Brief Discussion on Theories of Motivation ( MASLOW's Theory, McCLELLAND FNEED THEORY, THEORY X AND THEORY Y).

**Leadership:** Concept - Importance - Leadership Styles - Autocratic, Democratic and Free Rein.

## UNIT – IV

**Staffing:** Concept - Human Resource Planning - A Brief Description of Recruitment - Selection - Training and Appraisal Methods Controlling: Meaning - Importance - Steps in Control Process - Problems of Controlling - A Brief Description of Control Techniques.

**Coordination:** Need for Coordination - Approaches to Effective Coordination - Techniques of Coordination.

### TEXT BOOKS:

1. Principles and Practice of Management by L.M. Prasad.

### REFERENCE BOOKS

1. Management, James A.F. Stoner And Charles Wankel
2. Management, Koontz Harold And O'donnel Cyril
3. Organisation And Management, Louis Allen
4. Management - Tasks And Responsibilities, Peter F Drucker



<b>MCA216</b>	<b>Python Programming Lab</b>	
<b>WORK LOAD: 4 PPW</b>	<b>Credits : 2</b>	<b>EXTERNAL MARKS: 50</b>

1. Python installation and configuration with windows and Linux
2. Programs for understanding the data types, control flow statements, blocks and loops
3. Programs for understanding functions, use of built in functions, user defined functions
4. Programs to use existing modules, packages and creating modules, packages
5. Programs for implementations of all object-oriented concepts like class, method, inheritance, polymorphism etc. (Real life examples must be covered for the implementation of object oriented concepts)
6. Programs for Pattern finding should be covered.
7. Programs covering all the aspects of Exception handling, user defined exception, Multithreading should be covered.
8. Programs demonstrating the IO operations like reading from file, writing into file from different file types like data file, binary file, etc.
9. Programs to perform searching, adding, updating the content from the file.
10. Basic programs with NumPy as Array, Searching and Sorting, date & time and String handling
11. Programs for series and data frames should be covered.
12. Programs to demonstrate data pre-processing and data handling with data frame
13. Program for data visualization should be covered.

**Note:**

- All the concepts of programs from Text Book including exercises must be practice, execute and write down in the practical record book.
- In the external lab examination student has to execute at least two programs with compilation and deployment steps are necessary.
- External Viva-voce is compulsory.

<b>MCA217</b>	<b>Database Management Systems Lab</b>	
<b>WORK LOAD: 4 PPW</b>	<b>Credits : 2</b>	<b>EXTERNAL MARKS: 50</b>

DDL, DML and DCL Commands, SQL constraints,

**MySQL Clauses**, Using Joins, Indexes, Creating Views, SQL Transactions,

**Aggregate Functions**, Programming in PL/SQL, Procedures, Functions

**Note:**

- All the concepts of programs from Text Book including exercises must be practice, execute and write down in the practical record book.
- In the external lab examination student has to execute at least two programs with compilation and deployment steps are necessary.
- External Viva-voce is compulsory.

<b>MCA218</b>	<b>Software Engineering Lab</b>	
<b>WORK LOAD: 4 PPW</b>	<b>Credits : 2</b>	<b>EXTERNAL MARKS: 50</b>

The following Tasks has to be done for various Applications

- To assign the requirement engineering tasks
- To perform the system analysis : Requirement analysis, SRS
- To perform the function oriented diagram : DFD and Structured chart
- Write the software requirement specification Document
- Draw the entity relationship diagram
- To perform the user's view analysis : Use case diagram
- To draw the structural view diagram : Class diagram, object diagram
- To draw the behavioral view diagram : Sequence diagram, Collaboration diagram
- To draw the behavioral view diagram : State-chart diagram, Activity diagram
- To draw the implementation view diagram: Component diagram
- To draw the environmental view diagram : Deployment diagram
- To perform various testing using the testing tool unit testing, integration testing

**Note:**

- All the concepts of programs from Text Book including exercises must be practice, execute and write down in the practical record book.
- In the external lab examination student has to execute at least two programs with compilation and deployment steps are necessary.
- External Viva-voce is compulsory.