GODAVARI INSTITUTE OF ENGINEERING AND TECHNOLOGY (A),RAJAHMUNDRY

COURSE STRUCTURE (GRCA-20)

MASTER OF COMPUTER APPLICATIONS

Approved by AICTE, Accredited by NBA & NAAC 'A+' Grade, Recognized under 2(f) and 12(b) of UGC, Permanently Affiliated to JNTUK, Kakinada

NH-16, Chaitanya Knowledge City, Rajahmundry – 533296. E.G.Dt., - AP.

DEPARTMENT OF COMPUTER APPLICATIONS

2 YEARS MCA COURSE STRUCTURE

(2020-21)

GODAVARI INSTITUTE OF ENGINEERING AND TECHNOLOGY (A),RAJAHMUNDRY

COURSE STRUCTURE (GRCA-20)

MASTER OF COMPUTER APPLICATIONS

I Year **I Semester**

S. No.	Course Code	Course Title	Periods per week			C	Scheme of Examination Maximum Marks		
			L	T	P		Int.	Ext.	Total
1.	20309101	Probability and Statistics	3	1	-	4	30	70	100
2.	20309102	Discrete Mathematical Structures	3	1	-	4	30	70	100
3.	20300103	Problem Solving using C & Data Structures	3	1	-	4	30	70	100
4.	20300104	Computer Organization	4	-	-	4	30	70	100
5.	20300105	Database Management Systems	4	-	-	4	30	70	100
6.	20300111	C &Data Structures Lab	-	-	3	1.5	30	70	100
7.	20300112	Database Management Systems Lab	-	-	3	1.5	30	70	100
8.	20300113	Python Programming Lab	-	-	4	2	30	70	100
		Total				**25**	**240**	**560**	**800**

L- LECTURE T-TUTORIAL P – PRACTICAL C – CREDITS Int. – INTERNAL Ext. - EXTERNAL

GODAVARI INSTITUTE OF ENGINEERING AND TECHNOLOGY (A),RAJAHMUNDRY

COURSE STRUCTURE (GRCA-20)

MASTER OF COMPUTER APPLICATIONS

I Year II Semester

S. No.	Course Code	Course Title	Periods per week			C	Scheme of Examination Maximum Marks		
			L	T	P		Int.	Ext.	Total
1.	20300201	OOPS Through Java	3	1	-	4	30	70	100
2.	20300202	Operating Systems	4	-	-	4	30	70	100
3.	20300203	Software Engineering	4	-	-	4	30	70	100
4.	20300204	Design & Analysis of Algorithms	3	1	-	4	30	70	100
5.	20300205	Computer Networks	4	-	-	4	30	70	100
6.	20300211	OOPS Through Java Lab	-	-	4	2	30	70	100
7.	20300212	Operating Systems and Unix Lab	-	-	3	1.5	30	70	100
8.	20300213	Software Engineering Lab	-	-	3	1.5	30	70	100
		Total				**25**	**240**	**560**	**800**

L- LECTURE T-TUTORIAL P – PRACTICAL C – CREDITS Int. – INTERNAL Ext. - EXTERNAL

GODAVARI INSTITUTE OF ENGINEERING AND TECHNOLOGY (A),RAJAHMUNDRY

COURSE STRUCTURE (GRCA-20)

MASTER OF COMPUTER APPLICATIONS

II Year III Semester

S. No.	Course Code	Course Title	Periods per week			C	Scheme of Examination Maximum Marks		
			L	T	P		Int.	Ext.	Total
1.	20300301	Full Stack Web Development	3	1	-	4	30	70	100
2.	20300302	Data Science	3	1	-	4	30	70	100
3.	20300303	Internet of Things	3	1	-	4	30	70	100
4.	20300364(A/B/C/D)	Elective -1	4	-	-	4	30	70	100
5.	20309305	Professional Ethics	4	-	-	4	30	70	100
6.	20300311	Full Stack Web Development Lab	-	-	4	2	30	70	100
7.	20300312	Data Science with R Programming Lab	-	-	3	1.5	30	70	100
8.	20300313	Internet of Things Lab	-	-	3	1.5	30	70	100
9.	20300321	Mini Project #				2	50	-	50
		Total				**27**	**290**	**560**	**850**

L- LECTURE T-TUTORIAL P – PRACTICAL C – CREDITS Int. – INTERNAL Ext. – EXTERNAL

This can be done within the Institute /Internship in Industry during *semester break* and evaluated at the end of 3rd Sem.

LIST OF ELECTIVES

Department Elective 1:

A. Cyber Security and Forensics (20300364A)
B. Software Testing and Quality Management (20300364B)
C. Design Patterns (20300364C)
D. Simulation Modelling (20300364D)

GODAVARI INSTITUTE OF ENGINEERING AND TECHNOLOGY (A),RAJAHMUNDRY

COURSE STRUCTURE (GRCA-20)

MASTER OF COMPUTER APPLICATIONS

II Year **IV Semester**

S. No.	Course Code	Course Title	Periods per week			C	Scheme of Examination Maximum Marks		
			L	T	P		Int.	Ext.	Total
1.	20300461(A/B/C/D)	Elective -2	4	0	-	4	30	70	100
2.	20300462 (A/B/C/D)	Elective -3	4	0	-	4	30	70	100
3.	20300431	Seminar	-	-	-	2	50	-	50
4.	20300441	Project Work/Dissertation	-	-	-	10	-	100	100
		Total				**20**	**110**	**240**	**350**

L- LECTURE T-TUTORIAL P – PRACTICAL C – CREDITS Int. – INTERNAL Ext. – EXTERNAL

LIST OF ELECTIVES

Department Elective 2:

A. Digital Image Processing (20300461A)
B. Machine Learning (20300461B)
C. Big Data Analytics (20300461C)
D. MOOCS - 1 (NPTEL/SWAYAM) (20300461D) *

Department Elective 3:

A. Software Project and Process Management (20300462A)
B. Multimedia Applications and Development (20300462B)
C. Cloud Computing (20300462C)
D. MOOCS - 2 (NPTEL/SWAYAM) (20300462D) *

***Students going for Industrial Project/Thesis will complete these courses through MOOCs**

Regulation GRCA20	Godavari Institute of Engineering & Technology (Autonomous)	I MCA I Sem			
Course Code 20309101	Probability and Statistics				
Teaching	Total Contact Hours 64	L	T	P	C
Prerequisite (s) : Knowledge of data and its storage		3	1	0	4

Course Objective(s)*:*

1. To introduce the basic concepts of probability and random variables
2. To acquaint the knowledge of testing of hypothesis for small and large samples
3. To introduce the concepts of correlation and regression techniques
4. To gain the knowledge of queuing theory which can be used to solve practical computer science problems

Course Outcomes:

On completion of the course, the students will be able to-	
CO1:	Enhance the knowledge in basic statistics and probability theory
CO2:	Enhance the knowledge in statistical distributions
CO3:	Compute probabilities, expectations, covariance's, and correlations coefficients
CO4:	Construct correlation and linear regression models
CO5:	Represent given data graphically and compute in SQC and Time Series
CO6:	Enhance the knowledge in Queuing theory

Syllabus

Unit – I

Objective: To gain the knowledge in probability theorems. **(CO1)**
Probability Theory: Sample spaces Events & Probability; Discrete Probability; Union , intersection and Multiplication Probability ; Conditional probability ;Baye's theorem.

Unit – II

Objective: To gain knowledge in statistical distributions. **(CO2)**
Random variables and distribution: Random variables Discrete Probability Distributions, Continuous probability distribution, Binomial, Poisson, uniform, Exponential, Normal.

Unit – III

Objective: To gain the knowledge of testing of hypothesis for all size of samples. **(CO2, CO3)**

Expectations and higher order moments – Moment Generating Function, Characteristic functions – Laws on large numbers – Weak Laws and strong laws of large numbers. Central limit theorem.

Sampling Distribution: Populations and samples - Sampling distributions of mean (σ known and unknown) proportions, sums and differences.

Unit – IV

Objective: To find the coefficient of correlation, Regression line equations. **(CO3, CO4)**

Tests of significance –Z-test, t-test, F-test, χ^2 test. Linear correlation coefficient linear regression . Least square fit; polynomial and Curve fittings.

Unit – V

Objective: To gain the practical knowledge in statistical techniques. **(CO6)**

Queuing theory – Markov Chains – Introduction to Queuing systems – Elements of a queuing model – Exponential distribution – Pure birth and death models.

Time Series and Forecasting: Moving averages, Smoothening of curves Forecasting models and methods.

Statistical Quality Control: Mean charts, R chart p-charts etc.

