



**AMRITA SAI INSTITUTE OF SCIENCE AND TECHNOLOGY  
(AUTONOMOUS)**

*Approved by AICTE, New Delhi; Permanently Affiliated To JNTU, Kakinada*  
**ACCREDITED BY NAAC WITH "A" GRADE**

**PARITALA(P), KANCHIKACHERLA(M), KRISHNA (D)-521 180(A. P.)**

**DEPARTMENT OF MASTER OF COMPUTER APPLICATIONS**



**Course Structure –**  
**MCA-AR20**

Semester	Total number of Credits (Regular Students)	Total number of Credits (Lateral Entry Students)
I	23.5	23.5
II	23.5	23.5
III	18	18
IV	12	12
Total	120	77

PREPARED

CHAIRMAN

MEMBER(S)



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**DEPARTMENT OF MASTER OF COMPUTER APPLICATIONS**

**SEMESTER – I**

S. No.	Subject Code	Subject Title	L	T	P	C	CE	SE	Tot
1	20MCA2301	Computer Organization	3	-	-	3	40	60	100
2	20MCA2302	Database Management Systems	3	1	-	4	40	60	100
3	20MCA2303	Object Oriented Programming through Java	3	1	-	4	40	60	100
4	20MCA2304	Operating Systems	3	1	-	4	40	60	100
5	20MCA2305	Web Design and Development	3	1	-	4	40	60	100
6	20MCA2351	Database Management Systems Lab	-	-	3	1.5	40	60	100
7	20MCA2352	Object Oriented Programming through Java Lab	-	-	3	1.5	40	60	100
8	20MCA2353	Web Design and Development Lab	-	-	3	1.5	40	60	100
9	20MCA5354	Personality Development Course (Logical Reasoning and English for Professionals)	-	-	2	0	100	-	100
			<b>15</b>	<b>4</b>	<b>11</b>	<b>23.5</b>	<b>420</b>	<b>480</b>	<b>900</b>

**L:** Lecture

**T:** Tutorial

**P:** Practical

**C:** Credits

**CE:** Continuous Evaluation

**SE:** Semester End Evaluation

**Tot:** Total Marks

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## DEPARTMENT OF MASTER OF COMPUTER APPLICATIONS

### SEMESTER - II

S. No.	Subject Code	Subject Title	L	T	P	C	CE	SE	Tot
1	20MCA2401	Statistics with R	3	-	-	3	40	60	100
2	20MCA2402	Computer Networks	3	1	-	4	40	60	100
3	20MCA2403	Design and Analysis of Algorithms	3	1	-	4	40	60	100
4	20MCA2404	Mobile Application Development	3	1	-	4	40	60	100
5	20MCA2405	Industrial Management	3	-	-	3	40	60	100
6	20MCA2451	Statistics with R Lab	-	-	3	1.5	40	60	100
7	20MCA2452	Computer Networks Lab	-	-	3	1.5	40	60	100
8	20MCA2453	Mobile Application Development Lab	-	-	3	1.5	40	60	100
9	20MCA4454	Seminar	-	-	2	1	40	60	100
10	20MCA5455	Personality Development Course (Aptitude and Campus Recruitment Training)	-	-	2	0	100	-	100
			15	3	13	23.5	460	540	1000

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## DEPARTMENT OF MASTER OF COMPUTER APPLICATIONS

### SEMESTER - III

S. No.	Subject Code	Subject Title	L	T	P	C	CE	SE	Tot
1	20MCA2501	Python Programming	3	-	-	3	40	60	100
2	20MCA2502	Data Mining	3	1	-	4	40	60	100
3	20MCA2503	Software Engineering	3	-	-	3	40	60	100
4	20MCA2504	<b>ELECTIVE -I</b>	3	-	-	3	40	60	100
5	20MCA3505	Data Mining Lab	-	-	-	2	40	60	100
6	20MCA2551	Python Programming Lab	-	-	3	1.5	40	60	100
7	20MCA4552	Professional Communication Practice Lab	-	-	3	1.5	40	60	100
			<b>12</b>	<b>1</b>	<b>6</b>	<b>18</b>	<b>280</b>	<b>420</b>	<b>700</b>

**L:** Lecture

**T:** Tutorial

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**Tot:** Total Marks

#### **ELECTIVE-I**

20MCA2405A - Artificial Intelligence

20MCA2405B - Computer Graphics

20MCA2405C - Distributed Systems

20MCA2405D – Optimization

Techniques

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**SEMESTER –IV**

S. No.	Subject Code	Subject Title	L	T	P	C	CE	SE	Tot
1	20MCA4651	Major Project	--	-	24	12	40	60	100
			-	-	24	12	40	60	100

**L:** Lecture

**T:** Tutorial

**P:** Practical

**C:** Credits

**CE:** Continuous Evaluation

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## DEPARTMENT OF MASTER OF COMPUTER APPLICATIONS

### 20MCA2301: COMPUTER ORGANIZATION

<b>Lecture</b>	3 hrs/week	<b>Internal Assessment</b>	40
<b>Tutorial</b>	-	<b>Final Examination</b>	60
<b>Practical</b>	-	<b>Credits</b>	3
<b>Learning Outcomes</b>	Upon successful completion of the course, the student will be able to:		
	<b>CO1</b>	Understand, analyze and design various digital circuits.	
	<b>CO2</b>	Understand the theory and architecture of central processing unit.	
	<b>CO3</b>	Analyze some of the design issues in terms of speed, technology, cost, performance.	
	<b>CO4</b>	Exemplify in a better way the I/O and memory organization.	
<b>UNIT – I</b>			
<b>Digital Logic Circuits:</b> Digital Computers, Logic Gates, Boolean Algebra, Map Simplification, Combinational Circuits, Flip-Flops, Sequential Circuits.			
<b>Digital Components:</b> Integrated Circuits, Decoders, Multiplexers, Registers, Shift Registers, Binary Counters, Memory Unit.			
<b>Data Representation:</b> Data Types, Complements, Fixed-Point Representation, Floating-Point Representation, Other Binary Codes, Error Detection Codes.			
<b>UNIT – II</b>			
<b>Basic Computer Organization and Design:</b> Instruction Codes, Computer Registers, Computer Instructions.			
<b>Microprogrammed Control:</b> Control Memory, Address Sequencing, Microprogram Example.			
<b>UNIT – III</b>			
<b>Central Processing Unit:</b> Introduction, General Register Organization, Stack Organization, Instruction Formats, Addressing Modes.			
<b>Computer Arithmetic:</b> Introduction, Addition and Subtraction, Multiplication Algorithms, Floating-point Arithmetic Operations.			
<b>UNIT – IV</b>			
<b>Input-Output Organization:</b> Peripheral Devices, Input-Output Interface, Asynchronous Data Transfer, Priority Interrupt, Direct Memory Access.			
<b>Memory Organization:</b> Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory.			
<b><u>Learning Resources</u></b>			
<b>Text Book:</b>			
[1] <b>Computer System Architecture</b> --- M. Morris Mano, 3rd edition, Pearson Education/PHI			
<b>Reference Books:</b>			
[1] Computer Organization, 5 <sup>th</sup> ed., Hamacher, Vranesic and Zaky, TMH, 2002			
[2] Computer Organization & Architecture: Designing for Performance, 7 <sup>th</sup> Ed., William Stallings, PHI, 2006			
[3] Digital Logic and Computer Systems Organization--- V.Rajaraman, T.Radhakrishnan PHI,2006			



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**DEPARTMENT OF MASTER OF COMPUTER APPLICATIONS**

**20MCA2401: STATISTICS WITH R**

<b>Lecture</b>	3 hrs/week	<b>Internal Assessment</b>	40
<b>Tutorial</b>	-	<b>Final Examination</b>	60
<b>Practical</b>	-	<b>Credits</b>	3

<b>Course Outcomes</b>	Upon successful completion of the course, the student will be able to		
	<b>CO1</b>	Able to write R commands for Basic math and Data representation.	
	<b>CO2</b>	Understand data reading, statistical graphs and control statements using R commands.	
	<b>CO3</b>	Classify Probability distributions, Data inference by T-test and find correlation using R commands.	
	<b>CO4</b>	Construct generalized linear models and understand survival analysis using R commands.	

**UNIT – I**

Introduction, Basics of R - Basic math, Variables, Data types, Vectors, Calling Functions, Missing Data. Advanced data structures- Data Frames, Lists, Matrices, Arrays.

**UNIT – II**

Reading data into R - Reading CSV"s, Excel data. Statistical Graphics - Basic graphics, ggplot2. Control Statements - if and if else, switch, if else, Compound tests. Loops- For loop, While Loops.

**UNIT – III**

Probability Distributions - Normal Distribution, Binomial Distribution, Poisson Distribution, other distribution. Basic Statistics - Correlation and Covariance, T- Tests- ANOVA (one way).

**UNIT – IV**

Linear Models - Simple Linear Regression, Multiple Regression. Generalized linear models - Logistic Regression, Poisson Regression, other Generalized linear Models - Survival Analysis.

**Learning Resources**

**Text Books:**

- [1] "The Art of R Programming, Norman Matloff", Cengage Learning.
- [2] "R for Everyone", Lander, Pearson.

**Reference Books:**

- [1] "Probability and Statistics for Engineers", Eighth edition, Richard A. Johnson.
- [2] "R Cookbook", Paul Teetor, Oreilly.
- [3] "R in Action", Rob Kabacoff, Manning.

**Web Resource:**

- [1] [digimat.in/nptel/courses/video/111104100/L01.html](http://digimat.in/nptel/courses/video/111104100/L01.html)



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**DEPARTMENT OF MASTER OF COMPUTER APPLICATIONS**

**20MCA2503: SOFTWARE ENGINEERING**

Lecture	3 hrs/ week	Internal Assessment	40
Tutorial	1 hr/ week	Final Examination	60
Practical	-	Credits	4

<b>Course Outcomes</b>	Upon successful completion of the course, the student will be able to		
	CO1	It is expected that the students have in-depth knowledge in various software processes and know how to choose between them and the process into practice.	
	CO2	It is expected that the learners know how to elicit requirements from a client and specify them.	
	CO3	It is expected that the learners are proficient in creating and analyzing design models.	
	CO4	It is expected that the students understand good coding practices, including documentation, contracts, regression tests and daily builds.	

**UNIT – I**

**Introduction to Software Engineering:** The Evolving Role of Software, Software, The 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 Models:** Prescriptive Models, The Waterfall Model, Incremental Process Models: The Incremental Model, The RAD Model, Evolutionary Process Model: Prototyping, The Spiral Model, The Concurrent Development Model.

**An Agile View of Process:** What is Agility? What is Agile Process? Agile Process Models: Extreme Programming, Scrum.

**UNIT – II**

**Software Engineering Practice:** Software Engineering Practice, communication practices, Planning Practices, Modeling Practices, Construction Practices, Deployment.

**Testing Tactics:** Software Testing Fundamentals, Black Box and White Box Testing, White Box Testing, Basis Path Testing, Control Structure Testing, Black Box Testing.

**UNIT – III**





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**Project Management:** The Management Spectrum, The People, The Product, The Process, The Project, The W5HH Principles.

**Metrics for Process and Projects:** Metrics in the Process and Project Domains, Software Measurement, Metrics for Software Quality, Integrating Metrics within Software Process, Metrics for Small Organizations.

**Estimation:** Observations on Estimations, The project planning process, Software Scope and Feasibility, Resources, Software Project Estimation.

**Quality Management:** Quality Concepts, Software Quality Assurance, Software Reviews, Formal Technical Reviews, Software Reliability, The ISO 9000 Quality Standards, the SQA Plan.

**UNIT – IV**

**Class Modeling:** Object and Class Concepts, Link and Association concepts, Generalization and Inheritance, A Sample Class Model.



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**State Modeling:** Events, States, Transitions and Conditions, state diagrams.

**Interaction Modeling:** Use Case Models, Sequence Models, Activity Models.

**Learning Resources:**

**Text Books:**

- [1] Roger S Pressman, **"Software Engineering–A Practitioner's Approach"**, Sixth Edition, TMH International. (UNIT - I, II, III)
- [2] Michael Blaha, James Rumbaugh, **"Object Oriented Modeling and Design with UML"**, Second Edition, PHI. (UNIT - IV)

**Reference Books:**

- [1] Sommerville, **"Software Engineering"**, Seventh Edition Pearson Education (2007).
- [2] **"Software Engineering"**, Kassem A. Saleh, Cengage Learning.
- [3] S.A.Kelkar, **"Software Engineering – A Concise Study"**, PHI.
- [4] Waman S.Jawadekar, **"Software Engineering"**, TMH.
- [5] Ali Behforooz and Frederick J.Hudson, **"Software Engineering Fundamentals"**, Oxford (2008).
- [6] **"Object Oriented Analysis & Design with Applications"**, Grady Booch, 2<sup>nd</sup> Edition Pearson Education 1999.
- [7] **"Unified Modeling Language Reference Manual"**, James Rumbaugh, Jacobson, Booch, PHI.
- [8] **"The Unified Software Development Process"**, Jacobson et al., AW, 1999.
- [9] **"UML Bible"** by Tom Pender John Wiley & Sons.

**Web Resources:**

- [1] <http://www-01.ibm.com/software/rational/announce/rose/>
- [2] <http://www-01.ibm.com/software/rational/>



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## DEPARTMENT OF MASTER OF COMPUTER APPLICATIONS

### 20MCA2303: OBJECT ORIENTED PROGRAMMING THROUGH JAVA

Lecture	3 hrs/week	Internal Assessment	40
Tutorial	1 hr/week	Final Examination	60
Practical	-	Credits	4
Learning Outcomes	CO1	Understand the object-oriented concepts, syntax, decision and iteration control structures to implement java classes.	
	CO2	Apply proficient knowledge of inheritance and polymorphism concepts in programming and able to work with Interfaces, Abstract Class, Packages and Exceptions.	
	CO3	Understand and apply the Multithreaded Programming concepts and able to work with I/O Streams and Files.	
	CO4	Able to develop Networking enabled applications and Applets.	

#### UNIT – I

**History & Evolution of Java:** Java's Lineage, The Birth of Modern Programming: C, C++: The Next Step, The Creation of Java, How Java Changed the Internet, Java Applets, Security, Portability, Java's Magic: The Byte code, The Java Buzzwords.

**An Overview of Java:** Object-Oriented Programming, Two Paradigms, Abstraction, The Three OOP Principles, A First Simple Program, Lexical Issues.

**Data Types, Variables and Arrays:** The Primitive Types, Integers, Floating-Point Types, Characters, Booleans, A Closer Look at Literals, Variables, Type Conversion and Casting, Arrays.

**Operators:** Arithmetic Operators, Bitwise Operators, Relational Operators, Boolean Logical Operators.

**Control Statements:** Java's Selection Statements, Iteration Statements, Nested Loops, Jump Statements.

**Introducing Classes:** Class Fundamentals, Declaring Objects, A Closer Look at new operator, Assigning Object Reference Variables, Introducing Methods, Constructors, this Keyword, Instance Variable Hiding, and Garbage Collection.

**A Closer Look at Methods and Classes:** Overloading Methods, Overloading Constructors, Using Objects as Parameters, Returning Objects, Recursion, Introducing Access Control, Understanding static, final, String Class, Command-Line Arguments.

#### UNIT – II

**Inheritance:** Inheritance Basics, Super class Variable-Reference a Subclass Object, Using super, using super to call Superclass Constructors, A Second use for Super, Creating a Multilevel Hierarchy, Method Overriding, Dynamic Method Dispatch, Abstract Classes, Using final with Inheritance.

**Packages and Interfaces:** Defining a Package, Access Protection, Importing Packages, Interfaces: Defining an Interface, Implementing Interfaces, Variables in Interfaces, Interfaces can be Extended.

**Exception Handling:** Exception-Handling Fundamentals, Java's Built-in Exceptions, Creating Your Own Exception Subclasses.

#### UNIT – III



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**Multithreaded Programming:** Creating a Thread: Implementing Runnable, Extending Thread, Creating Multiple threads, Using isAlive() and join(), Thread Priorities, Synchronization, Interthread Communication, Deadlock, Suspending, Resuming, and Stopping threads.

**Input/Output: Exploring java.io** - The I/O Classes and Interfaces, File- Directories, The Stream Classes, The Byte Streams- InputStream, OutputStream, FileInputStream, FileOutputStream Buffered Byte Streams, DataInputStream and DataOutputStream, RandomAccessFile, The Character Streams-Reader Writer FileReader, FileWriter, BufferedReader, PrintWriter, Serialization.

**UNIT – IV**

**Networking:** Networking Basics, The Networking Classes and Interfaces, InetAddress Factory Methods, Instance Methods, TCP/IP Client Sockets, URL, URLConnection, TCP/IP Server Sockets, Datagrams.

**The Applet Class:** Applet Basics, The Applet Class, Applet Architecture, An Applet Skeleton, Applet Initialization and Termination, A Simple Banner Applet, Using the Status Window, The HTML APPLLET Tag, Passing Parameters to Applets, getDocumentBase() and getCodeBase().

**Learning Resources**

**Text Book:**

- [1] **"The Complete Reference Java"**, Eighth Edition, Herbert Schildt, TMH Publishing Company Ltd, New Delhi.

**Reference Books:**

- [1] **JAVA How to program**, Eighth Edition, Paul Deitel,Harvey Deitel,PHI Learning Pvt.Ltd.,New Delhi
- [2] **Core Java 2**, Vol 1, Fundamentals, Cay. S. Horstmann and Gary Cornell, Seventh Edition, Pearson Education.
- [3] **Core Java 2**, Vol 2, Advanced Features, Cay. S. Horstmann and Gary Cornell, Seventh Edition, Pearson Education.
- [4] **Thinking in Java**, 3rd Edition, Bruce Eckel
- [5] **Object Oriented Programming through JAVA**, P. Radha Krishna

**Web Resources:**

- [1] [https://www.youtube.com/watch?v=OjdT2l-EZJA&list=PLfn3cNtmZdPOe3R\\_wO\\_h540QNfMkCQ0ho](https://www.youtube.com/watch?v=OjdT2l-EZJA&list=PLfn3cNtmZdPOe3R_wO_h540QNfMkCQ0ho)



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## DEPARTMENT OF MASTER OF COMPUTER APPLICATIONS

### 20MCA2205: OPERATING SYSTEMS

<b>Lecture</b>	3 hrs/week	<b>Internal Assessment</b>	40
<b>Tutorial</b>	-	<b>Final Examination</b>	60
<b>Practical</b>	-	<b>Credits</b>	3

<b>Course Outcomes</b>	Upon successful completion of the course, the student will be able to		
	<b>CO1</b>	Understand the Operating System fundamentals, design concepts, and get familiar with the Debugging and implementation of System Structures.	
	<b>CO2</b>	Interpret the need of Multithreaded Programming and implement these concepts in Process Scheduling.	
	<b>CO3</b>	Apply Synchronization, Deadlock Handling Methods and identify the demand of Memory-Management Concepts during the execution of a process.	
	<b>CO4</b>	Recognize the importance of Virtual Memory Management Schemes and File System concepts.	

#### UNIT – I

**Introduction:** What Operating Systems Do, Computer-System Organization, Computer-System Architecture, Operating System Structure, Operating-System Operations, Process Management, Memory Management, Storage Management, Protection and Security, Kernel Data Structures.

**System Structures:** Operating-System Services, User and Operating-System Interface, System Calls, Types of System Calls, System Programs, Operating-System Design and Implementation, Operating System Structure, Operating-System Debugging, Operating-System Generation, System Boot.

#### UNIT – II

**Process Concept:** Process Concept, Process Scheduling, Operations on Processes, Interprocess Communication.

**Multithreaded Programming:** Overview, Multithreading Models, Thread Libraries, Threading Issues.

**Process Scheduling:** Basic Concepts, Scheduling Criteria, Scheduling Algorithms.

#### UNIT – III

**Synchronization:** Background, The Critical-Section Problem, Peterson's Solution, Semaphores, Classical Problems of Synchronization, Monitors.

**Deadlocks:** System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock.

**Memory-Management Strategies:** Background, Swapping, Contiguous Memory Allocation, Segmentation, Paging.



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**UNIT – IV**

**Virtual-Memory Management:** Background, Demand Paging, Page Replacement, Thrashing.

**File System:** File Concept, Access Methods, Directory and Disk Structure, File-System Mounting, File Sharing, Protection.

**CONTENT BEYOND THE SYLLABUS:** Multicore Programming, Thread Scheduling, Mutex Locks, File-System Implementation, Disk Scheduling.



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**Learning Resources**

**Text Book:**

- [1] Abraham Silberschatz, Peter B Galvin, Gerg Gagne, **“Operating System Concepts”**, Ninth Edition, Wiley, 2016 India Edition.

**Reference Books:**

- [1] William Stallings, **“Operating Systems – Internals and Design Principles”**, Fifth Edition, Pearson Education (2007).  
[2] Deitel & Deitel, **“Operating Systems”**, Third Edition, Pearson Education (2008).

**Web Resource:**

- [1] <https://www.bing.com/videos/search?q=Deadlocks+nptel>



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**DEPARTMENT OF MASTER OF COMPUTER APPLICATIONS**



**20MCA2252: OBJECT ORIENTED PROGRAMMING THROUGH  
JAVA LAB**

<b>Lecture</b>	-	<b>Internal Assessment</b>	40
<b>Tutorial</b>	-	<b>Final Examination</b>	60
<b>Practical</b>	3 hrs/week	<b>Credits</b>	1.5
<b>Learning Outcomes</b>	<ul style="list-style-type: none"><li>• Know the language syntax and how to solve the problems using object oriented concepts.</li><li>• Able to write the programs using Inheritance, Polymorphism, Interfaces, Abstract Class, Packages and Exceptions.</li><li>• Proficient to write programs using the concepts of Multithreaded Programming.</li><li>• Develop programs using Files, Networking enabled applications and Applets.</li></ul>		





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## DEPARTMENT OF MASTER OF COMPUTER APPLICATIONS

### LIST OF PROGRAMS

#### LAB CYCLE - I

1. a) Write a Java program that prompts the user for an integer and then prints out all prime numbers up to that integer.  
b) Write a Java program to find both the largest and smallest number in a list of integers.
2. Write a Java program to multiply two given matrices by checking the compatibility of multiplication.
3. a) Find Volume of a box using classes.  
b) Write a Java program to illustrate method overloading and constructor overloading.  
c) Write a Java program to demonstrate on static variables and methods.
4. Write a Java program to demonstrate objects as arguments.
5. Write a Java program using String class methods to perform the following operations  
a) Sort a list of names in ascending order by command line arguments.  
b) Develop a program that will take a string from a command line argument in order to check whether it is a palindrome.

#### LAB CYCLE – II

6. Design three classes: Student, Exam and Result. The student class has data members such as roll no, name etc. Create a class Exam by inheriting the Student class. The Exam class adds data members representing the marks scored in six subjects. Derive the Result from class Exam and it has its own members such as total marks and average. Calculate the total marks and average.
7. a) Write a java program to implement Method Overriding.  
b) Write a java program to demonstrate constructor chaining in Inheritance.  
c) Write a java program to demonstrate the use of final.
8. a) Write a java program by implementing super class reference and subclass object (Implement Dynamic Binding).  
b) Write a Java program to create an abstract class named Shape that contains an empty method named numberOfSides( ). Provide three classes named Trapezoid, Triangle and Hexagon such that each one of the classes extends the class Shape. Each one of the classes contains only the method numberOfSides( ) that shows the number of sides in the given geometrical figures.



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**DEPARTMENT OF MASTER OF COMPUTER APPLICATIONS**

9. Write a Java program that illustrates the following.
  - a) Creation of simple package.
  - b) Accessing a package.
10. Develop a program to demonstrate multiple inheritance through interface

**LAB CYCLE – III**

11. Write Java programs that illustrates the following
  - a) Handling predefined exceptions
  - b) Handling user defined exceptions
12. Write a Java program to create thread using Thread class and Runnable Interface.
13. Write a Java program to demonstrate Synchronization.

**LAB CYCLE – IV**

14. a) Write a Java program that reads a file and displays the file on the screen, with a line number before each line.  
b) Write a Java program that displays the number of characters, lines and words in a text file.
15. Write a Java program to demonstrate URL and URLConnection.
16. Write a Java program for establishing a socket connection.
17. Write a Java program to pass parameters to Applets.

**Learning Resources**

**Text Books:**

- [1] **“The Complete Reference Java”**, Seventh Edition, Herbert Schildt, TMH Publishing Company Ltd, New Delhi.
- [2] **JAVA How to program**, Eighth Edition, Paul Deitel,Harvey Deitel,PHI Learning Pvt.Ltd., New Delhi.
- [3] **Core Java 2**, Vol 1, Fundamentals, Cay. S. Horstmann and Gary Cornell, Seventh Edition, Pearson Education.
- [4] **Core Java 2**, Vol 2, Advanced Features, Cay. S. Horstmann and Gary Cornell, Seventh Edition, Pearson Education.
- [5] **Object Oriented Programming through JAVA**, P. Radha Krishna.