Text Books:

1. Probability, Statistics and Random Processes Dr.K.Murugesan & P.Gurusamy By Anuradha Agencies, Deepti Publications
2. Probability, Statistics and Random Processes, T.Veerarajan, TMH, India

Reference Books:

1. Probability and Statistics for Engineers: Miller and Freund, PHI.
2. Probability, Statistics and Queuing Theory Applications, 2nd ed, Trivedi, John Wiley and Sons

Web Links:

1. https://lecturenotes.in/subject/69/probability-and-statistics-ps

2. http://users.encs.concordia.ca/~doedel/courses/comp-233/slides.pdf

3. https://ocw.mit.edu/courses/civil-and-environmental-engineering/1-151-probability-and-statistics-in-engineering-spring-2005/lecture-notes/

Course code		**20309101 Probability and Statistics**									
Course Designed By		Department of Computer Applications									
Program Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
Course outcomes	CO1	✓	✓								
	CO2		✓		✓						
	CO3			✓		✓					
	CO4			✓	✓	✓					
	CO5									✓	✓
	CO6						✓	✓	✓		
Category	**Programming**		**Core**		**Mathematics Based**		**Non Computer Based**		**Latest Technology**		
					✓						
Mode of Evaluation :Written Examination											

Regulation GRCA -20	Godavari Institute of Engineering & Technology (Autonomous)	I MCA I Sem			
Course Code 20309102	Discrete Mathematical Structures				
Teaching	Total Contact Hours 64	L	T	P	C
Prerequisite (s) : Familiar with sequences, series, limits, integration and differentiation		3	1	0	4

Course Objective(s):

1. To understand the basic principles of sets and operations in sets
2. To introduce concepts of mathematical logic for analyzing propositions and proving theorems
3. To understand techniques, algorithms and reasoning process involved in the study of Discrete Mathematical Structures
4. To understand the mathematical statements by means of Inductive reasoning

Course Outcomes:

On completion of the course, the students will be able to-	
CO1:	Use mathematically correct terminology and notation
CO2:	Test the logic of a program
CO3:	Identify mathematical structures on various levels.
CO4:	Identify class of functions which transform a finite set into another finite set which relates to input output functions in computer science
CO5:	Recognize the importance of analytical problem solving approach in engineering Problems
CO6:	Apply logical reasoning to solve a variety of problems

Syllabus

Unit -I
Objective: To Discuss Mathematical logic and Predicate calculus.(**CO1, CO2**)

Mathematical Logic: Statements and notations, Connectives, Well formed formulas, Truth Tables, tautology, equivalence implication, Normal forms, Theory of inference for the statement calculus, Rules of inference, Consistency of premises and indirect method of proof, Automatic Theorem Proving.

Predicate Calculus: Predicates, statement functions, variables and quantifiers, predicate formulas, free & bound variables, universe of discourse, inference theory of predicate calculus.

Unit -II
Objective: To gain knowledge about Set theory & relations and Functions.(**CO1, CO3**)

Set Theory Relations: Introduction, Relations and ordering, Properties of binary Relations, Equivalence, Compatibility Relations, Partial ordering, Hasse diagram.

Functions: Composition of functions, Inverse Function, Recursive Functions, Lattice and its Properties, Pigeon hole Principles and its application.

Algebraic Structures: Algebraic systems, Examples and general properties, Semi groups and monoids , groups, sub groups, Definitions, Examples, homomorphism, Isomorphism and related problems.

Unit -III
Objective: To discuss Elementary Combinatorics usage .(**CO4**)

Elementary Combinatorics: Basis of counting, Enumeration of Combinations & Permutations ,Enumerating of Combinations &Permutations with repetitions and constrained repetitions, Binomial Coefficients, Binomial Multinomial theorems, principles of Inclusion– Exclusion.

Unit -IV
Objective: To Discuss recurrence relations usage for solving recursive problems.(**CO5**)

Recurrence Relations:

Generating Function of Sequences, Calculating Coefficient of generating functions, Recurrence relations, Solving recurrence relation by substitution and Generating functions, The method of Characteristic roots, Solution of Inhomogeneous Recurrence Relation.

Unit -V
Objective: To Discuss Graph Theory and it's applications.(**CO5, CO6**)

Graph Theory:

Representation of Graph, Spanning Trees, BFS, DFS, Kruskal's Algorithm, Binary trees, Planar Graphs, Graph Theory and Applications, Basic Concepts, Isomorphism and Sub graphs, Multi graphs and Euler circuits, Hamiltonian graphs, Chromatic Numbers.

Text Books:

1. Discrete Mathematical Structures with Applications to Computer Science, J.P Trembley, R.Manohar, TMH
2. Discrete Mathematics for Computer Scientists & Mathematicians, J.L.Mott, A.Kandel, T.P.Baker, PHI

Reference Books:

1. Elements of Discrete Mathematics, C L Liu and D P Mohanpatra, TMH

2. Discrete Mathematics, Schaum's Outlines, Lipschutz and Lipson,TMH.
3. Discrete Mathematical Structures, Kolman, Busby and Ross, 6th ed., PHI, 2009.
4. Discrete Mathematics, Johnsonbaugh, 6th ed., Pearson, 2005.

Web Links:

1. http://jkdirectory.blogspot.in/2010/11/mfcs.html
2. http://cs.bme.hu/fcs/graphtheory.pdf
3. http://math.tut.fi/~ruohonen/GT_English.pdf

COURSE CODE	**20309102 Discrete Mathematical Structures**									
COURSE DESIGNED BY	DEPARTMENT OF COMPUTER APPLICATIONS									
Program Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
Course outcomes	CO1	✓	✓								
	CO2		✓		✓						
	CO3					✓					
	CO4		✓			✓			✓		
	CO5				✓						
	CO6				✓						✓
Category	**Programming**	**Core**		**Mathematics Based**		**Non Computer Based**		**Latest Technology**		
				✓						
Mode of Evaluation :Written Examination										

Regulation GRCA-20	Godavari Institute of Engineering & Technology (Autonomous)	I MCA I Sem			
Course Code 20300103	Problem Solving using C & Data Structures				
Teaching	Total Contact Hours 64	L	T	P	C
Prerequisite (s) : Problem Solving		3	1	0	4

Course Objective(s):

1. To impart adequate knowledge on the need of programming languages and problem solving techniques
2. To develop programming skills using the fundamentals and basics of C Language
3. To enable effective use of arrays, structures, functions, pointers and memory management concepts
4. To understand the concepts of data structure , choosing appropriate data for specified application

Course Outcomes:

On completion of the course, the students will be able to-	
CO1:	Write clear, elementary C programs, understand algorithmic thinking and apply it to Programming
CO2:	Apply for problem-solving techniques
CO3:	Code with C arithmetic, increment, decrement, assignment, relational, equality and logical operators
CO4:	Code C control structures (if, if/else, switch, while, do/while, for) and use built-in data types
CO5:	Use standard library functions and write user-defined function definitions
CO6:	Identify and implement different data structure concepts for realistic problems

Syllabus

Unit - I

Objective: To learn how to write an algorithm, computational procedure, editing and executing programs and understanding branching, iteration. (CO1, CO2, CO3)

Introduction to Programming: Algorithm / Pseudo code, flowchart, program development steps, Computer languages.

Basics of C: Structure of a C program, identifiers, basic data types and sizes. Constants, Variables, Operators, expressions, type conversions, Conditional Expressions, precedence and order of evaluation.

Selection Statements: Simple if, If-else, nested if, if-else-if ladder and switch statements.

Iterations: Loops- while, do-while and for statements.

Jumping Statements: break, continue, goto and return

Unit - II

Objective: To understand data representation using arrays , modular programming and recursive solution formulation.(**CO4,CO5**)

Arrays: Arrays- concepts, declaration, definition, accessing elements, storing elements, 1-D arrays, 2-D arrays, Multidimensional arrays, array applications: Matrix operations**,** Strings and String Manipulations.

Functions- modular programming: Functions, basics, parameter passing, storage classes, scope rules, user defined functions, standard library functions, recursive functions, header files, C Preprocessor.

Unit - III
Objective: To know about pointers, enumerated types, derived types and file handling. (**CO1, CO5**)

Pointers: Pointers- concepts, initialization of pointer variables, pointers and function arguments, passing by address- dangling memory, address arithmetic, character pointers and functions, pointers to pointers, pointers and multi-dimensional arrays, dynamic memory management functions, command line arguments

Enumerated and Derived types: Structure, Union and enum.

File handling: Concept of a file, text files and binary files, Formatted I/O, File I/O operations, example programs.