**Web Resources**

- [1] <http://download.oracle.com/javase/tutorial/index.html>
- [2] <http://www.javaj2ee.net/core-java-video-tutorial>
- [3] <http://www.coderanch.com/forums/f-33/java>
- [4] <http://www.javacertificate.net/>
- [5] <http://oopweb.com/Java/Documents/IntroToProgrammingUsingJava/VolumeFrames.html>
- [6] <http://www.deitel.com/Tutorials/Freetutorialsandarticles/tabid/1575/default.aspx>
- [7] <http://www.herongyang.com/Java/>



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**DEPARTMENT OF MASTER OF COMPUTER APPLICATIONS**

**20MCA1254: PROFESSIONAL COMMUNICATION PRACTICE LAB**

<b>Lecture</b>	-	<b>Internal Assessment</b>	40
<b>Tutorial</b>	-	<b>Final Examination</b>	60
<b>Practical</b>	2 hrs/week	<b>Credits</b>	1
<b>Objectives</b>	<ul style="list-style-type: none"><li>• To offer training in administrative and professional writing skills</li><li>• To expose the learners to the processes of putting across their lines of thinking and concepts</li><li>• To train the learners in salient procedures related to technology enabled processes of communication</li><li>• To raise the capabilities of learners in technical communication</li><li>• To enhance the awareness of life skills required for professional leadership</li></ul>		
<b>Learning Outcomes</b>	<ul style="list-style-type: none"><li>• Be aware of the processes of administrative communication</li><li>• Develop insights into the professional argumentation</li><li>• Be proficient in technology enabled communication skills</li><li>• Develop technical and professional drafting skills</li><li>• Be aware of the elements of Professional leadership</li></ul>		
<b>UNIT – I</b>			
Administrative drafting and correspondence – Format, style and techniques Memos Minutes E-mail Etiquette and Web notes			
<b>UNIT – II</b>			
Self Affirmation Advanced Group Discussion Pyramid Discussion PNI & Point-Counter Point			
<b>UNIT – III</b>			
Technology enabled conferencing skills Developing Abstract Introduction to Executive summary- written and spoken Technical Vocabulary- relevant sentential patterns			
<b>UNIT – IV</b>			



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**DEPARTMENT OF MASTER OF COMPUTER APPLICATIONS**

Select Life Skills (50)  
Select Logics, Isms, Phobias and Manias (25 each)  
Sentence Completion (50 items)  
Fundamentals of Syllogisms

**Learning Resources**

**Text Books:**

- [1] Deborah. J. Bennett, Logic made easy: How to know when Language Deceives you, WW Norton & company , I edition(Reprint), 2005.

- [2] Ashraf Rizvi, Effective Technical Communication, TMI, I edition 2005.  
[3] „Krishna", English Language Communication Skills, I Edition, Duvvuri Publications, 2008.  
[4] Eclectic Learning Materials offered by the Department

**Reference Books:**

- [1] Khera Shiv, Living with Honour, Macmillan, I edition (Reprinted) 2003  
[2] Daniel Goleman, Working with Emotional Intelligence, Bantam Books, I edition ( Export Edition) 1999.  
[3] Christopher. M.Avary et al, Teamwork is an individual Skill, Magna, I edition 2003  
[4] William W Hewitt, Art of Developing Personal Power, Jaico, Third Impression, 2003

**E-Resources and other digital materials:**

- [1] Visionet Spears Digital Language Lab software Advance Pro, 28-01-2015  
[2] [www.bbc.co.uk/learning/subjects/english.shtml](http://www.bbc.co.uk/learning/subjects/english.shtml)



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**DEPARTMENT OF MASTER OF COMPUTER APPLICATIONS**



**20MCA2301: INDUSTRIAL MANAGEMENT**

<b>Lecture</b>	3 hrs/week	<b>Internal Assessment</b>	40
<b>Tutorial</b>	-	<b>Final Examination</b>	60
<b>Practical</b>	-	<b>Credits</b>	3
<b>Course Outcomes</b>	Upon successful completion of the course, the student will be able to		
	<b>CO1</b>	Gain knowledge on how to apply the managerial functions and principles in an organization. They also gain knowledge on Social Responsibilities of Business and Decision Making Process.	
	<b>CO2</b>	Learn how to associate with peers, superiors and other employees in an organization?	
	<b>CO3</b>	Understanding the financial goals and investment decisions based on the requirement of business through knowledge on financial management.	
	<b>CO4</b>	Get knowledge on human resource planning, recruitment, selection, training, career development, performance appraisal and motivation.	
<b>UNIT – I</b>			
<b>Management:</b> Meaning, Management: A Science or an Art?, Management vs. Administration, Management Functions: Planning, Organizing, Staffing, Directing and Controlling, Management Levels, Scientific Management, Administrative Management, Fayol's Principles of Management, Objectives of Business, Social Responsibilities of Business, Decision Making: Types and Process.			
<b>UNIT – II</b>			
<b>Organizational Behavior:</b> Meaning, Nature and Significance of Organizational Behavior, Values, Attitudes, Emotions and Moods, Personality: Traits, Determinants, Personality Development and Personality Theories, Perception: Perceptual Process and Barriers to Perceptual Accuracy, Learning: Characteristics of Learning, Process and Theories of Learning, Stress Management: Causes of Stress, How to manage stress?			
<b>UNIT – III</b>			



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## DEPARTMENT OF MASTER OF COMPUTER APPLICATIONS

**Financial Management:** Meaning, Scope, Finance Function, Financial Goal, Profit Maximization vs. Wealth Maximization, Value and Return, Future Value: Future Value of Single Cash Flow and Annuity, Annuity of a Future Value, Present Value: Present Value of Single Cash Flow and Annuity, Cost of Capital: Significance, Weighted Average Cost of Capital (WACC), Capital Budgeting Decisions: Nature and Features, Techniques of Capital Budgeting, Discounted Cash Flow Techniques: Net Present Value (NPV), Internal Rate of Return (IRR) and Profitability Index (PI), Non-Discounted Cash Flow Techniques: Payback, Discounted Payback and Accounting Rate of Return (ARR).

### **UNIT – IV**

**Human Resource Management:** Nature and Scope, Functions, Objectives, Human Resource Planning: Importance and The Planning Process, Recruitment: Nature, Purpose, Importance, Factors and Process, Selection: Nature and Process, Training, Development and Career Management: Nature of Training and Development, The Training Process, How to Make Training Effective? and Career Development, Performance Appraisal: Appraisal Process and Methods of Appraisal, Job Evaluation: Process and Methods, Motivation: Meaning, Importance, Theories of Motivation: Maslow's Need Hierarchy Theory and Herzberg's Two Factor Theory.



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### CONTENT BEYOND THE SYLLABUS

**Marketing:** Definition, significance, marketing Concepts, Role of Marketing in Indian Economy, Marketing Strategy, Marketing Mix, Segmentation, Targeting Positioning.

### Learning Resources

#### Text Books:

- [1] P. Subba Rao, "Management and Organisational Behaviour, Text and Cases", Himalaya Publishing House, Mumbai, 2012.
- [2] I. M. Pandey: "Financial Management", Vikas Publishing House Pvt. Ltd., 11<sup>th</sup> Edition, 2015.
- [3] K. Aswathappa: "Human Resource Management, Text and Cases", Tata McGraw Hill Publishing Company Limited, New Delhi, 2008.

#### Reference Books:

- [1] Gupta R S, Sharma B D Bhalla N S: "Principles and Practice of Management", Kalyani Publications, Hyderabad, 2008.
- [2] Prasanna Chandra, "Fundamentals of Financial Management", McGraw Hill Education (India) Pvt. Ltd., New Delhi, 6<sup>th</sup> Edition.
- [3] M.Y Khan, P K Jain: "Financial Management-Text and Problems", Tata McGraw Hill, New Delhi. 2003
- [4] Gary Dessler: "Human Resources Management", PHI Private Limited, New Delhi, 2007.
- [5] Ramaswamy V.S and Nama kumari S, "Marketing Management- Indian Context Global Perspective", McGrawHill, NewDelhi, 2010.

#### Web Resources:

- [1] [https://www.managementstudyguide.com/management\\_principles.htm](https://www.managementstudyguide.com/management_principles.htm)
- [2] [https://www.tutorialspoint.com/organizational\\_behavior/index.htm](https://www.tutorialspoint.com/organizational_behavior/index.htm)
- [3] [https://www.tutorialspoint.com/human\\_resource\\_management/index.htm](https://www.tutorialspoint.com/human_resource_management/index.htm)
- [4] [https://www.tutorialspoint.com/managerial\\_economics/index.htm](https://www.tutorialspoint.com/managerial_economics/index.htm)
- [5] <https://nptel.ac.in/courses/112/107/112107292/>



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**DEPARTMENT OF MASTER OF COMPUTER APPLICATIONS**

**20MCA2302: DATABASE MANAGEMENT SYSTEMS**

<b>Lecture</b>	3 hrs/week	<b>Internal Assessment</b>	40
<b>Tutorial</b>	1 hr/week	<b>Final Examination</b>	60
<b>Practical</b>	-	<b>Credits</b>	4

<b>Course Outcomes</b>	Upon successful completion of the course, the student will be able to		
	<b>CO1</b>	Identify the features of the DBMS that will meet the organizational needs.	
	<b>CO2</b>	Familiarize on different ER models, Relational database constraints and able to write the SQL queries using Relational model concepts.	
	<b>CO3</b>	Recognize the importance of design guidelines for relation schemas and Normal Forms.	
<b>CO4</b>	Judge the value of transaction transparency and Concurrency Control Techniques in the maintenance of data integrity.		

**UNIT – I**

**Databases and Database Users:** Introduction, An Example, Characteristics of the Database Approach, Actors on the Scene, Workers behind the Scene, Advantages of Using the DBMS Approach.

**Database System Concepts and Architecture:** Data Models, Schemas and Instances, Three-Schema Architecture and Data Independence, Database Languages and Interfaces, Centralized and Client/Server Architectures for DBMSs, Classification of Database Management Systems.

**UNIT – II**

**Data Modeling Using the Entity-Relationship (ER) Model:** Using High-Level Conceptual Data models for Database Design, Entity Types, Entity Sets, Attributes and Keys, Relationship Types, Relationship Sets, Roles and Structural Constraints, Weak Entity Types.

**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 Violations.

**SQL-99: Schema Definition, Constraints, Queries, and Views:** SQL Data Definition and Data Types, Specifying Constraints in SQL, Schema Change Statements in SQL, Basic Queries in SQL, More Complex SQL Queries, INSERT, DELETE and UPDATE Statements in SQL.

**UNIT – III**

**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:** Multivalued Dependencies and Fourth Normal Form, Join Dependencies and Fifth Normal Form.





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**DEPARTMENT OF MASTER OF COMPUTER APPLICATIONS**

**UNIT – IV**

**Introduction To Transaction Processing Concepts and Theory:** Introduction to Transaction Processing, Transaction and System Concepts, Desirable Properties of Transactions, Characterizing Schedules Based on Recoverability, Characterizing Schedules Based on Serializability.



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

**CONTENT BEYOND THE SYLLABUS**

**Disk Storage, Basic File Structures, and Hashing:** Hashing Techniques, Other Primary File Organizations, Parallelizing Disk Access Using RAID Technology.

**Learning Resources**

**Text Book:**

- [1] Ramez Elmasri, Shamkant B. Navathe, **"Fundamentals of Database Systems"**, Fifth Edition, Pearson Education (2007).

**Reference Books:**

- [1] **"Database Management Systems"**, Peter Rob, A. Anand Rao, Carlos Coronel, Cengage Learning.
- [2] **"Database System Concepts"**, Abraham Silberschatz, Henry F. Korth, S. Sudarshan
- [3] **"Database Management Systems"**, Raghu ramakrishnan, Fourth Edition
- [4] **"Database Management System Oracle SQL and PL/SQL"**, P.K.Das Gupta, PHI.
- [5] **"Database System Concepts"**, Peter Rob & Carlos Coronel, Cengage Learning, 2008.

**Web Resource:**

- [1] <https://nptel.ac.in/courses/106/105/106105175/>



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**DEPARTMENT OF MASTER OF COMPUTER APPLICATIONS**

**20MCA2304: COMPUTER NETWORKS**

<b>Lecture</b>	3 hrs/week	<b>Internal Assessment</b>	40
<b>Tutorial</b>	1 hr/week	<b>Final Examination</b>	60
<b>Practical</b>	-	<b>Credits</b>	4

<b>Course Outcomes</b>	Upon successful completion of the course, the student will be able to		
	<b>CO1</b>	Familiarize the concepts of computer networks and structuring of computer networks using OSI and TCP/IP reference model.	
	<b>CO2</b>	Compare and contrast different Transmission Media along with their characteristics and understand the methods for detecting and correcting errors in Data Link Layer Protocols.	
	<b>CO3</b>	Understand the functionality of various routing algorithms.	
	<b>CO4</b>	Understand the transport services, elements of transport protocols, TCP, UDP and DNS.	

**UNIT – I**

**INTRODUCTION: Uses of Computer Networks:** Business Applications, Home Applications, Mobile Users, Social Issues. **Network Hardware:** Personal Area Networks, Local Area Networks, Metropolitan Area Networks, Wide Area Networks, Internetworks. **Network Software:** Protocol Hierarchies, Design Issues for the Layers, Connection Oriented and Connectionless Services, Service Primitives, The relationship of Services to Protocols. **Reference Models:** The OSI Reference Model, The TCP/IP Reference Model, A Comparison of OSI and TCP/IP reference Model, A Critique of the OSI Model and Protocols, A Critique of the TCP/IP reference model.

**UNIT – II**

**PHYSICAL LAYER**

**Guided Transmission Media:** Magnetic Media, Twisted Pair, Coaxial Cable, **Power Lines** and Fiber Optics.

**DATA LINK LAYER**

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

**UNIT – III**



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## DEPARTMENT OF MASTER OF COMPUTER APPLICATIONS

### **THE NETWORK LAYER**

**Network Layer Design Issues:** Store and Forward Packet Switching, Services provided to the Transport Layer, Implementation of Connectionless Services, Implementation of Connection Oriented Services, Comparison of Virtual Circuit and Datagram Networks.

**Routing Algorithms:** The Optimality Principle, Shortest Path Routing, Flooding, Distance Vector Routing, Link State Routing, Hierarchical Routing.

**Congestion Control Algorithms:** Approaches to Congestion Control, Traffic-Aware Routing,



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Congestion Control, Traffic Throttling, Load Shedding.

**The Network Layer in the Internet:** The IP Version 4 Protocol, IP address.

**UNIT – IV**

**THE TRANSPORT LAYER**

**The Transport Service:** Services provided to the Upper Layers, Transport Services Primitives, and Berkeley Sockets. **Elements of Transport Protocols:** Addressing, Connection Establishment, Connection Release, Flow Control. **The Internet Transport Protocols: UDP:** Introduction to UDP, Remote Procedure Call.

**The Internet Transport Protocols: TCP:** Introduction to TCP, The TCP Service Model, The TCP Protocol, The TCP segment header, TCP connection establishment, TCP connection release, Modeling TCP connection management, TCP Transmission Policy, TCP congestion Control, TCP Timer Management, Wireless TCP and UDP, Transactional TCP.

**THE APPLICATION LAYER**

**DNS - The Domain Name System:** The DNS Name Space, Resource Records, Name Servers.

**Learning Resources**

**Text Book:**

- [1] Andrew S. Tanenbaum, “**Computer Networks**”, 5<sup>th</sup> Edition, PHI.

**Reference Books:**

- [1] Behrouz A Forouzan, “**Data Communications and Networking**”, Fourth Edition, TMH (2007).  
[2] James F. Kurose, Keith W. Ross, “**Computer Networking**”, Third Edition, Pearson Education.  
[3] Michael A. Gallo, William M. Hancock, “**Computer Communications and Networking Technologies**”, Cengage Learning (2008).

**Web Resource:**

- [1] <https://nptel.ac.in/courses/106/105/106105081/>



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## DEPARTMENT OF MASTER OF COMPUTER APPLICATIONS

### 20MCA2305: WEB DESIGN AND DEVELOPMENT

Lecture	3 hrs/week	Internal Assessment	40
Tutorial	1 hr/week	Final Examination	60
Practical	-	Credits	4

Course Outcomes	Upon successful completion of the course, the student will be able to		
	CO1	Design and implement web pages using XHTML, CSS, JavaScript.	
	CO2	Configuring the web server and how to use open source database.	
	CO3	Design and implement web pages using PHP and MYSQL.	
	CO4	Design of web pages that can handle session tracking.	

#### UNIT – I

**XHTML:** Introduction, Headers, Linking, Images, Special characters, Tables, Tables and formatting, Forms, Interlinking, Image maps, Meta Elements, Frames, Nested Frames.

**CASCADING STYLE SHEETS (CSS):** Introduction, Inline styles, Embedded style sheets, External Style Sheets, Positioning Elements, Backgrounds, Element Dimensions, Text flow and Box Model, User Style Sheets.

**Java Script:** Introduction to Scripting, Control Statements, Functions, Arrays, Objects.

#### UNIT – II

**Introduction to Apache:** Apache Explained; Starting, Stopping and Restarting Apache.

**Configuration:** Modifying the Default Configuration.

**Securing Apache:** Set User and Group, Consider Allowing Access to Local Documentation, Don't Allow Public\_html Web Site (Unless You want to), .htaccess, Remove server-status and server-info.

**Apache Log files:** Access control with .htaccess.

**Introduction to MySQL:** The SHOW DATABASE and CREATE DATABASE Commands, The USE Command, The CREATE TABLE and SHOW TABLES Commands, The DESCRIBE Command, The INSERT Command, The SELECT Command, The UPDATE Command, The DELETE Command, Some Administrative Details, Database Independent Interface, Table Joins, Loading and Dumping a Database.

#### UNIT – III



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**DEPARTMENT OF MASTER OF COMPUTER APPLICATIONS**

**Introduction:** Embedding PHP into HTML, Configuration, A Couple of Quick Examples.

**Language syntax:** Variables, Data types, Arrays, Web Variables, Operators, Flow control Constructs, Writing PHP functions.

**Built in PHP functions:** Important Functions, Array functions, String functions, Other functions.

**PHP and MYSQL:** MySQL Functions Part 1 & Part 2, More PHP MySQL Functions.

**UNIT – IV**

**Sessions and Authentication:** Introduction to Sessions, Definition of session, Perpetuation of a Session, Session Security, How PHP implements Sessions, Basic PHP Sessions, Limitations of Basic PHP Sessions.



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**DEPARTMENT OF MASTER OF COMPUTER APPLICATIONS**

Learning Resources

**Text Books:**

- [1] **"Internet and World Wide Web How To Program"**, Third Edition, H.M.Deitel, P.J.Deitel, A.B.Goldberg, PHI Pvt. Ltd., New Delhi (Unit-I).
- [2] **"Open Source Web Development with LAMP"**, James Lee and Brent Ware (Unit-II and Unit-III).
- [3] **"Professional PHP6"**, Ed Lecky-Thompson, Steven D.Nowicki, Thomas Myer(Unit-IV).

**Reference Books:**

- [1] C. Bates, **"Web Programming Building Internet Applications"**, Willey Dream Tech, 3rd edition, 2006.
- [2] Kevin Tatroe, Peter MacIntyre, **"Programming PHP"**, O,,REILLY, 3rd Edition, 2013.
- [3] Adam Trachtenberg, David Sklar, **"PHP Cookbook: Solutions and Examples for PHP Programmers"**, O,,REILLY, 2nd Edition, 2006.
- [4] Lucas Carlson, Leonard Richardson, **"Ruby Cookbook"**, O,,REILLY, 2<sup>nd</sup> Edition, 2015.
- [5] Jay McGavren, **"Head First Ruby"**, O,,REILLY, 2nd Edition, 2015.
- [6] Robert W. Sebesta, **"Programming the World Wide Web"**, Third Edition, Pearson Education (2007).
- [7] Chris Bates, **"Web Programming–Building Internet Applications"**, Second Edition, Wiley (2007).
- [8] Jeffrey C. Jackson, **"Web Technologies – A Computer Science Perspective"**, Pearson Education (2008).

**Web Resource:**

- [1] <https://nptel.ac.in/courses/106/106/106106222/>





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**PARITALA(P), KANCHIKACHERLA(M), KRISHNA (D)-521 180(A. P.)**

**DEPARTMENT OF MASTER OF COMPUTER APPLICATIONS**

**20MCA2351: DATABASE MANAGEMENT SYSTEMS LAB**

<b>Lecture</b>	-	<b>Internal Assessment</b>	40
<b>Tutorial</b>	-	<b>Final Examination</b>	60
<b>Practical</b>	3 hrs/week	<b>Credits</b>	1.5

<b>Course Outcomes</b>	Upon successful completion of the course, the student will be able to		
	<b>CO1</b>	Familiarize on different DDL Commands.	
	<b>CO2</b>	Identify the features of the DML commands.	
	<b>CO3</b>	Recognize the importance of DCL Commands.	
	<b>CO4</b>	Gain the knowledge of PL/SQL.	

**LAB CYCLE – I**

1. List the products which have highest sales.
2. Find out the details of top 5 earners of company.
3. Determine the names of employee, who earn more than their managers.
4. Find the names of clients who have placed orders worth of Rs. 10,000/- or more.
5. Determine the names of employees, who take highest salary in their departments.
6. Find the names of clients who have placed orders before the month of may 2006.
7. Find the customer names and address for the clients, who placed the order „019001“.
8. Display names of the managers who is having maximum number of employees working under him.
9. Create a view, which contain employee names and their manager names working in sales department.
10. Find out if the product is „1.44 drive“ is ordered by any client and print the client number, name to whom it is sold.

**LAB CYCLE – II**

11. Queries using Aggregate functions.
12. Nested Queries using ANY, ALL, EXISTS, NOT EXISTS.
13. Nested Queries using UNION, INTERSECT.
14. Create a user.
15. Grant/Revoke Privileges on/from Tables.

**LAB CYCLE – III**

16. Create predefined exceptions.
17. Create user-defined exceptions.
18. Create an index for fast access.
19. Lock table in Share/Exclusive mode.



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**LAB CYCLE – IV**

20. Write a PL/SQL program to display top 10 rows in emp table based on their job and salary.
21. Write a PL/SQL procedure to read the data into table as per following description:  
EMP (Empno, Ename, Address(Object), Qualification, PhoneNum (varray))



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22. Write a PL/SQL program to update the salary of a given employee using cursors.

Salary	Increment
-----	-----
<=1000	5%
> 1000 & < = 2500	10%
> 2500 & < = 4000	20%
> 4000	30%

23. Write a recursive function to calculate the  $n_{C_R}$  value.

**Learning Resources**

**Text Book:**

- [1] "Introduction to SQL", Rick F.Vander Lans, Pearson education.

**Reference Books:**

- [1] "Oracle PL/SQL", B.Rosenzweig and E.Silvestrova, Pearson education.  
[2] "Oracle PL/SQL Programming", Steven Feuerstein, SPD.  
[3] "SQL & PL/SQL for Oracle 10g", Black Book, Dr.P.S.Deshpande, Dream Tech.  
[4] "Oracle Database 11g PL/SQL Programming", M. Mc Laughlin, TMH.

**Web Resource:**

- [1] <https://nptel.ac.in/courses/106/105/106105175/>



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**20MCA2353: WEB DESIGN AND DEVELOPMENT LAB**

<b>Lecture</b>	-	<b>Internal Assessment</b>	40
<b>Tutorial</b>	-	<b>Final Examination</b>	60
<b>Practical</b>	3 hrs/week	<b>Credits</b>	1.5
<b>Course Outcomes</b>	Upon successful completion of the course, the student will be able to		
	<b>CO1</b>	Design and implement web pages using XHTML, CSS, JavaScript.	
	<b>CO2</b>	Configuring the web server and develop web pages using PHP.	
	<b>CO3</b>	Design and implement web pages using PHP and MYSQL.	
	<b>CO4</b>	Design of web pages that can handle session tracking.	
<b>LAB CYCLE – I</b>			
<ol style="list-style-type: none"><li>1. Create an XHTML Document using frames dividing the page into three frames: Top frame, Left frame and Right frame. Top frame should contain a banner. Left frame containing menu with hyperlinks and pages to the links in the left frame must be loaded in Right frame initially this page contains description of frames.</li><li>2. Create an XHTML Document that marks up your Resume using the XHTML tags.</li><li>3. Write a XHTML Document using Inline, Internal and External Cascading Style Sheets.</li><li>4. Design a Registration form using Form elements and validate it using JavaScript.</li><li>5. Write a java script program using String, Date and Math Objects.</li></ol>			
<b>LAB CYCLE – II</b>			
<ol style="list-style-type: none"><li>6. Installation and configuration of scripting language.</li><li>7. Develop web pages on making use of data types.</li><li>8. Develop web pages that make use of operators.</li><li>9. Develop web pages that make use of control structures.</li></ol>			
<b>LAB CYCLE – III</b>			
<ol style="list-style-type: none"><li>10. Develop web pages using arrays and functions.</li><li>11. Develop web pages using string functions.</li><li>12. Develop web pages to demonstrate form handling.</li><li>13. Develop web page to fetch the data from MYSQL database.</li></ol>			
<b>LAB CYCLE – IV</b>			



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14. Develop web pages to demonstrate validation of forms/active record validation.

Case study: Application Development that uses form validation.