Unit - IV
Objective: To Overview the basic concepts of data structure, various searching and sorting techniques and introduce the stack and queue data structure operations and applications **(CO6)**

Searching and Sorting *– Sorting- selection sort, bubble sort, insertion sort, quick sort, merge sort, Searching-linear and binary search methods.*
Data Structures *– Introduction to Data Structures, abstract data types, Linear list – linked list implementation, insertion, deletion and searching operations on linear list, Stacks-Operations, array and linked representations of stacks, stack application-infix to postfix conversion, postfix expression evaluation, recursion implementation, Queues-operations, array and linked representations.*

Unit -V
Objective: To know the tree and graph data structures, operations and its applications **(CO6)**

Trees – Terminology, Representation of Trees, Properties of Binary Trees, Binary Tree traversals, Max Heap-Definition, Insertion into a Max Heap, Deletion from a Max Heap. Graphs – Introduction, Definition, Terminology, Graph Representations- Adjacency matrix, Adjacency lists, Graph traversals- DFS and BFS.

Text Books:

1. C Programming, A Problem Solving Approach, Forouzan, Gilberg and Prasad, CENGAGE
2. Data Structures using C, R.Thareja, Oxford University Press.

Reference Books:

2. Programming with C, Bichkar, Universities Press
3. Programming in C, Reema Thareja, OXFORD
4. Fundamentals of Data structures in C, 2nd Edition, E.Horowitz, S.Sahni and Susan Anderson-Freed, Universities Press.
5. Data Structures, S.Lipscutz, Schaum's Outlines, TMH

Web Links:

1. https://www.eskimo.com/~scs/cclass/notes/top.html
2. https://www.tutorialspoint.com/cprogramming/cprogramming_tutorial.pdf
3. www.cprogramming.com/tutorial/c/lesson1.html

COURSE CODE		**20300103 Problem Solving using C & Data Structures**									
COURSE DESIGNED BY		DEPARTMENT OF COMPUTER APPLICATIONS									
Program Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
Course outcomes	CO1	✓									
	CO2		✓								
	CO3	✓	✓								
	CO4	✓	✓								
	CO5			✓	✓	✓					
	CO6			✓				✓	✓	✓	✓
Category	**Programming**	**Core**		**Mathematics Based**		**Non Computer Based**		**Latest Technology**			
	✓										
Mode of Evaluation :Written Examination											

Regulation GRCA-20	Godavari Institute of Engineering & Technology (Autonomous)	I MCA I Sem			
Course Code 20300104	Computer Organization				
Teaching	Total Contact Hours 64	L	T	P	C
Prerequisite (s) : Logical Thinking & Analytics		4	0	0	4

Course Objective(s):

1. To understand basic number systems, codes and logical gates
2. To understand the concepts of Boolean algebra
3. To understand the design of combinational and sequential circuits
4. To understand the basics of various types of memories

Course Outcomes:

On completion of the course, the students will be able to-	
CO1:	Understand number system and codes
CO2:	Solve Boolean expressions using minimization and maximization methods
CO3:	Design sequential and combinational circuits
CO4:	Know the architecture of modern computer
CO5:	Understand CPU Instruction set format and addressing modes and micro program control
CO6:	Gain knowledge in Memory and IO organization

Syllabus

Unit – I

Objective: To have a thorough understanding of the basic structure and operation of a digital computer. **(CO1, CO2, CO3)**

Digital Logic Circuits: Digital Computers, Logic Gates, Boolean algebra, Map Simplification, Combinational Circuits, Flip-flops, Sequential Circuits. Digital Components: Integrated Circuits, Decoders, Multiplexers, Registers, Shift Registers, Binary Counters, Memory Unit.

Unit – II

Objective: To discuss in detail Data types , micro operations and Computer Organization Design**(CO1, CO4)**

Data Representation: Data types, Complements, Fixed-point Representation, Floating-point representation, other binary codes, Error detection Codes. Register Transfer and Micro operations: Register transfer language, Register transfer, Bus & memory Transfers, Arithmetic micro operations, logic micro operations, Shift micro operations, Arithmetic Logic Shift Unit Basic Computer Organization and Design: Instruction Codes, Computer registers, Computer

Instructions, Timing and Control, Instruction Cycle, Memory-Reference Instructions, Input-output Interrupt

Unit – III
Objective:. To study the Micro programmed control and CPU **(CO5)**

Micro programmed Control: Control memory, Address Sequencing, Micro program Example, Design of control Unit. Central Processing Unit: General Register Organization, Stack Organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Program Control

Unit – IV
Objective: To discuss in detail the operation of the arithmetic unit including the floating-point addition, subtraction, multiplication & division. **(CO1)**

Computer Arithmetic: Introduction, Addition and subtraction, Multiplication algorithm, Floating point arithmetic operations, Decimal Arithmetic unit, Decimal Arithmetic operations.

Unit – V
Objective: To study the hierarchical memory system including cache memories **(CO6)**

To study the different ways of communicating with I/O devices and standard I/O interfaces.

Input-Output Organization: Peripheral Devices, Input-Output Interface, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt Memory Organization: Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory

Text books:

1. Computer System Architecture, 3rd ed ., M. Morris Mano, PHI, 1994
2. Digital Logic and Computer Organization, Rajaraman, Radhakrishnan, PHI, 2006

Reference Books:

1. Computer Organization and Architecture, V. Rajaraman, T. Radha Krishnan, PHI
2. Computer Organization, 5th ed., Hamacher, Vranesic and Zaky, TMH,2002
3. Computer System Organization & Architecture, John D. Carpinelli,Pearson, 2008
4. Computer Organization & Architecture: Designing for Performance, 7th ed., William Stallings, PHI, 2006

Web Links:

1. http://www.alljntuworld.in/download/digital-logic-design-dld-materials-notes/
2. http://www.scoopworld.in/2015/04/digital-logic-designdld-jntu-2-1-cse.html
3. https://www.smartzworld.com/notes/digital-logic-design-dld/

COURSE CODE		**20300104 Computer Organization**									
COURSE DESIGNED BY		DEPARTMENT OF COMPUTER APPLICATIONS									
Program Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
Course outcomes	CO1		✓								
	CO2	✓	✓		✓						
	CO3		✓								
	CO4				✓	✓					
	CO5		✓			✓					
	CO6								✓		✓
Category	**Programming**	**Core**		**Mathematics Based**		**Non Computer Based**		**Latest Technology**			
		✓									
Mode of Evaluation :Written Examination											

Regulation GRCA20	Godavari Institute of Engineering & Technology (Autonomous)	I MCA I Sem			
Course Code 20300105	Data Base Management Systems				
Teaching	Total Contact Hours 64	L	T	P	C
Prerequisite (s) : Knowledge of data and its storage		4	0	0	4

Course Objective(s)*:*

1. To understand terms related to database design and management
2. To know how to organize, maintain and retrieve information efficiently and effectively from DBMS
3. To understand relational model and relational database management system
4. To understand database performance issues

Course Outcomes:

On completion of the course, the students will be able to-	
CO1:	Analyze the difference between traditional file system and DBMS
CO2:	Write relational algebra expressions for queries
CO3:	Deal with online transactions and control concurrency
CO4:	Work with indexing and sorting in disk files
CO5:	Improve the database design by normalization
CO6:	Convert the ER-Model to relational tables, populate relational database and formulate SQL queries on data

Syllabus

Unit – I

Objective: To know about the database system applications, data models, Database design and ER Diagrams. **(CO1, CO6)**

Introduction: Data base System Applications, data base system Vs file system, View of Data, Data Abstraction, Instances and Schemas, data Models , the ER Model, Relational Model, Other Models, Database Languages , DDL , DML , database access for applications programs , data base Users and Administrator , Transaction Management , data base System Structure , Storage Manager ,the Query Processor , History of Data base Systems.

Data base design and ER diagrams, Beyond ER Design Entities, Attributes and Entity sets, Relationships and Relationship sets, Additional features of ER Model, Concept Design with the ER Model, Conceptual Design for Large enterprises.

Unit – II

Objective: To construct relational model and relational algebra. **(CO2)**

Relational Model: Introduction to the Relational Model , Integrity Constraint Over relations , Enforcing Integrity constraints ,Querying relational data , Logical data base Design , Introduction to Views , Destroying /altering Tables and Views

Relational Algebra and Calculus: Relational Algebra, Selection and projection set operations , renaming , Joins , Division ,Examples of Algebra overviews , Relational calculus , Tupple relational Calculus , Domain relational calculus , Expressive Power of Algebra and calculus.

Unit – III

Objective: To acquire the knowledge of query evaluation and designing of database applications using normalization.**(CO2, CO5)**

Overview of SQL Query Language :Form of Basic SQL Query , Examples of Basic SQL Queries , Introduction to Nested Queries , Correlated Nested Queries Set ,Comparison Operators , Aggregative Operators , NULL values , Comparison using Null values , Logical connectivity's , AND,OR and NOR , Impact on SQL Constructs , Outer Joins , Disallowing NULL values , Complex Integrity Constraints in SQL Triggers and Active Data bases. Schema refinement , Problems Caused by redundancy , Decompositions , Problem related to decomposition , reasoning about FDS , FIRST, SECOND, THIRD Normal forms , BCNF , Lossless join Decomposition , Dependency preserving Decomposition , Schema refinement in Data base Design , Multi valued Dependencies , forth Normal Form - fifth Normal Form- Inclusion dependencies.

Unit – IV

Objective: To impart knowledge in transaction processing, concurrency control techniques and recovery procedures**.(CO3)**

Overview of Transaction Management: ACID Properties , Transactions and Schedules , Concurrent Execution of transaction ,Lock Based Concurrency Control , Performance Locking , Transaction Support in SQL , Introduction to Crash recovery.

Concurrency Control: Serializability, and recoverability , Introduction to Lock Management , Lock Conversions , Dealing with Deadlocks , Specialized Locking Techniques , Concurrency without Locking.

Crash recovery: Introduction to ARIES, the Log, and Other Recovery related Structures, the Write-Ahead Log Protocol, Check pointing recovering from a System Crash, Media recovery, other approaches and Interaction with Concurrency control.

Unit – V

Objective: To gain the knowledge on indexing structures. **(CO4)**

Overview of Storage and Indexing: Data on External Storage , File Organization and Indexing , Cluster Indexes, Primary and Secondary Indexes , Index data Structures , Hash Based Indexing , Tree base Indexing , Comparison of File Organizations .

Overview of Query Evaluation: Tree Structured Indexing: Intuitions for tree Indexes , Indexed Sequential Access Methods (ISAM) , B+ Trees: A Dynamic Index Structure. Hash Based Indexing: Static Hashing , Extendable hashing , Linear Hashing , Extendable vs. Linear hashing .Storing data in disks and file .The memory hierarchy , Redundant arrays of independent disks.

Text Books:

1. Data base Management Systems- 3/e, Raghu rama Krishnan and Johannes Gehrke- TMH.
2. Data base System Concepts- 6/e, Silberschatz, Korth- TMH

Reference Books:

1. Data base Management System, 5/e, Elmasri Navathe, Pearson
2. Introduction to Database Systems, 8/e, C.J.Date, Pearson
3. Data base Systems design, Implementation, and Management, 5/e, Rob, Coronel and Thomson
4. Database Management systems, Garcia-Molina, Ullman and Widom, Pearson
5. Database Management Systems, Majumdar and Bhattacharyya, TMH.
6. Database System Concepts, Peter Rob and Coronel, Cengage.

Web Links:

1. https://books.google.co.in/books?id=pk5GAQAAIAAJ&redir_esc=y
2. http://www.britannica.com/technology/database-management-system

Course code		**20300105 Data Base Management Systems**									
Course Designed By		Department of Computer Applications									
Program Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
Course outcomes	CO1		✓			✓					
	CO2			✓	✓	✓					
	CO3						✓	✓	✓		
	CO4		✓								
	CO5							✓	✓	✓	✓
	CO6				✓	✓					
Category		**Programming**	**Core**		**Mathematics Based**		**Non Computer Based**		**Latest Technology**		
			✓								
Mode of Evaluation :Written Examination											

Regulation GRCA-20	Godavari Institute of Engineering & Technology (Autonomous)	I MCA I Sem			
Course Code 20300111	C &Data Structures Lab				
Teaching	Total Contact Hours 48	L	T	P	C
Prerequisite (s) : Numerical Exploration, Expression Evaluation ,Advanced Control Flow		0	0	3	1.5

Course Objective(s):

1. To know the concepts in problem solving.
2. To write diversified solutions using C language.
3. To write and execute programs in C to solve problems using data structures such as arrays, linked lists, stacks, queues, trees, graphs, hash tables
4. To write and execute programs in C for various sorting and searching methods**.**

Course Outcomes:

On completion of the course, the students will be able to-	
CO1:	Recognize constants, variables, identifiers, operators, type conversion and other building blocks of C Language.
CO2:	Use of conditional expressions and looping statements to solve problems Associated with conditions and repetitions.
CO3:	Use functions involving the idea of modularity.
CO4:	Construct structures and unions through which derived data types can be formed
CO5:	Implement file handling for permanent storage of data or record.
CO6:	Identify the appropriate data structure for given problem.

Recommended Systems/Software Requirements:

Intel based desktop PC, A N S I C Compiler with Supporting Editors, IDE's such as Turbo C

List of experiments:

1. Write a C Program to calculate the area of triangle using the formula area = (s (s-a) (s-b)(s-c))1/2 , where s= (a+ b +c)/2 (**CO1, CO2**)
1. Write a C program to find the 2"s complement of a binary number. (**CO1, CO2**).
2. Write a C program to find the roots of a quadratic equation. **(CO1, CO2)**
3. Write a C program, which takes two integer operands and one operator form the user, performs the operation and then prints the result. (Consider the operators +,-,*, /, % and use Switch Statement(**CO1, CO2**).
4. Write a C program to find the sum of individual digits of a positive integer and find the reverse of the given number. (**CO1, CO2**)

5. A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. (**CO1, CO2)**
6. Write a C program to generate all the prime numbers between 1 and n, where n is a value Supplied by the user.(**CO1, CO2)**
7. Write a C Program to enter a decimal number, and calculate and display the binary equivalent of that number. **(CO1, CO2)**
8. Write a C Program to check whether the given number is Armstrong number or not. **(CO1, CO2)**
9. Write a C program to interchange the largest and smallest numbers in the array. (**CO1, CO2**)
10. Write C programs illustrating call by value and call by reference concepts.(**CO3)**
11. Write C Programs for the following string operations without using the built in functions(**CO3**)
    a. to concatenate two strings
    b. to append a string to another string
    c. to compare two strings.
    d. to find t he length of a string
    e. to find whether a given string is palindrome or not
12. Write C programs that use both recursive and non recursive functions for the following(**CO3**)
    a. To find the factorial of a given integer.
    b. To find the GCD of two given integers.
    c. To find Fibonacci sequence.
13. Write a C program which copies one file to another. (**CO5**)
14. Write a C program to count the number of Characters and number of lines in a file. (**CO5)**
15. Write a C Program to merge two files into a third file. The names of the files must be entered using command line arguments. **(CO2, CO5)**
16. Write a C program to implement a linear search. **(CO2,CO6)**
17. Write a C program to implement binary search.(**CO2, CO6)**
18. Write C program for implementing Bubble sort to arrange a list Of integers in Ascending order :(**CO2, CO6)**
19. Write C program for implementing Insertion sort to arrange a list Of integers in Ascending order :(**CO2, CO6)**
20. Write C program for implementing Selection sort to arrange a list Of integers in Ascending order : (**CO2, CO6)**
21. Write C program for implementing Merge sort to arrange a list Of integers in Ascending order : (**CO2, CO6**)
22. Write C program for implementing Quick sort to arrange a list Of integers in Ascending order : (**CO2, CO6**)
23. Write a C program that uses functions to perform the following: (**CO2, CO6**)

a. Create a stack of integers.
b. Delete a given integer from the above .
c. Display the contents of the above .

24. Write a C program that uses functions to perform the following: (**CO2, CO6**)
    a. Create a queue of integers.
    b. Delete a given integer from the above .
    c. Display the contents of the above .
25. Write a C program that uses functions to perform the following: (**CO2, CO6**)
    a. Create a singly linked list of integers.
    b. Delete a given integer from the above linked list.
    c. Display the contents of the above list after deletion.
26. Write a C program that uses functions to perform the following: (**CO2, CO6**)
    a. Create a doubly linked list of integers.
    b. Delete a given integer from the above doubly linked list.
    c. Display the contents of the above list after deletion
27. Write a C program to Implement a B-tree (**CO2, CO6**)
28. Write a C program to Implement a Binary Search Tree (**CO2, CO6**)
29. Write C programs for implementing DFS graph traversal algorithms (**CO2, CO6**)
30. Write C programs for implementing Breadth first traversal graph traversal algorithms (**CO2, CO6**)

References:

1. C programming and Data Structures, P. Padmanabham, Third Edition, BS Publications
2. Data Structures: A pseudo code approach with C, second edition R.F. Gilberg and B.A. Forouzan
3. Programming in C, P.Dey and M. Ghosh, Oxford Univ.Press.