15. Develop web pages Cookies and Sessions handling.

Case study: Application Development using the language.

**Learning Resources**

**Text Books:**

- [1] **“Internet and World Wide Web How To Program”**, Third Edition, H.M.Deitel, P.J.Deitel, A.B.Goldberg, PHI Pvt. Ltd., New Delhi.
- [2] **“Open Source Web Development with LAMP”**, James Lee and Brent Ware..
- [3] **“Professional PHP6”**, Ed Lecky-Thompson, Steven D.Nowicki, Thomas Myer.



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**Reference Books:**

- [1] C. Bates, **“Web Programming Building Internet Applications”**, Willey Dream Tech, 3rd edition, 2006.
- [2] Kevin Tatroe, Peter MacIntyre, **“Programming PHP”**, O,,REILLY, 3rd Edition, 2013.
- [3] Adam Trachtenberg, David Sklar, **“PHP Cookbook: Solutions and Examples for PHP Programmers”**, O,,REILLY, 2nd Edition, 2006.
- [4] Lucas Carlson, Leonard Richardson, **“Ruby Cookbook”**, O,,REILLY, 2<sup>nd</sup> Edition, 2015.
- [5] Jay McGavren, **“Head First Ruby”**, O,,REILLY, 2nd Edition, 2015.
- [6] Robert W. Sebesta, **“Programming the World Wide Web”**, Third Edition, Pearson Education (2007).
- [7] Chris Bates, **“Web Programming–Building Internet Applications”**, Second Edition, Wiley (2007).
- [8] Jeffrey C. Jackson, **“Web Technologies – A Computer Science Perspective”**, Pearson Education (2008).

**Web Resource:**

- [1] <https://nptel.ac.in/courses/106/106/106106222/>



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**DEPARTMENT OF MASTER OF COMPUTER APPLICATIONS**

**20MCA5354: PERSONALITY DEVELOPMENT COURSE  
(Logical Reasoning and English for Professionals)**

Lecture	-	Internal Assessment	100
Tutorial	-	Final Examination	-
Practical	2	Credits	0
Upon successful completion of the course, the student will be able to			
Course Outcomes	CO1	Assess their strengths and weaknesses, both in their personality development and productivity.	
	CO2	Solve problems in quantitative aptitude and reasoning.	
	CO3	Face interviews and group discussions with confidence and attain their realistic goals and objectives.	
<b>UNIT – I</b>			
<b>Introduction</b> – Introducing one self. <b>“Shaping Young Minds”</b> – A talk by Azim Premji – Listening activity and Discussion. R.C. Tips Self-Analysis, Developing Positive Attitude. Perception- Importance of analytical thinking. PPT – activity. <b>General Mental Ability:</b> Series completion; Coding and decoding ; Blood relations ; Puzzle test; Sequential output tracing ; Direction sense test; Logical Venn diagrams; Alphabet test.			
<b>UNIT – II</b>			
<b>Communication skills</b> – Need and Methods. PPT – activity. Body Language – I, How to interpret and understand – PPT. Body Language – II, How to improve one"s body language. PPT – activity. Anger Management – PPT. Stress Management – steps to reduce – Practical tips. Time Management – Methods of using time effectively. <b>General Mental Ability:</b> Number, Ranking& time sequence test; Mathematical operations; Logical sequence of words; Arithmetical reasoning; Inserting the missing character. Data sufficiency; Assertion and reason; Verification of the truth of the statement.			
<b>UNIT – III</b>			
Social and Business etiquettes – Video clips. Telephone and etiquette. <b>Logic reasoning:</b> Statement- conclusions.			
<b>UNIT – IV</b>			
Team Building – Leadership Qualities – Importance of a Team.			



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**Learning Resources**

**Text Books:**

- [1] Personality development - Wallace and Masters.
- [2] Winning at interview - Edgar Thorpe, Showick Thorpe.
- [3] Quantitative Aptitude - R. S. Aggarwal.
- [4] A Modern approach to Verbal and Non verbal reasoning - R.S.Aggarwal.





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### **Reference Books:**

- [1] Six thinking hats - Edward de Bono.
- [2] Communication skills in English - Shipa Sapre –Bharmal, Dinesh Kumar, Susmita Dey, Nilakshi Roy.
- [3] Technical communication - Principles and Practice - Meenakshi Raman, Sangeetha Sharma.
- [4] Personality Development and soft skills - Barun K. Mitra.

### **Web Resources:**

- [1] <https://www.indiabix.com/aptitude/questions-and-answers/>
- [2] <https://www.indiabix.com/aptitude/clock/>
- [3] <https://www.indiabix.com/online-test/aptitude-test/>



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**DEPARTMENT OF MASTER OF COMPUTER APPLICATIONS**

**20MCA2401: DATA MINING**

<b>Lecture</b>	3 hrs/week	<b>Internal Assessment</b>	40
<b>Tutorial</b>	-	<b>Final Examination</b>	60
<b>Practical</b>	-	<b>Credits</b>	3

<b>Course Outcomes</b>	Upon successful completion of the course, the student will be able to		
	<b>CO1</b>	Utilize a range of techniques for designing Data Mining and Data Warehousing Systems.	
	<b>CO2</b>	Familiarize with the functionality of the various data mining and Data Warehousing components.	
	<b>CO3</b>	Realize the strengths and limitations of various data mining and data warehousing models.	
	<b>CO4</b>	Recognize the ability of Cluster Analysis and Hierarchical Methods.	

**UNIT – I**

**Data Mining:** Introduction, Why Data Mining? What is Data Mining? What kinds of Data can be Mined? What kinds of Patterns Can be mined? Which Technologies are used? Which kinds of applications are Targeted? Major issues in Data Mining.

**Getting to Know Your Data:** Data Objects and Attribute Types, Measuring Data Similarity and Dissimilarity.

**Data Preprocessing: Data Preprocessing an Overview,** Data Cleaning, Data Integration, Data Reduction, Data Transformation and Data Discretization.

**UNIT – II**

**Data Warehousing and Online Analytical Processing:** Data Warehouse: Basic Concepts. Data Warehouse Modeling: Data Cube and OLAP. Data Warehouse Design and usage. Data Warehouse Implementation.

**UNIT – III**

**Mining Frequent Patterns, Associations and Correlations-Basic concepts and Methods:** Basic Concepts. Frequent Itemset Mining Methods.

**Classification: Basic Concepts:** Basic Concepts, Decision Tree Induction, Bayes Classification Methods, Rule-Based Classification.

**Classification Advanced Methods:** Bayesian Belief Networks, Classification by Backpropagation, Other Classification Methods.

**UNIT – IV**

**Cluster Analysis: Basic Concepts and Methods:** Cluster Analysis, Partitioning Methods, Hierarchical Methods, Density-Based Methods, Grid-Based Methods, Outlier Detection: Outliers and Outlier Analysis.



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**Learning Resources**

**Text Book:**

- [1] Jiawei Han Micheline Kamber, “Data Mining Concepts and Techniques”, Morgan Kaufmann Publishers, Third Edition.



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**Reference Books:**

- [1] S.N.Sivanandam, S.Sumathi, **"Data Mining – Concepts, Tasks and Techniques"**, Thomson (2006).
- [2] Ralph Kimball, **"The Data Warehousing Toolkit"**, Wiley.
- [3] Margaret H. Dunham, **"Data mining - Introductory and advanced topics"**, Pearson Education.
- [4] D.Hand, H. Mannila and P.Smyth, **"Principles of Data mining"**, PHI (2001).

**Web Resource:**

- [1] <https://nptel.ac.in/courses/106/105/106105174/>



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**DEPARTMENT OF MASTER OF COMPUTER APPLICATIONS**

**20MCA2403: MOBILE APPLICATION DEVELOPMENT**

<b>Lecture</b>	3 hrs/week	<b>Internal Assessment</b>	40
<b>Tutorial</b>	1 hr/week	<b>Final Examination</b>	60
<b>Practical</b>	-	<b>Credits</b>	4
<b>Course Outcomes</b>	Upon successful completion of the course, the student will be able to		
	<b>CO1</b>	Able to build their own android apps and understand how the Android™ applications work, their life cycle, and ADTs.	
	<b>CO2</b>	Have a clear understanding of intents and fragments.	
	<b>CO3</b>	Design and develop Android™ applications with menus, views, pictures, and action bars.	
	<b>CO4</b>	Able to store and manipulate data in SQLite database.	
<b>UNIT – I</b>			
<p><b>Getting Started With Android Programming:</b> What Is Android? - Android Versions, Features of Android, Architecture of Android, Android Devices in the Market, The Android Market, The Android Developer Community.</p> <p>Setting up An Android Studio Development Environment, Creating Your First Android Application, Anatomy of an Android Application.</p> <p><b>Activities, Fragments, and Intents:</b> Understanding Activities - Applying Styles and Themes to an Activity, Hiding the Activity Title, Displaying a Dialog Window, Displaying a Progress Dialog, Displaying a More Sophisticated Progress Dialog.</p>			
<b>UNIT – II</b>			
<p><b>Activities, Fragments, and Intents:</b> Fragments-Adding Fragments Dynamically, Life Cycle of a Fragment, Interactions between Fragments. Calling Built-In Applications Using Intents - Understanding the Intent Object, Using Intent Filters, Displaying Notifications.</p> <p><b>Getting to know the Android User Interface:</b> Understanding the Components of a Screen - Views and ViewGroups, LinearLayout, AbsoluteLayout, TableLayout, RelativeLayout, FrameLayout, ScrollView.</p>			
<b>UNIT – III</b>			
<p><b>Getting to know the Android User Interface:</b> Adapting to Display Orientation- Anchoring Views, Resizing and Repositioning. Utilizing the Action Bar - Adding Action Items to the Action Bar, Customizing the Action Items and Application Icon, Creating the User Interface Programmatically.</p> <p><b>Designing your User Interface with Views:</b> Using Basic Views - textView View, Button, ImageButton, EditText, CheckBox, ToggleButton, RadioButton, and RadioGroup Views, ProgressBar View, AutoCompleteTextView View.</p>			



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**UNIT – IV**

**Designing your User Interface with Views:** Using List Views to Display Long Lists- ListView View, Using the Spinner View.

**Displaying Pictures and Menus with Views:** Using Image Views to Display Pictures- Gallery and ImageView Views, Using Menus with Views- Creating the Helper Methods, Options Menu, Context Menu.



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**Data Persistence:** Creating and Using Databases- Creating the DBAdapter Helper Class, Using the Database Programmatically, Pre-Creating the Database.

**Learning Resources**

**Text Book:**

- [1] **“Beginning Android 4 Application Development”**, Wei-Meng Lee, Wiley India (Wrox).

**Reference Books:**

- [1] **“Professional Android 4 Application Development”**, Reto Meier, Wiley India, (Wrox).  
[2] **“Android Application Development for Java Programmers”**, James C Sheusi, Cengage Learning.  
[3] Sam’s **“Teach Yourself Android Application Development in 24 Hrs”**, Lauren Darcy and Shane Conder, 2ed.  
[4] **“Android apps for absolute beginners”**, Wallace Jackson, Apress.

**Web Resources:**

- [1] <https://nptel.ac.in/courses/106/106/106106147/>  
[2] [www.ebookfrenzy.com/pdf\\_previews/AndroidStudioEssentialsPreview.pdf](http://www.ebookfrenzy.com/pdf_previews/AndroidStudioEssentialsPreview.pdf)  
[Chapter 2 in the pdf - Setting up An Android Studio Development Environment (for Unit-I)]



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**DEPARTMENT OF MASTER OF COMPUTER APPLICATIONS**

**20MCA2404: DESIGN AND ANALYSIS OF ALGORITHMS**

<b>Lecture</b>	3 hrs/week	<b>Internal Assessment</b>	40
<b>Tutorial</b>	1 hr/week	<b>Final Examination</b>	60
<b>Practical</b>	-	<b>Credits</b>	4

<b>Course Outcomes</b>	Upon successful completion of the course, the student will be able to		
	<b>CO1</b>	Describe the divide-and-conquer paradigm and explain when a particular algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize divide-and-conquer algorithms, and analyze them.	
	<b>CO2</b>	Describe the greedy and dynamic programming paradigms and explain when a particular algorithmic design situation calls. Recite algorithms that employ the particular paradigm. Synthesize the greedy and dynamic programming algorithms, and analyze them.	
	<b>CO3</b>	Describe the backtracking and basic traversal and search paradigms and explain when a particular algorithmic design situation calls. Recite algorithms that employ the particular paradigm. Synthesize the backtracking and basic traversal and search algorithms, and analyze them.	
	<b>CO4</b>	Describe the branch-and-bound and NP-Hard and NP – Complete problems paradigms and explain when a particular algorithmic design situation calls. Recite algorithms that employ the particular paradigm. Synthesize the NP-Hard and NP – Complete problems algorithms, and analyze them.	

**UNIT – I**

**Introduction:** What is an algorithm, Algorithm Specification:Pseudocode Conventions, Recursive Algorithms; Performance Analysis: Space Complexity, Time Complexity, Asymptotic notations  
**Divide and Conquer:** General Method, Binary Search, Finding Maximum and Minimum, Merge Sort, Quick sort, Strassen"s Matrix Multiplication.

**UNIT – II**

**The Greedy Method:** The general method, Knapsack Problem, Job sequencing with deadlines; Minimum cost spanning trees: Prim"s Algorithm, Kruskal"s Algorithm; Optimal Storage on tapes, Optimal Merge patterns, Single Source shortest paths.  
**Dynamic Programming:** The general method, Multistage graphs, All-Pairs shortest paths, Single source shortest paths, , 0/1 Knapsack Problem, The Traveling Salesperson Problem.

**UNIT – III**





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**Basic Traversal and Search Techniques:** Techniques for Binary Trees, Techniques for graphs: Breadth First Search, Depth First Search traversals; Connected Components and Spanning Trees.  
**Backtracking:** The general method, The 8-Queens problem, Sum of Subsets, Graph coloring, Hamiltonian cycles.



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**UNIT – IV**

**Branch and Bound:** The Method: Least Cost search, Control abstractions for LC search, Bounding, FIFO Branch and Bound, LC Branch and Bound; LC Branch and Bound solution, FIFO Branch and Bound solution, Traveling Salesperson problem.

**NP-Hard and NP – Complete problems:** Basic concepts: Non deterministic algorithms, The classes NP hard and NP Complete.

**Learning Resources**

**Text Book:**

- [1] Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran **“Fundamentals of Computer Algorithms”**, Second Edition, Universities Press (2008).  
**Chapters:** 1,3,4,5,6,7,8 and 11.

**Reference Books:**

- [1] Thomas H Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, **“Introduction to Algorithms”**, Second Edition, McGraw Hill.  
[2] Anany Levitin, **“Introduction to the Design and Analysis of Algorithms”**, Second Edition, Pearson Education (2007).

**Web Resources:**

- [1] <https://nptel.ac.in/courses/106/101/106101060/>  
[2] <http://www.nptelvideos.in/2012/11/design-analysis-of-algorithms.html>



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## DEPARTMENT OF MASTER OF COMPUTER APPLICATIONS

### 20MCA2405A: ARTIFICIAL INTELLIGENCE

<b>Lecture</b>	3 hrs/week	<b>Internal Assessment</b>	40
<b>Tutorial</b>	-	<b>Final Examination</b>	60
<b>Practical</b>	-	<b>Credits</b>	3

<b>Course Outcomes</b>	Upon successful completion of the course, the student will be able to		
	<b>CO1</b>	Use logic as a representation and reasoning strategy for AI effectively.	
	<b>CO2</b>	Understand the representation schemas such as Procedural Representations, Network Representations and Structured Representations and apply these to case studies.	
	<b>CO3</b>	Select and apply a variety of graph search algorithms underpinning AI applications.	
	<b>CO4</b>	Undertake efficient searches and interpret the results of such searches.	

#### UNIT – I

**What is AI:** The AI Problems, The Underlying Assumption, What is AI Technique? The level of the Model, Criteria for Success.

**Problems, Problem spaces & Search:** Defining the Problem as a State Space Search, Production Systems, Problem Characteristics, Production System Characteristics, Issues in the design of Search Programs, Additional Problems.

**Heuristic Search Techniques:** Generate and Test, Hill Climbing, Best First Search, Problem Reduction, Constraint Satisfaction, Means Ends Analysis.

#### UNIT – II

**Knowledge Representation Issues:** Representations and Mappings, Approaches to Knowledge Representation, Issues in Knowledge Representation, The Frame Problem.

**Using Predicate Logic:** Representing Simple Facts in Logic, Representing Instance and Isa Relationships, Computable Functions and Predicates, Resolution, Natural Deduction.

**Representing knowledge using Rules:** Procedural versus Declarative Knowledge, Logic Programming, Forward versus Backward Reasoning, Matching, Control Knowledge.

#### UNIT – III

**Symbolic Reasoning under Uncertainty:** Introduction to Nonmonotonic Reasoning, Logics for Nonmonotonic Reasoning, Implementation Issues, Augmenting a Problem Solver, Implementation: Depth-First Search, Implementation: Breadth-First Search.

**Weak slot & filler Structures:** Semantic Nets, Frames.

**Planning :** Overview, An Example Domain : The Blocks World, Components of a Planning System, Goal Stack Planning, Nonlinear Planning Using Constraint Posting, Hierarchical Planning, Reactive Systems, Other Planning Techniques.



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**DEPARTMENT OF MASTER OF COMPUTER APPLICATIONS**

**UNIT – IV**

**Natural Language Processing:** Introduction, Syntactic Processing, Semantic Analysis, Discourse and Pragmatic Processing

**Commonsense:** Qualitative Physics, Commonsense Ontologies, Memory Organisation, Case-Based Reasoning.



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**DEPARTMENT OF MASTER OF COMPUTER APPLICATIONS**

**Expert Systems:** Representing and Using Domain Knowledge, Expert System Shells, Explanation, Knowledge Acquisition.

**Learning Resources**

**Text Book:**

[1] Elaine Rich, Knight K, "Artificial Intelligence", TMH (1991)

**Chapters:** 1 through 7, 9, 13, 15, 10 and 20.

**Reference Books:**

[1] Michael Negnevitsky, "Artificial Intelligence – A Guide to Intelligent Systems", Second Edition, Pearson Education (2008).

[2] Winston P.H, "Artificial Intelligence", Addison Wesley (1993).

**Web Resource:**

[1] <https://nptel.ac.in/courses/106/105/106105077/>



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**DEPARTMENT OF MASTER OF COMPUTER APPLICATIONS**

**20MCA2405B: COMPUTER GRAPHICS**

<b>Lecture</b>	3 hrs/week	<b>Internal Assessment</b>	40
<b>Tutorial</b>	-	<b>Final Examination</b>	60
<b>Practical</b>	-	<b>Credits</b>	3

<b>Course Outcomes</b>	Upon successful completion of the course, the student will be able to		
	<b>CO1</b>	Understand the overview of recent advances in Computer Graphics including applications of computer graphics.	
	<b>CO2</b>	Implement various algorithms for Generating Line, Circle and Ellipse and also familiarize with Aliasing & Anti aliasing techniques.	
	<b>CO3</b>	Implement 2D Geometric transformations on graphics objects and also understanding various clipping operations & 2D viewing concepts.	
	<b>CO4</b>	Design basic graphics application programs including animations. Understand the basic concept of Multimedia & its applications and also make acquainted with 3D Geometric Transformations & Projections.	

**UNIT – I**

**Overview of Computer Graphics:** Introduction to Computer graphics & its applications, Video Display Devices, Raster Scan Displays, Random Scan Displays, Color CRT Monitors, Direct View Storage Tubes, Flat Panel Displays, Raster Scan Systems, Random Scan Systems, Input Devices & output Devices.

**Graphical User Interfaces and Interactive Input Methods:** The User Dialogue, Windows and Icons, Input of Graphical Data, Input Functions.

**UNIT – II**

**Output Primitives:** Points and Lines, Line-Drawing Algorithms: DDA Algorithm, Bresenham's Line Algorithm, Circle Generation Algorithms, Ellipse Generation Algorithms.

**Attributes of output Primitives:** Line Attributes, Area Fill Attributes, Character Attributes, Bundled Attributes, Ant aliasing.

**UNIT – III**

**Two Dimensional Geometric Transformations:** Basic Transformations, Matrix Representation and Homogenous Coordinates, Composite Transformations, Other Transformations.

**Two Dimensional Viewing:** The Viewing pipeline, Viewing Coordinates Reference Frame, Window to Viewport Coordinate Transformations, Two Dimensional Viewing Functions, Clipping Operations, Point Clipping, Line Clipping: Cohen-Sutherland Line Clipping, Polygon Clipping: Sutherland-Hodgeman Polygon Clipping, Curve Clipping, Text Clipping, Exterior Clipping.

**UNIT – IV**



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**Three-Dimensional Object Representations:** Polygon Surfaces, Quadric Surfaces, Super quadrics.

**Three Dimensional Geometric and Modeling Transformations:** Translation, Rotation, Scaling, Composite Transformations, Three-Dimensional Transformation Functions, Projections.

**Animations:** Creating Animations: Creating Keyframes, Layers in Animation, Steps for Creating Animation, Frame-by-Frame Animation, Tweened Animations.

**Multimedia:** Introduction to Multimedia, Multimedia Applications, Building Blocks of Multimedia, Visual elements, Sound Elements, Multimedia storage.



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## DEPARTMENT OF MASTER OF COMPUTER APPLICATIONS

### Learning Resources

#### Text Books:

- [1] "Computer Graphics", 2nd Edition, Donald Hearn and M.Pauline Baker, PHI/Pearson Education. (UNIT - I, II, III).
- [2] "Computer Graphics, Multimedia and Animation", Malay K. Pakhira, PHI Publications. (UNIT - IV).

#### Reference Books:

- [1] "Computer Graphics C Version", Donald Hearn and M.Pauline Baker, Pearson Education.
- [2] "Computer Graphics 2nd Edition", Zhigand xiang, Roy Plastock, Schaum"s outlines, Tata Mc- Graw hill edition.
- [3] "Procedural elements for Computer Graphics", David F Rogers, Tata Mc Graw hill, 2nd Edition

#### Web Resources:

- [1] <https://nptel.ac.in/courses/106/106/106106090/>
- [2] <http://www.mhhe.com/ansinha/cg>





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## DEPARTMENT OF MASTER OF COMPUTER APPLICATIONS

### 20MCA2405C: DISTRIBUTED SYSTEMS

Lecture	3 hrs/week	Internal Assessment	40
Tutorial	-	Final Examination	60
Practical	-	Credits	3

Course Outcomes	Upon successful completion of the course, the student will be able to		
	CO1	List the principles of distributed systems and describe the problems and challenges associated with these principles	
	CO2	Understand Distributed Computing techniques, Synchronous and Processes	
	CO3	Design a distributed system that fulfills requirements with regards to key distributed systems properties.	
	CO4	Apply Distributed web-based system.	

#### UNIT – I

**Introduction:** Definition of a Distributed System, Goals, Hardware Concepts, Software Concepts, The Client-Server.

**Communication:** Layered Protocols, Remote Procedure Call- Basic RPC Operation, Parameter Passing, Extended RPC Models, Remote Object Invocation - Distributed Objects, Binding a Client to an Object, Static versus Dynamic Remote Method Invocations, Parameter Passing.

#### UNIT – II

**Processes:** Threads, Clients, Servers, Code Migration, Software Agents.

**Naming:** Naming Entities -Names, Identifiers and Addresses, Name Resolution, The Implementation of a Name Space. Locating Mobile Entities, Removing Unreferenced Entities.

#### UNIT – III

**Synchronization:** Clock Synchronization. Logical Clocks, Global State, Election Algorithms, Mutual Exclusion, Distributed Transactions.

**Consistency and Replication:** Introduction, Data- Centric Consistency Models, Client –Centric Consistency Models, Distribution Protocols, Consistency Protocols.

#### UNIT – IV

**Fault Tolerance:** Introduction to Fault Tolerance, Process Resilience, Reliable Client-Server Communication, Reliable Group Communication, Distributed Commit, Recovery.

**Distributed File Systems:** Sun Network File System, The Coda File System.



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**Learning Resources**

**Text Book:**

- [1] Andrew S. Tanenbaum, Maarten Van Steen, **“Distributed Systems: Principles and Paradigms”**, 2002, Pearson Education/PHI.

**Reference Books:**

- [1] **“Distributed Systems: Principles and Paradigms, A S Tanenbaum & MartiSteen”**, 2/E, PHI, 2006.  
[2] **“Distributed Systems Concepts & Design”**, Colouris, Dollimore, Kindberg, Pearson, 4/Ed. 2005.