COURSE CODE		**20300111 C &Data Structures Lab**									
COURSE DESIGNED BY		DEPARTMENT OF COMPUTER APPLICATIONS									
Program Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
Course outcomes	CO1	✓	✓								
	CO2			✓	✓						
	CO3			✓	✓						
	CO4			✓		✓					
	CO5				✓						
	CO6								✓	✓	✓
Category	**Programming**		**Core**		**Mathematices Based**		**Non Computer Based**		**Latest Technology**		
	✓										
Mode of Evaluation :Written Examination											

Regulation GRCA-20	Godavari Institute of Engineering & Technology (Autonomous)	I MCA I Sem			
Course Code 20300112	Database Management Systems Lab				
Teaching	Total Contact Hours 48	L	T	P	C
Prerequisite (s) : Knowledge of database systems		0	0	3	1.5

Course Objective(s):

1. To learn systematic database design approaches covering conceptual design, logical design and an overview of physical design.
2. To present the concepts and techniques relating to query processing by SQL engines.
3. To learn the concepts and techniques relating to PL/SQL.
4. Understand the issues and techniques relating to concurrency and recovery in multiuser database environment.

Course Outcomes:

On completion of the course, the students will be able to-	
CO1:	Design ER-Model for given requirements and convert the same into database tables
CO2:	Design ER-Model for given requirements and convert the same into database tables
CO3:	Develop the ability to handle databases of varying complexities
CO4:	Work with objects in databases.
CO5:	Develop Table ,View, Log & Triggers.
CO6:	Use PL/SQL for working with data

List of Programs

SQL

Experiment 1:

DDL Commands: **(CO4,CO1)**

a. Table Creation : EMP(eid-PK, ename, dob, desg, salary, dno-FK)
DEPT(dno-PK,dname, location)
PRODUCT(pno-PK, pname, dom, price)
STUDENT(pin-PK, name, dob, prg)
ACCOUNT(accno-PK,name,balance)

b. Command : Alter :

- Adding Constraints to the Table like not null,check,default etc.

- Changing size and type of a column
- Removing a column from the table

c. Command : Truncate
d. Command : Drop
e. Command : Rename

Experiment 2:

DML commands: (Tables of week 1) **(CO2)**

a. Queries on Insert Command (Inserting Records in all 5 tables)
   - Inserting single rows with values
   - Inserting multiple rows by using '&'
   - Inserting values in some columns
b. Queries on Update Command
   - Updating all records
   - Updating some records based on condition
c. Queries on Delete Command
   - Deleting all records
   - Deleting records based on condition

Experiment 3:

DRL Command: (Tables of week 1) **(CO2)**

a. Listing Records
b. Listing Records using operators like AND,OR,BETWEEN,LIKE etc
c. Listing Records using Order By Clause
d. Listing Records using Group By Clause

Experiment 4:

DRL Command: (Tables of week 1) **(CO6)**

a. Listing Records using Nested Statements
b. Listing Records using Aggregate Functions-count,sum,max etc.
c. Listing Records using built-in functions – length,power,trim etc.

Experiment 5:

Creation of View V1 for EMP Table **(CO3)**

a. Insertion using View V1
b. Deletion using View V1
c. Updation using View V1
d. Retrieval using View V1

Experiment 6:

TCL and DCL Commands: **(CO1)**

a. Creating a User
b. Granting Permissions to the User
c. Revoking Permissions of the User
d. Saving a Transaction
e. Creating Savepoints

f. Undo a Transaction

Experiment 7:
Implement the Bank Database and execute the given queries/updates(CO1,CO2,CO3)

Bank Database Schema:

account(account_number, branch_name, balance)
branch (branch_name, branch_city, assets)
customer (customer_name customer_street, customer_city)
loan (loan_number, branch_name, amount)
depositor((customer_name, account_number)
borrower(customer_name, loan_number)

Queries/Updations on Bank Database

Retrieving records from a table:

a. List all branch names and their assests
b. List all accounts of Brooklyn branch
c. List all loans with amount > 1000.
d. List all accounts of Perryridge branch with balance < 1000.
e. List Numbers of accounts with balances between 700 and 900

Updating records from a table:

a. Change the assests of Perryridge branch to 340000000.
b. Transfer the accounts and loans of Perryridge branch to Downtown branch.
c. Transfer Rs. 100 from account A-101 to A-215.

Deleting records from a table:

a. Delete the branch Perryridge.
b. Waive off all the loans with amount < 1000.
c. Delete the accounts and loans of Downtown branch.

Experiment 8: (Table of Week 6 to be used) **(CO1,CO2,CO3)**

Modifying the structure of tables:

a. Add a column phoneNo to customer table.
b. Change the size of the branch_city to varchar(20).
c. Drop the column phoneNo from customer table.

Retrieving records from multiple tables

a. For all customers who have a loan from the bank, find their names, loan numbers, and loan amount.
b. Find the customer names, loan numbers, and loan amounts, for all loans at the Perryridge branch.

Rename and Tuple Variables(Use as in select and from)

a. For all customers who have a loan from the bank, find their names and loan numbers with the attribute loan_number replaced by loan_id.
b. Find the names of all branches that have assets greater than atleast one branch located in Brooklyn.

String Operations (Use %, _, LIKE)

a. Find the names of all customers whose street address includes the substring 'Main'.

Ordering the display of Tuples(Use ORDER BY ASC DESC)

a. List loan data, ordered by decreasing amounts, then increasing loan numbers.

PL/SQL

Experiment 9: **(CO5)**

- PL/SQL Program To Add Two Numbers
- PL/SQL Program for Prime Number
- PL/SQL Program to Find Factorial of a Number
- PL/SQL Program to Print Table of a Number
- PL/SQL Program for Reverse of a Number

Experiment 10:

- PL/SQL code block to calculate the area of the circle for a value of radius varying from 3 to 7. Store the radius and the corresponding values of calculated area in a table Area.**(CO5)**
- PL/SQL block of code for inverting a number 5639 or 9365. **(CO5)**
- PL/SQL block which displays area for a given radius. If no data found then display an error message.**(CO5)**

Experiment 11:

- PL/SQL block of code to achieve the following: if the price of Product 'p00001' is less than 4000, then change the price to 4000. The Price changes to be recorded in a separate table along with Product no and the date on which the price was last changed. (Table: PRODUCT). **(CO1,CO5)**

- PL/SQL block that will display the name, department and salary of the first 10 employees getting the highest salary(Table –EMP,DEPT) **(CO5)**

Experiment 12:

- PL/SQL block that will display the name, department of all employees using Cursor. (Table –EMP,DEPT) **(CO5)**

- Create a package to include the following: **(CO5)**
  a. A named procedure to list the employee names of given department .(Table : EMP,DEPT)
  b. A function which returns the max salary for the given department .(Table : EMP,DEPT)

Experiment 13: **(CO5)**

- PL/SQL code for retrieving records based on single fields from STUDENT Table.
- PL/SQL code for retrieiving records based on full rows from STUDENT Table

Experiment 14: **(CO5)**

- PL/SQL code for creating a high function that finds the employee with highest salary from EMP Table.
- PL/SQL code for creating procedure that finds the largest among three given values

Experiment 15:

- PL/SQL code for creating function to join name and designation from the EMP Table. **(CO5)**
- PL/SQL block of code that lists the highest salary drawn by an employee in each of the departments. It should make use of a function dept_highest which return the highest salary drawn by an employee for the given department .(Table : EMP,DEPT) **(CO5)**

Experiment 16:

- Write a row trigger to convert names entered by user to uppercase for EMP Table**.(CO4)**
- Write a row trigger to insert the existing values of the salary table into a new table when the salary in EMP table is updated **.(CO4)**

Course code		**20300112 Database Management Systems Lab**									
Course Designed By		Department of Computer Applications									
Program Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
Course outcomes	CO1	✓							✓		
	CO2		✓				✓				
	CO3		✓				✓				
	CO4			✓							
	CO5				✓			✓			
	CO6			✓						✓	

Category	**Programming**	**Core**	**Mathematics Based**	**Non Computer Based**	**Latest Technology**
	✓				

Mode of Evaluation :Written Examination

Regulation GRCA-20	Godavari Institute of Engineering & Technology (Autonomous)	I MCA I Sem			
Course Code 20300113	**Python Programming Lab**				
Teaching	**Total Contact Hours 48**	**L**	**T**	**P**	**C**
Prerequisite (s) : Knowledge of general programming concepts		**0**	**0**	**4**	**2**

Course Objective(s)*:*

1. To understand the basics Python Programming concepts
2. To understand the development of applications using Python.
3. To understand file handling in python.
4. To illustrate the application of matrices and regular expressions in building the python programs.

Course Outcomes:

On completion of the course, the students will be able to-	
CO1:	Design, create, build, and debug Python applications
CO2:	Express different decision making statements and functions
CO3:	Design and develop client server network applications using python
CO4:	Interpret the concepts of object-oriented programming as used in python using encapsulation, polymorphism and inheritance
CO5:	Create one and two dimensional arrays for sorting, calculating, and displaying of data
CO6:	Discover the capabilities of python regular expression for data verification and utilize matrices for building performance efficient python programs

Requirements: Python 2.7/3 for Windows, Editor: Notepad

List of Programs:

1. Write a Python program which accepts the user's first and last name and print them in reverse order with a space between them. (CO1)
2. Write a Python program which accepts a sequence of comma-separated numbers from user and generate a list and a tuple with those numbers. (CO1)
3. Write a Python program to print the calendar of a given month and year. (CO1)
4. Write a Python program to calculate number of days between two dates. (CO1)
5. Write a Python program to get the volume of a sphere with radius 6. (CO1)

6. Write a Python program to test whether a number is within 100 of 1000 or 2000. (CO2)
7. Write a Python program to calculate the sum of three given numbers, if the values are equal then return thrice of their sum. (CO1)
8. Write a Python program to get a new string from a given string where "Is" has been added to the front. If the given string already begins with "Is" then return the string unchanged. (CO1)
9. Write a Python program to count the number 4 in a given list. (CO2)
10. Write a Python program to test whether a parsed letter is a vowel or not. (CO2)
11. Write a Python program to create a histogram from a given list of integers. (CO3)
12. Write a Python program that will accept the base and height of a triangle and compute the area. (CO1)
13. Write a Python program to solve (x + y) * (x + y). (CO1)
14. Write a Python program to compute the distance between the points (x1, y1) and (x2, y2). (CO1)
15. Write a Python program to convert height (in feet and inches) to centimeters. (CO1)
16. Write a Python program to calculate the hypotenuse of a right angled triangle. (CO1)
17. Write a Python program to sort files by date. (CO5)
18. Write a Python program to get a directory listing, sorted by creation date. (CO5)
19. Write a Python program to calculate midpoints of a line. (CO1)
20. Write a Python program to get numbers divisible by fifteen from a list using an anonymous function. (CO4)
21. Write a Python program to check if lowercase letters exist in a string. (CO1)
22. Write a Python program to add leading zeroes to a string. (CO1)
23. Write a program that counts a number's factors and determines whether the number is prime. (CO2)
24. Write a Python program to convert an array to an ordinary list with the same items. (CO5)
25. Write a Python program to sort a list alphabetically in a dictionary. (CO5)
26. Write a Python program for counting sort. (CO5)
27. Write a Python program for sequential search. (CO5)
28. Write a Python program for binary search. (CO5)

COURSE CODE		20300113 Python Programming Lab									
COURSE DESIGNED BY		DEPARTMENT OF COMPUTER APPLICATIONS									
Program Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
Course outcomes	CO1		✓		✓		✓			✓	✓
	CO2	✓							✓		
	CO3	✓		✓				✓			
	CO4		✓			✓					
	CO5	✓				✓					
	CO6		✓		✓			✓			
Category	**Programming**		**Core**		**Mathematices Based**		**Non Computer Based**		**Latest Technology**		
	✓										
Mode of Evaluation :Written Examination											

Regulation GRCA-20	Godavari Institute of Engineering & Technology (Autonomous)	I MCA II Sem			
Course Code 20300201	**OOPS Through Java**				
Teaching	**Total Contact Hours 64**	**L**	**T**	**P**	**C**
Prerequisite (s) : Knowledge of any basic programming language		**3**	**1**	**0**	**4**

Course Objective(s):

1. To impart knowledge on basic Object Oriented Programming in java which includes defining classes, invoking methods.
2. To illustrate inheritance concepts for reusing the program.
3. To understand the basics of java console and using class GUI based programming libraries.
4. To understand the principles of inheritance packages and interfaces.

Course Outcomes:

On completion of the course, the students will be able to-	
CO1:	Implement concepts on the streams and operations in java programming for a given application programme
CO2:	Develop object oriented constructs such as various class hierarchies, interfaces & exception handling
CO3:	Able to implement, compile, test and run Java programs comprising more than one class, to address a particular software problem
CO4:	Demonstrate the ability to use simple data structures like arrays in a Java program
CO5:	Make use of members of classes found in the Java API
CO6:	Build the internet based dynamic applications using the concept of applets

Syllabus

Unit-I

Objective: To describe basic concepts of Object Oriented Programming, java data types, classes and objects. (CO1, CO2)

Basics of Object Oriented Programming (OOP): Need for OO paradigm , A way of viewing world - Agents, responsibility, messages, methods, classes and instances, class hierarchies(Inheritance), method binding, overriding and exceptions, summary of oop concepts, coping with complexity , abstraction mechanisms.

Java Basics: Data types, variables, scope and life time of variables, arrays, operators,

expressions, control statements, type conversion and costing, simple java program, classes and objects - concepts of classes, objects, constructor methods, access control, this keyword, garbage .handling.

Unit-II

Objective: To implement object oriented constructs such as various class hierarchies, interfaces and exception handling. (CO2,CO3)

Inheritance: Hierarchical abstractions, Base class object, subclass, subtype, substitutability, forms of inheritance- specialization, specification, construction, extension, limitation, combination, benefits of inheritance costs of inheritance. Member access rules, super uses, using final with inheritance, polymorphism, abstract classes**.**

Packages and Interfaces: Defining, Creating and Accessing a package, Understanding Class path ,Importing packages, differences between classes and interfaces, defining an interface, Implementing interface, applying interfaces variables in interface and extending interfaces.

Unit -III

Objective: To gain knowledge of throwing on exception and catching it. (CO2,CO3)

Exception handling and multithreading: Concepts of exception handling, benefits of exception handling, Termination or presumptive models, exception hierarchy, usage of try, catch, throw, throws and finally, built in exceptions, creating own exception sub classes. Differences between multi threading and multitasking, thread life cycle, creating threads, synchronizing threads, daemon threads, thread groups.

Unit -IV

Objective: To be able to build dynamic user interface using event handling and to designing the user interface using the UI components. (CO5, CO6)

Event Handling: Events, Event sources, Event classes, Event Listeners, Delegation event model, handling mouse and keyboard events, Adapter classes, inner classes. The AWT class hierarchy, user interface components-labels, button, canvas, scrollbars, text components, check box, check box groups, choices, list panes- scroll pane, dialogs, menu bar , graphics, layout manager- layout manager types- boarder, grid, flow, card and grid bag.

Unit , V

Objective: To know about the creation of applets & using it and application oriented knowledge on swings. (CO5, CO7)

Applets: Concepts of Applets, differences between applets and applications, lifecycle of an applet, types of applets, creating applets, passing parameters to applets.

Swings: Introduction, limitations of AWT, MVC architecture, components, containers, exploring swing- JApplet, JFrame and JComponent, Icons and Labels, text fields, buttons-The JButton class, Check boxes, Radio Buttons, Combo boxes, Tabbed panes, Scroll panes, Trees and Tables.

Text Book:

1. Java-The complete reference - 7/e, Herbert schildt, TMH.
2. Java: The Complete Reference, Herbert Schildt, 11/e, McGraw-Hill Education, 2019.

Reference Books:

1. JAVA: How to program, 8/e, Dietal and Dietal, PHI.
2. Introduction of programming with JAVA, S.Dean, TMH.
3. Introduction to Java programming, 6/e, Y.Daniel Liang, Pearson.
4. Core Java 2, Vol 1(Vol 2) Fundamentals (Advanced), 7/e, Cay.S.Horstmann, Gary Cornell, Pearson.
5. Big Java, 5/e, Cay.S. Horstmann, Wiley, 2009.
6. Object Oriented Programming through Java, P.Radha Krishna, University Press.

Web Links:

1. http://introcs.cs.princeton.edu/java/10elements/
2. http://www.ntu.edu.sg/home/ehchua/programming/java/J3a_OOPBasics.html
3. http://www.horstmann.com/bigjava2.html
4. https://www.edx.org/course/introduction-programming-java-part-1-uc3mx-it-1-1x

Course code		**20300201 OOPS Through Java**									
Course Designed By		Department of Computer Applications									
Program Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
Course outcomes	CO1		✓								
	CO2			✓	✓						
	CO3	✓	✓	✓	✓						
	CO4		✓					✓	✓		✓
	CO5	✓	✓	✓							
	CO6				✓	✓					

Category	**Programming**	**Core**	**Mathematics Based**	**Non Computer Based**	**Latest Technology**
	✓				

Mode of Evaluation :Written Examination

	Godavari Institute of Engineering & Technology (Autonomous)	**I MCA II Sem**
Course Code	**Operating Systems**	

20300202					
Teaching	**Total Contact Hours 64**	**L**	**T**	**P**	**C**
Prerequisite (s) : Knowledge about Process , processors and I/O Devices		**4**	**0**	**0**	**4**

Course Objective(s):

1. To recognize the concepts and principles of Operating Systems.
2. To understand the structure and organization of the file system.
3. To know different approaches used on memory management.
4. To use system calls for managing processes, memory and the file system.