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**Web Resource:**

[1] <https://nptel.ac.in/courses/106/106/106106107/>



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**20MCA2405D: OPTIMIZATION TECHNIQUES**

<b>Lecture</b>	3 hrs/week	<b>Internal Assessment</b>	40
<b>Tutorial</b>	-	<b>Final Examination</b>	60
<b>Practical</b>	-	<b>Credits</b>	3
Upon successful completion of the course, the student will be able to			
<b>Course Outcomes</b>	<b>CO1</b>	Formulate and solve mathematical model (linear programming problem) for a physical situations like production, distribution of goods and economics.	
	<b>CO2</b>	Solve the problem of transporting the products and assigning jobs with minimum cost.	
	<b>CO3</b>	Identify the optimal strategies for the players to win a game and optimal sequence for sequencing and scheduling problems.	
	<b>CO4</b>	Assess the resources required for a project and produce a plan and work schedule in an optimal way.	
<b>UNIT – I</b>			
<b>Linear Programming:</b> Introduction, Formulation of Linear Programming Problems, Graphical method, Standard form, Simplex method, Big-M method, Two-phase method, Dual simplex method.			
<b>UNIT – II</b>			
<b>Transportation Problem:</b> Introduction, Mathematical formulation, Basic feasible solution by Matrix minima method, Vogel"s approximation method, Optimal solution by (uv-method) Modi method, Unbalanced Transportation problem. <b>Assignment problem:</b> Formulation, Hungarian method, Maximal Assignment problem, Unbalanced Assignment problem.			
<b>UNIT – III</b>			
<b>Theory of Games:</b> Introduction, Characteristics of game theory, Minimax & Maximin principles, Saddle point, Optimal strategies and value of the game, Solution of 2x2 game, Dominance property, Graphical method for 2xn and mx2 games. <b>Sequencing and Scheduling:</b> Introduction, Johnson"s algorithm, Problems with n jobs and two machines, n jobs and m machines.			
<b>UNIT – IV</b>			
<b>Project Management:</b> Introduction, PERT and CPM , Rules for drawing network diagram, Time Estimates and critical path in network analysis, Forward pass computations, Backward pass computations, Determination of floats and slack times, Determination of critical path, Project Evaluation and Review Technique.			



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Learning Resources

**Text Book:**

[1] "Operations Research", S.D.Sharma, Kedarnath Co, Meerut.

**Reference Books:**

[1] "Operations Research, An introduction", 8/e, Taha, Pearson.



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[2] "Operations Research", 2/e, Panneerselvam.

[3] "Operations Research theory and applications", 3/e, JK Sharma, McMillan.

**Web Resource:**

[1] <https://nptel.ac.in/courses/111/107/111107128/>



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**20MCA2452: DATA MINING LAB**

<b>Lecture</b>	-	<b>Internal Assessment</b>	40
<b>Tutorial</b>	-	<b>Final Examination</b>	60
<b>Practical</b>	3 hrs/week	<b>Credits</b>	1.5
<b>Course Outcomes</b>	Upon successful completion of the course, the student will be able to		
	<b>CO1</b>	Get acquaintance with data mining tools and implement different methods of preprocessing data.	
	<b>CO2</b>	Understand the association rule mining concepts of data mining.	
	<b>CO3</b>	Implement multiple classification algorithms.	
	<b>CO4</b>	Implement and analyze clustering algorithms for different datasets.	
<b>LAB CYCLE – I</b>			
1. Introduction to weka and rapidminer tool. 2. Create a dataset and apply preprocessing techniques like Data cleaning. 3. Application of Association rule mining using apriori algorithm.			
<b>LAB CYCLE – II</b>			
4. Application of Association rule mining using FP Growth algorithm. 5. Implementation of classification technique using Decision trees. 6. Demonstration of classification technique using Naive Bayesian classifier			
<b>LAB CYCLE – III</b>			
7. Exhibiting clustering process using simple k-means and k-medians algorithm. 8. Evaluation of clustering process using DBSCAN algorithm			
<b>LAB CYCLE – IV</b>			
9. Demonstration of clustering process using BIRCH algorithm 10. Analysing the clustering algorithms.			



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**Learning Resources**

**Text Book:**

- [1] **“RapidMiner: Data Mining Use Cases and Business Analytics Applications”**  
(Chapman & Hall/CRC Data Mining and Knowledge Discovery Series) - Markus Hofmann and Ralf Klinkenberg.

**Reference Books:**

- [1] **“Data Mining: Practical Machine Learning Tools and Techniques”**, Second Edition  
(Morgan Kaufmann Series in Data Management Systems) 2nd Edition –Ian H.Witten and Eibe Frank.
- [2] J. Han and M. Kamber, **“Data Mining Concepts and Techniques”**, 2 ed, Elseiver Publishers.
- [3] A. K. PUJARI, **“Data Mining Techniques”** University Press.

**Web Resource:**

- [1] <http://www.cs.waikato.ac.nz/ml/weka/>





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**20MCA2453: MOBILE APPLICATION DEVELOPMENT LAB**

<b>Lecture</b>	-	<b>Internal Assessment</b>	40
<b>Tutorial</b>	-	<b>Final Examination</b>	60
<b>Practical</b>	3 hrs/week	<b>Credits</b>	1.5
<b>Course Outcomes</b>	Upon successful completion of the course, the student will be able to		
	<b>CO1</b>	Build custom android applications.	
	<b>CO2</b>	Design and develop apps with good user interface by using menus and views.	
	<b>CO3</b>	Design and develop apps with pictures and action bars.	
	<b>CO4</b>	Develop apps that store data in files and databases.	
<b>LAB CYCLE – I</b>			
<ol style="list-style-type: none"><li>1. Understand the architecture of Android, features of android, and Android versions.</li><li>2. Installation of the required software: JDK, Android SDK, and Eclipse IDE.</li><li>3. Create an Android application that shows “Welcome to Android” and run it on the emulator.</li></ol>			
<b>LAB CYCLE – II</b>			
<ol style="list-style-type: none"><li>4. Create an application that displays a dialog window using an activity.</li><li>5. Create an application that displays the progress of an operation.</li><li>6. Create an application that obtains result from an activity.</li><li>7. Create an application that dynamically adds a fragment.</li></ol>			
<b>LAB CYCLE – III</b>			
<ol style="list-style-type: none"><li>8. Create a screen that has input boxes for Name, Address, Gender (radio buttons for male and female), Age (numeric), Date of Birth (Date Picket), State (Spinner) and a Submit button. On clicking the submit button, print all the data below the Submit Button.</li><li>9. Use (a) Linear Layout (b) Relative Layout and (c) Grid Layout or Table Layout.</li><li>10. Create an application that uses the basic views of Android.</li></ol>			
<b>LAB CYCLE – IV</b>			
<ol style="list-style-type: none"><li>11. Develop an application that uses a menu with 3 options for dialing a number, opening a website and to send an SMS. On selecting an option, the appropriate action should be invoked using intents.</li><li>12. Create a user registration application that stores the user details in a database table.</li><li>13. Create a database and a user table where the details of login names and passwords are stored. Insert some names and passwords initially. Now the login details entered by the user should be verified with the database and an appropriate dialog should be shown to the user.</li></ol>			



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**Learning Resources**

**Web Resource:**

[1] <https://nptel.ac.in/courses/106/106/106106156/>



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**20MCA4454: SEMINAR**

<b>Lecture</b>	-	<b>Internal Assessment</b>	40
<b>Tutorial</b>	-	<b>Final Examination</b>	60
<b>Practical</b>	2 hrs/week	<b>Credits</b>	1
<b>Course Outcomes</b>	Upon successful completion of the course, the student will be able to		
	<b>CO1</b>	Choose the topic in the domain of interest in order to study literature.	
	<b>CO2</b>	Analyze the selected topic and organize the content.	
	<b>CO3</b>	Summarize and communicate the content to audience in an effective manner.	
	<b>CO4</b>	Practice the learning by self study.	



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**20MCA5455: PERSONALITY DEVELOPMENT COURSE  
(Aptitude and Campus Recruitment Training)**

<b>Lecture</b>	-	<b>Internal Assessment</b>	100
<b>Tutorial</b>	-	<b>Final Examination</b>	-
<b>Practical</b>	2 hrs/week	<b>Credits</b>	0
<b>Course Outcomes</b>	Upon successful completion of the course, the student will be able to		
	<b>CO1</b>	Assess their strengths and weaknesses, both in their personality development and productivity.	
	<b>CO2</b>	Solve problems in quantitative aptitude and reasoning.	
	<b>CO3</b>	Would face interviews and group discussions with confidence and attain their realistic goals and objectives.	
<b>UNIT – I</b>			
Introduction to topics. Vocabulary: Analogies. Sentence Completion – Sentence-Course of Action. Sentences – Assumptions, Correction of sentences. Analogy, Sentence and Arguments, Sentence and Conclusion. Paragraph Writing. <b>Arithmetical ability:</b> Numbers; H.C.F &L.C.M of numbers; Averages; Problem on numbers; Problem on ages; Percentages.			
<b>UNIT – II</b>			
Group Discussion – How to present yourself. Group Discussion – Activity practical sessions with PPTs. <b>Arithmetical ability:</b> Profit& loss; Ratio& Proportion; Partnership; Chain rule; Time& work; Pipes & cisterns.			
<b>UNIT – III</b>			
Letter Writing – Formal and Informal. CV/Resume with Practice Session. <b>Arithmetical ability:</b> Time & Distance; Problems on trains; boats & Streams; Allegation OR mixtures; Simple interest; compound interest; Area.			
<b>UNIT – IV</b>			
Interview Questions – Problem questions and Answers. Interview- Practice session with student activity and video clips. <b>Arithmetical ability:</b> Calendar; Clocks; Permutations & Combinations; Probability. <b>Data interpretation:</b> Bar graph, pie chart, Line graph, table method.			



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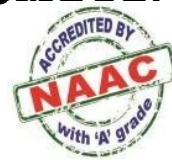


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**Learning Resources**

**Text Books:**

- [1] Personality development - Wallace and Masters.
- [2] Winning at interview - Edgar Thorpe, Showick Thorpe.
- [3] Quantitative Aptitude - R. S. Aggarwal.
- [4] A Modern approach to Verbal and Non verbal reasoning - R.S.Aggarwal.



**Reference Books:**

- [1] Six thinking hats - Edward de Bono.
- [2] Communication skills in English - Shipa Sapre –Bharmal,Dinesh Kumar, Susmita Dey, Nilakshi Roy.
- [3] Technical communication - Principles and Practice - Meenakshi Raman, Sangeetha Sharma.
- [4] Personality Development and soft skills - Barun K. Mitra.

**Web Resources:**

- [1] <https://www.indiabix.com/aptitude/questions-and-answers/>
- [2] <https://www.indiabix.com/aptitude/clock/>
- [3] <https://www.indiabix.com/online-test/aptitude-test/>

**PYTHON  
PROGRAMMING**

Course Category:	Programme Core	Credits:	3
Course Type:	Theory	Lecture -Tutorial-Practice:	3 - 0 - 0
Co - requisites:	Problem Solving	Continuous Evaluation:	30
	Methods	Semester end Evaluation:	70
	Programming in	Total Marks:	100
	C		
	Object Oriented		
	Programming		
	using Java		

**COURSE CONTENT**

**UNIT I**

Getting started: Introducing python, Need of Python Programming, python features, basic applications of python.

Variables, expressions and statements: Values and types, variables, operators,

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expressions, statements, simple I/O, interactive mode and script mode. Conditionals and

Loops: Conditional statements: using the- if, else, elif statements, creating while loops, avoiding infinite loops, using compound conditions. using for loops.

Strings: Declaring a String, using quotes with strings, using escape sequences with strings, concatenating and repeating a strings, slicing strings, string methods.

**UNIT II**

Arrays: Creating an array, importing the array module, indexing and slicing on arrays, processing an array, types of arrays, working with arrays.

Functions: Creating functions, Parameters and return values, Keyword arguments, global and local variables.

Lists: Introducing Lists, Naming and defining a list, Traversing a list, List operations, List slices, list methods.

Tuples: Introducing Tuples, creating tuples, using tuples operations.

**UNIT III**

Dictionaries: Introduction to dictionaries, creating and accessing dictionaries.

Modules: Importing a module, packages and creating a module.

Exceptions and Assertions: Difference between an error and Exception, Handling Exceptions, Built-in exceptions, and Assertions.

Files: reading and writing to text files, storing complex data in files.

Regular Expressions: Regular expressions in python.

**UNIT – IV**

Object oriented programming: object oriented basics, creating classes, methods and objects, constructors, attributes, class attributes and static methods, object encapsulation, private attributes and methods, attribute access, sending and receiving messages, combining objects, inheritance, extending a class through inheritance, altering behavior of inherited methods, understanding polymorphism.

GUI Development: examining GUI, understanding event driven programming, root window, labels, buttons, creating a GUI using a class, binding widgets and event handlers, text and entry widgets and Grid layout manager, check buttons, radio buttons.