Course Outcomes:

On completion of the course, the students will be able to-	
CO1:	Identify basic components of OS.
CO2:	Correlate basic concepts of OS with an existing OS.
CO3:	Conceptualize synchronization amongst various components of a typical OS.
CO4:	Identify and define key terms related to OS.
CO5:	Apply concept of creating new process from parent process.
CO6:	Design, implement and evaluate a computer based system to meet desired goals.

Syllabus

Unit -I

Objective: To provide an overview of computer architecture and organization, with emphasis on topics related to operating system design.**(CO1,CO2)**

Introduction to Operating Systems: OS structure and strategies, Evolution of operating systems-simple, batch, Multi programmed, time shared, personal computer, parallel, distributed systems, real time systems. Operating-system Services, Operating-system Interface, System calls, Types of System calls, System programs, Operating-system Design and Implementation.

Unit- II

Objective: To know detailed analysis of processes, multithreading. Provides a discussion of various approaches to process scheduling. **(CO2, CO3,**CO5**)**

Process Management: Processes: Process Concept, Process Scheduling, Operations on Processes, Inter process Communication, Examples of IPC Systems, Communication in Client-Server systems Threads: Overview, Multithreading Models.

CPU Scheduling: Basic concepts, Scheduling Criteria, Scheduling Algorithms, Multiple-Processor Scheduling, Thread Scheduling.

Process Synchronization: Background, the Critical- section problem, Peterson's solution, Synchronization Hardware, Semaphores, Classic problems of Synchronization, Monitors, Atomic Transactions.

Unit- III:

Objective: To gain knowledge about the techniques used for memory management, including virtual memory. **(CO3, CO4)**

Memory management: Main memory: Swapping, Contiguous memory Allocation, Paging, Structure of the Page table, Segmentation

Virtual memory: Background, Demand paging, copy-on-Write, Page Replacement, Allocation of frames, Thrashing, Memory-Mapped Files.

Unit -IV

Objective: To know the concepts of file system interface, implementation and disk management. **(CO2, CO4)**

File-system Interface: Concept, Access Methods, Directory structure, File-system Mounting, File sharing, Protection. File-system Implementation: File-system Structure, Implementation, Directory Implementation, Allocation Methods, Free- Space Management, Efficiency and Performance, Recovery, Log-Structured File systems,NFS.

Device Management: Disk Structure, Disk Attachment, Disk Scheduling, Disk Management, Swap Space Management, RAID structure. Stable storage Implementation. I/O System: I/O hardware, Application I/O Interface, Kernel I/O Subsystem, Transforming I/O request to hardware operation, STREAMS.

Unit -V

Objective: To know how protection and security mechanisms are carried out. (**CO2, CO6**)

Deadlocks: Deadlocks: Necessary conditions, resource allocation graph, methods for handling deadlocks, preventions, avoidance, detection and recovery.

Protection: Goals of Protection, Principles of protection, Domain of Protection.

Security: The Security Problem, Program Threads, System and Network Threats, Cryptography as a security tool, User Authentication, Firewall to protect systems and Networks.

Textbooks:

1. Operating System Concepts, Abraham Silberschatz, Peter B. Galvin and Greg Gagne, e/10, Wiley, 2018.
2. Operating System Concepts with java, Abraham Silberschatz, Peter B. Galvin and Greg Gagne, e/8, Wiley, 2009

Reference Books:

1. Operating systems,6/E,William Stallings, PHI/Pearson.
2. Operating systems 3/e,Dietal and Dietal,Pearson.
3. An introduction to Operating systems, Concepts and practice, Pramod Chandra P.Bhat,PHI
4. Operating systems, Haldar and Aravind, Pearson.
5. Operating systems, PAL Choudhury, PHI.
6. Operating systems: Design and Implementation, 3/e, Tanenbaum, Woodhull.

Web Links:

1. https://www.quora.com/What-is-the-best-book-on-operating-systems

2. https://en.wikipedia.org/wiki/Memory_management_
3. www.tutorialspoint.com/operating_system/os_memory_management.
4. https://www.andrew.cmu.edu/cgi-bin/search?type=4&name=15

Course code		**20300202 Operating Systems**									
Course Designed By		Department of Computer Applications									
Program Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
Course outcomes	CO1		✓							✓	
	CO2	✓			✓			✓			
	CO3						✓				
	CO4	✓				✓			✓		
	CO5			✓							
	CO6							✓	✓	✓	
Category	**Programming**	**Core**		**Mathematics Based**		**Non Computer Based**		**Latest Technology**			
		✓									
Mode of Evaluation :Written Examination											

Regulation GRCA-20	Godavari Institute of Engineering & Technology (Autonomous)	I MCA II Sem			
Course Code 20300203	**Software Engineering**				
Teaching	**Total Contact Hours 64**	**L**	**T**	**P**	**C**
Prerequisite (s) : Basics knowledge about software and programming		**4**	**0**	**0**	**4**

Course Objective(s):

1. To understand the role of project management including planning, scheduling, risk management etc.
2. To understand different software architectural styles.
3. To understand the issues such as modularity and coding.
4. To understand the professional standards ethical and social responsibility of a software engineering.

Course Outcomes:

On completion of the course, the students will be able to-	
CO1:	Choose the appropriate process model depending on the user requirements
CO2:	Identify the minimum requirements for the development of application
CO3:	Develop, maintain, efficient, reliable and cost effective software solutions
CO4:	Analyze a problem, and identify and define the computing requirements appropriate to its Solution
CO5:	Analyze quality of software
CO6:	Apply knowledge of computing and mathematics appropriate to the discipline

Syllabus

Unit- I

Objective: To know the basic features of software and how to change in nature. (CO1, CO3)

Introduction to Software Engineering: The evolving role of software, Changing Nature of Software, Legacy systems, Software myths, Software engineering-a layered technology, Process frame work, CMMI, Process Patterns, Process assessment.

The software problem: Cost, schedule and quality, Scale and change.

Unit- II

Objective: To introduce the software process models such as waterfall and evolutionary models.

(CO2, CO3)

Software Process: Process and project, component software process, Software development process models : Waterfall model, prototyping, iterative development, relational unified process, time boxing model, Extreme programming and agile process, using process models in a project. Project management process.

Unit- III

Objective: To elicit the concepts of software requirements and SRS document preparation. (CO3, CO4)

Software requirement analysis and specification: Value of good SRS, requirement process, requirement specification, functional specifications with use-cases, other approaches for analysis, validation.

Planning a software project: Effort estimation, project schedule and staffing, quality planning, risk management planning, project monitoring plan, detailed scheduling.

Unit- IV

Objective: To gain knowledge of various software architectural styles. (CO2, CO5)

Software Architecture: Role of software architecture, architecture views, components and connector view, architecture styles for C & C view, documenting architecture design, evaluating architectures.

Design: Design concepts, function-oriented design, object oriented design, detailed design, verification, and metrics.

Unit - V

Objective: To learn how to identify and design objects, classes, and their relationships to each other (CO2, CO3)

Introduction to UML: Importance of modeling, principles of modeling,object oriented modeling, conceptual model of the UML, Architecture,Software Development Life Cycle.
Basic Structural Modeling: Classes, Relationships, Common mechanisms and diagrams.
Class and Object Diagrams: Terms, concepts, modeling techniques for class and object diagrams, Common modeling techniques

Text Books:

1. Software Engineering, 7/e, Roger S.Pressman, McGraw-Hill Higher Eduction, 2010.
2. Software Engineering, A Precise Approach, Pankaj Jalote, Wiley

3. The Unified Modeling Language User Guide, Grady Booch, James Rumbaugh, Ivar Jacobson, Addition-Wesley Professional, 2005.

References:

1. Software Engineering, 10/e, Ian Sommerville, Pearson, 2016.
2. Software Engineering Principles and Practice, W S Jawadekar, TMH

Web Links:

1. https://www.computerscience.org/careers/software-engineer/
2. https://www.packtpub.com/product/the-complete-edition-software-engineering-for-real-time-systems/9781839216589
3. https://www.tutorialspoint.com/software_engineering/software_engineering_quick_guide.htm
4. https://en.wikipedia.org/wiki/Software_engineering

Course code		**20300203 Software Engineering**									
Course Designed By		Department of Computer Applications									
Program Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
Course outcomes	CO1				✓			✓			
	CO2	✓	✓							✓	
	CO3				✓	✓					✓
	CO4				✓		✓				
	CO5			✓					✓		✓
	CO6		✓		✓		✓		✓		
Category	**Programming**	**Core**		**Mathematics Based**		**Non Computer Based**		**Latest Technology**			
		✓									
Mode of Evaluation :Written Examination											

Regulation GRCA-20	Godavari Institute of Engineering & Technology (Autonomous)	I MCA II Sem			
Course Code 20300204	**Design & Analysis of Algorithms**				
Teaching	**Total Contact Hours 64**	**L**	**T**	**P**	**C**
Prerequisite (s) : Knowledge of Algorithm Design and Data structures		**3**	**1**	**0**	**4**

Course Objective(s):

1. To teach various advanced design and analysis techniques such as greedy algorithm and dynamic programming.
2. To know **Mathematical Aspects and Analysis of Algorithms.**
3. To understand how the worst-case time complexity of an algorithm is defined.
4. To know the concepts of tractable and intractable problems and the classes P, NP and NP-complete problems.