Graphics and Plotting with Pylab – creating a graphics window, setting background image, understanding the graphics coordinate system, displaying a sprite, text, message, moving sprites, dealing with screen boundaries, handling a mouse input, a basic plot, Plotting several plots on the same graph, and Animations

**TEXT BOOKS**

- [1] Michael Dawson, -Python Programming for absolute beginners || , 3rd Edition, CENGAGE Learning Publications, 2018. (Unit I – Chapters: 1,3, Unit II – Chapters: 2, Unit III – Chapters: 1,3 and Unit IV – Chapters: 1,2,3)
- [2] Martin C. Brown, -The Complete Reference Python || , 4th Edition, McGraw Hill,2018. (Unit III – Chapters: 2 and 3)
- [3] Allen B. Downey, -Think Python || , Second Edition, O'Reilly Media, 2017. (Unit I – Chapters: 2, Unit II – Chapters: 3,4)
- [4] Web Link : [https://www.tutorialspoint.com/python/python\\_arrays.htm](https://www.tutorialspoint.com/python/python_arrays.htm) (Unit II – Chapters: 1)
- [5] Web Link for : <https://www.python-course.eu/re.php>. (Unit III – Chapters: 4)

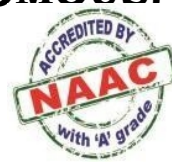
**REFERENCE BOOKS**

- [1] Charles Dierbach, – Introduction to Computer Science using Python, A Computational Problem- Solving Focus || , Wiley India , 2017.
- [2] John V. Guttag, – Introduction to Computation and Programming using Python || , 2nd Edition, PHI Publications, MIT Press , 2015.
- [3] Michael T. Goodrich, Roberto Tamassia , Michael H. Goldwasser, -Data Structures and Algorithms in Python || , Wiley publications, 2017.
- [4] Vamsi Kurama "Python Programming: A Modern Approach", 2017, Pearson Publications.
- [5] TanejaSheetal , Kumar Naveen "Python Programming: A modular approach" , Pearson Publications, 2017.
- [6] Mark Lutz, – Learning Python || , 5th Edition , O'Rielly Media, 2017.

**E-RESOURCES AND OTHER DIGITAL MATERIAL**

- [1] Prof. Madhavan Mukund , IIT Madras , "Programming, Data Structures And Algorithms Using Python",  
Available: [https://onlinecourses.nptel.ac.in/noc18\\_cs21/preview](https://onlinecourses.nptel.ac.in/noc18_cs21/preview). Last accessed on August 2018.
- [2] Prof. JoydipGhosh, "Python - A to Z Full course for beginners" Available:<https://www.udemy.com/python-django-programming-beginner-to-advance-tutorial-step-by-step/> Last accessed on August 2018.
- [3] Programming for Everybody(Python) By Prof. Charles Severance, University of Michigan in [www.coursera.com](http://www.coursera.com) URL:  
<https://www.coursera.org/course/pythonlearn> Last accessed on Aug 2018.



**PYTHON PROGRAMMING LABORATORY**

Course Category:	Programme Core	Credits:	1
Course Type:	Practical	Lecture -Tutorial-Practice:	0-0-2
Prerequisites:	C Programming Laboratory and Java Programming Laboratory	Continuous Evaluation:	30
		Semester end Evaluation:	70
		Total Marks:	100

**COURSE OUTCOMES**

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

CO1	Implement the basic concepts of Python
CO2	Implement basic data structures in python
CO3	Implement handling exceptions and files.
CO4	Develop GUI using python.

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3				1									
CO2		2	1		1								1	1
CO3			2		2				1				2	
CO4			2		3				2		2		3	3

**COURSE CONTENT**

**TASK-1:** Implement basic concepts of loops, value types, statements and variables.

**TASK-2:** Use Strings and develop a python application and analyse various string patterns.

**TASK-3:** Implement Arrays to a given application

# AMRITA SAI INSTITUTE OF SCIENCE AND TECHNOLOGY (AUTONOMOUS)



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**ACCREDITED BY NAAC WITH "A" GRADE**

**PARITALA(P), KANCHIKACHERLA(M), KRISHNA (D)-521 180(A. P.)**



## **DEPARTMENT OF MASTER OF COMPUTER APPLICATIONS**

**TASK-4:** Create a List and apply list operations in python.



**TASK-5:** Develop a dictionary and Implement dictionary operations in python.

**TASK-6:** Create a module and access members from a module.

**TASK-7:** Create an application to copy content from one file to another file

**TASK-8:** Implement the concept of classes and objects. **TASK-**

**9:** Develop a python application using inheritance **TASK-10:**

Develop a python application using polymorphism.

**TASK-11:** Implement Exception handling to a given application. **TASK-**

**12:** Develop a GUI Application using python graphics system. **TASK-13:**

Create a GUI application plot a graph with given coordinates. **Projects:**

1. Design and develop an automated ballot vote system.

2. Design and develop a banking application.

## **TEXT BOOKS & REFERENCE BOOKS**

[1] Michael Dawson, -Python Programming for absolute beginners || , 3rd Edition, CENGAGE Learning Publications, 2018. [ Unit I – Chapters: 1,3,

[2] Martin C. Brown, -The Complete Reference Python || , 4th Edition, McGraw Hill,2018.

[3] Allen B. Downey, -Think Python || , Second Edition, O'Reilly Media, 2017.

[4] Web Link : [https://www.tutorialspoint.com/python/python\\_arrays.htm](https://www.tutorialspoint.com/python/python_arrays.htm)

[5] Web Link for : <https://www.python-course.eu/re.php>. [ Unit III – Chapters: 4.3]

[6] Web Link for : [http://jakevdp.github.io/mpl\\_tutorial/tutorial\\_pages/tut1.html](http://jakevdp.github.io/mpl_tutorial/tutorial_pages/tut1.html)



**E-RESOURCES AND OTHER DIGITAL MATERIAL**

- [1] Prof. Madhavan Mukund , IIT Madras, "Programming, Data Structures And Algorithms Using Python",  
Available: [https://onlinecourses.nptel.ac.in/noc18\\_cs21/preview](https://onlinecourses.nptel.ac.in/noc18_cs21/preview). Last accessed on August 2018.
- [2] Prof. Joydip Ghosh, "Python - A to Z Full course for beginners"  
Available: <https://www.udemy.com/python-django-programming-beginner-to-advance-tutorial-step-by-step/> Last accessed on August 2018.
- [3] Programming for Everybody(Python) By Prof. Charles Severance, University of Michigan in [www.coursera.com](http://www.coursera.com)  
URL: <https://www.coursera.org/course/pythonlearn> Last accessed on Aug 2018.

**STATISTICS WITH R LABORATORY**

<b>Course Category:</b>	Open Elective	<b>Credits:</b>	1
<b>Course Type:</b>	Laboratory	<b>Lecture -Tutorial-Practice:</b>	0 - 0 - 2
<b>Prerequisites:</b>	Discrete	<b>Continuous Evaluation:</b>	30
	Mathematical Structures	<b>Semester end Evaluation:</b>	70
		<b>Total Marks:</b>	100

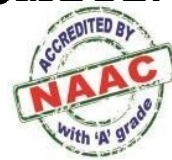
**COURSE OUTCOMES**

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

<b>CO1</b>	Apply statistical methods to data for inferences and introduce the concepts of R
<b>CO2</b>	Analyze the libraries for data manipulation and data visualization in R
<b>CO3</b>	Analyze data-sets to create testable hypotheses and identify appropriate statistical tests
<b>CO4</b>	Analyze and summarize data-sets to fit linear and nonlinear models .

**Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)**

	<b>PO</b>	<b>PO</b>	<b>PO</b>	<b>PO</b>	<b>PO</b>	<b>PO</b>	<b>PO</b>	<b>PO</b>	<b>PO</b>	<b>PO</b>	<b>PO</b>	<b>PO</b>	<b>PSO</b>	<b>PSO</b>
	1	2	3	4	5	6	7	8	9	10	11	12	1	2

**DEPARTMENT OF MASTER OF COMPUTER APPLICATIONS**

CO1	2	2			2								2	2
CO2	2	1			2								2	2
CO3	3	2		3									1	2
CO4	3	2	3	2	2								1	2

**COURSE CONTENT****Task 1**

Program to handle vectors and perform simple statistics on the vectors using R.

**Task 2**

Program to create a data frame in R and perform operations on it.



### **Task 3**

(a) Program to read data from files(.csv) and handle the data using functions like plot, hist, summary and mean, mode, median and standard deviation .

(b) Merge the datasets ,transformation of variables and creating subsets of the dataset.

### **Task 4**

a) Program to find the factorial of a number using recursion in R

b) Program to print numbers from 1 to 100 using while loop and for loop in R

### **Task 5**

Program to plot graphs -scatter plot, box plot and bar plot.

### **Task 6**

Program to create a list in R and perform operations on it like list Slicing, sum and mean functions, head and tail functions and finally delete the list using rm() function.

### **Task 7**

a) Program to implement simple and multiple linear regression.

b) Program to implement non- linear regression.

### **Task 8**

Program to implement logistic regression.

### **Task 9**

Program to perform ANOVA test (one-way, two way).

### **Task 10**

Program to perform Principal component analysis (PCA) on the dataset.

### **Task 11**

Program to perform matrix operations ( transpose, inverse, least square estimates, eigen values).

### **Task 12**

Program to handle mathematical functions with single argument.

## **TEXT BOOKS**

- [1] Norman Matloff, *The Art of R Programming*, No Starch Press, San Francisco 2011 [Unit I,II,III]



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**DEPARTMENT OF MASTER OF COMPUTER APPLICATIONS**

[2] Jared P. Lander, R for Everyone, Addison Wesley Data & Analytics Series, Pearson, 2014. [Unit III,IV]

## **REFERENCE BOOKS**

- [1] Rob Kabacoff and Dale Ogden, R in Action, Manning, Second Edition, 2018
- [2] G. Jay Kerns, Introduction to Probability and Statistics using R, First Edition, 2010

## **E-RESOURCES AND OTHER DIGITAL MATERIAL**

- [1] Mine Çetinkaya-Rundel, David Banks, Colin Rundel, Merlise A Clyde, Duke University, (08,08,2019). Statistics with R Specialization.  
**Available:** <https://www.coursera.org/specializations/statistics>
- Rafael Irizarry, Michael Love, Statistics with R, Harvard University (08, 08, 2019) Available: <https://www.edx.org/course/statistics-r-harvardx-ph5251x-1>



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**DEPARTMENT OF MASTER OF COMPUTER APPLICATIONS**



Course code	Course Name	L-T-P-Credits	Year of Introduction
CS334	Network Programming Lab	0-0-3-1	2021
<b>Pre-requisite:</b> CS307 Data Communication			
<b>Course Objectives</b> <ul style="list-style-type: none"><li>• To introduce Network related commands and configuration files in Linux Operating System.</li><li>• To introduce tools for Network Traffic Analysis and Network Monitoring.</li><li>• To practice Network Programming using Linux System Calls.</li><li>• To design and deploy Computer Networks.</li></ul>			





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## DEPARTMENT OF MASTER OF COMPUTER APPLICATIONS

List of Exercises/ Experiments (12 Exercises/ Experiments are to be completed . Exercises/  
Experiments marked with \* are mandatory)

1. Getting started with Basics of Network configurations files and Networking Commands in Linux.
2. To familiarize and understand the use and functioning of System Calls used for Operating system and network programming in Linux.
3. Familiarization and implementation of programs related to Process and thread.
4. Implement the First Readers-Writers Problem.
5. Implement the Second Readers-Writers problem.
6. Implement programs for Inter Process Communication using PIPE, Message Queue and Shared Memory.
7. Implement Client-Server communication using Socket Programming and TCP as transport layer protocol.\*
8. Implement Client-Server communication using Socket Programming and UDP as transport layer protocol.\*
9. Implement a multi user chat server using TCP as transport layer protocol.\*
10. Implement Concurrent Time Server application using UDP to execute the program at remoteserver. Client sends a time request to the server, server sends its system time back to the client. Client displays the result.\*
11. Implement and simulate algorithm for Distance vector routing protocol.
12. Implement and simulate algorithm for Link state routing protocol.
13. Implement Simple Mail Transfer Protocol.\*
14. Develop concurrent file server which will provide the file requested by client if it exists. If not server sends appropriate message to the client. Server should also send its process ID (PID) to clients for display along with file or the message.\*
15. Using Wireshark observe data transferred in client server communication using UDP and identify the UDP datagram.
16. Using Wireshark observe Three Way Handshaking Connection Establishment, Data Transfer and Three Way Handshaking Connection Termination in client server communication using TCP.
17. Develop a packet capturing and filtering application using raw sockets.
18. Design and configure a network with multiple subnets with wired and wireless LANs using required network devices. Configure the following services in the network- TELNET, SSH, FTP server, Web server, File server, DHCP server and DNS server.\*
19. Install network simulator NS-2 in any of the Linux operating system and simulate wired and wireless scenarios.

### Expected Outcome

The students will be able to

1. Use network related commands and configuration files in Linux Operating System.
2. Develop operating system and network application programs.
3. Analyze network traffic using network monitoring tools.