Course Outcomes:

On completion of the course, the students will be able to-	
CO1:	Analyze and design algorithms and to appreciate the impact of algorithm design in practice
CO2:	Analyze the asymptotic performance of algorithms
CO3:	Apply important algorithmic design paradigms and methods of analysis
CO4:	Synthesize efficient algorithms in common engineering design situations
CO5:	Compare between different data structures, pick an appropriate data structure for a design situation
CO6:	Analyze worst case running times of algorithms using asymptotic analysis

Syllabus

Unit -I:

Objective: To understand how the worst-case time complexity of an algorithm is defined, how asymptotic notation is used to provide a rough classification of algorithms **(CO1,CO2)**

Basic Concepts of Algorithms: Introduction, Notion of Algorithm, Fundamentals of Algorithmic Solving , Important Problem types , Fundamentals of the Analysis Framework, Asymptotic Notations and Basic Efficiency Classes.

Mathematical Aspects and Analysis of Algorithms: Mathematical Analysis of Non-recursive Algorithm,- Mathematical Analysis of Recursive Algorithm. (Performance Analysis, Space Complexity and Time Complexity. Disjoint Set, Disjoint Set Operation, Union and find algorithm).

Unit - II

Objective: To study paradigms and approaches used to analyze sorting algorithms and to appreciate the impact of algorithm design in practice.**(CO6)**

Analysis of Sorting and Searching Algorithms: Brute Force , Selection Sort And Bubble Sort , Sequential Search And Brute,Force String Matching , Divide And Conquer, Merge Sort , Quick Sort , Binary Search , Binary Tree, Traversal and Related Properties , Decrease and Conquer , Insertion Sort , Depth First Search and Breadth First Search.

Unit - III

Objective: Synthesize dynamic-programming algorithms, and analyze them**(CO4,CO6)**

Algorithmic Techniques: Transform and conquer , Presorting , Balanced Search trees , AVL Trees , Heaps and Heap sort , Dynamic Programming , Matrix Chain Multiplication ,0/1 Knapsack Problem, Travelling Salesman Problem ,Warshall's and Floyd's Algorithm, Optimal Binary Search trees , Greedy Techniques, Prim's Algorithm , Kruskal's Algorithm , Dijkstra's Algorithm, Huffman trees.

Unit - IV

Objective: To introduce the backtracking and branch and bound algorithms. **(CO5,CO3)**

Algorithm Design Methods : Backtracking , n-Queen's Problem , Hamiltonian Circuit problem , Subset-Sum problem , Branch and bound , Assignment problem , Knapsack problem , Traveling salesman problem.

Unit - V

Objective: Know the concepts of tractable and intractable problems and the classes P, NP and NP-complete problems.**(CO3,CO5)**

Branch and Bound: LC Branch and Bound solution, FIFO Branch and Bound solution.

NP-Hard and NP-Complete problems: Basic concepts, non deterministic algorithms, NP - Hard and NP Complete classes, Cook’s theorem.

Text Books:

1. The Design and Analysis of Computer Algorithms - A.V.Aho, J.E. Hop croft and J.D.Ullman- Pearson Education Asia, 2003.
2. Introduction to Algorithms -T.H. Cormen, C.E. Leiserson, R.L. Rivest and C. Stein- MIT Pvt. Ltd., 2009.

Reference Books:

1. Computer Algorithms - Introduction to Design and Analysis- Sara Baase and Allen Van Gelder, Addison Wesly, 1999.
2. Introduction to the Design and Analysis of Algorithm- Anany Levitin, Pearson Education, 2012.

Web Links:

1. https://books.google.co.in/books?id=FKcCHr9NxjYC&pg=PA47&lpg=PA47&dq=1.%09The+Design+and+Analy
2. https://books.google.co.in/books/about/Design_Analysis_Of_Algorithms.html?id=FKcCHr9NxjYC

Course code		**20300204 Design & Analysis of Algorithms**									
Course Designed By		Department of Computer Applications									
Program Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
Course outcomes	CO1		✓				✓				
	CO2	✓			✓						
	CO3			✓				✓			
	CO4					✓				✓	
	CO5				✓						✓
	CO6				✓				✓		
Category	**Programming**		**Core**		**Mathematics Based**		**Non Computer Based**		**Latest Technology**		
			✓								
Mode of Evaluation :Written Examination											

Regulation GRCA-20	Godavari Institute of Engineering & Technology (Autonomous)	I MCA II Sem			
Course Code 20300205	**Computer Networks**				
Teaching	**Total Contact Hours 64**	**L**	**T**	**P**	**C**
Prerequisite (s) : Knowledge of communication engineering and coding theory		**4**	**0**	**0**	**4**

Course Objective(s)*:*

1. To build an understanding of the fundamental concepts of computer networking.
2. To familiarize with the basic taxonomy and terminology of the computer networking area.
3. To introduce the advanced networking concepts, preparing the student for entry Advanced courses in computer networking.
4. To gain expertise in some specific areas of networking such as the design and maintenance of individual networks.

Course Outcomes:

On completion of the course, the students will be able to-	
CO1:	Analyze the contents in a given data link layer packet, based on the layer concept
CO2:	Identify the different types of network topologies and protocols
CO3:	Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer
CO4:	Identify the different types of network devices and their functions within a network
CO5:	Design logical sub address blocks with a given address block
CO6:	Describe the general principles of data communications

Syllabus

Unit -I:

Objective: To Know the basic concepts of computer networks and various reference models.(CO1, CO3)

Overview of the Internet: Protocol, Layering Scenario, TCP/IP Protocol Suite: The OSI Model, Internet history standards and administration; Comparison of the OSI and TCP/IP reference model.

Physical Layer: Guided transmission media, wireless transmission media.

Data Link Layer - design issues, CRC codes, Elementary Data Link Layer Protocols, sliding window prorocol

Unit- II:
Objective: To know the functioning of network layer and various routing algorithms.(CO2,CO4)

Channel allocation methods: TDM, FDM, ALOHA, Carrier sense Multiple access protocols, Collision Free protocols ,IEEE standard 802 for LANS , Ethernet, Token Bus, Token ring, Bridges.

Network layer Routing Algorithms: Shortest path, Flooding, Flow based Distance vector, Link state, Hierarchical, Broadcast routing, Congestion Control algorithms-General principles of congestion control, Congestion prevention polices, Choke packets and Load shedding.

Unit- III
Objective: To Recognize the different internetworking devices and their functions. Explain the role of protocols in networking.(CO4,CO5)

Internet Working : Tunneling, internetworking, Fragmentation, network layer in the internet , IP protocols, IP address, Subnets, Internet control protocols, OSPF, BGP, Internet multicasting, Mobile IP. Network layer in the ATM Networks , cell formats, connection setup, routing and switching, service categories, and quality of service, ATM LANs.

Unit -IV:
Objective: To Analyze the services and features of the Transport layer (CO5)

The Transport Layer: Elements of transport protocols , addressing, establishing a connection, releasing connection, flow control and buffering and crash recovery, end to end protocols : UDP, reliable Byte Stream (TCP) end to end format, segment format, connection establishment and termination, sliding window revisited, adaptive retransmission, TCP extension, Remote Procedure Call , BLAST, CHAN, SELECT, DCE.

Unit- V:
Objective: To Analyze the features and operations of various application layer protocols such as HTTP, DNS and SMTP (CO5, CO6)

Application Layer: Network Security, Cryptographic Algorithms: DES, RSA. Security Mechanisms : Authentication Protocols, Firewalls, Domain Name service (DNS) Domains

Hierarchy, Name servers. Traditional Applications : SMTP, MIME, World Wide Web : HTTP, Network Management : SNMP

Text Books:

1. Computer Networks, Andrew.S. Tanenbaum, 4/e, Prentice Hall PTR, 2010.
2. Data and computer communications, Stallings, william, 10/e, Pearson, 2014.

Reference Books:

1. Data communications and networking, Forouzan, 4/e, McGraw-Hill Higher Education, 2007.
2. Computer Networks , A System Approach , Larry L Peterson and Bruce S Davie, 5/e, Elsevier, Morgan Kaufmann, 2011.
3. Communication Networks, Alberto Leon-Garcia, Indra Widjaja, 2/e, McGraq-Hill, 2003.
4. Understanding data communications, Held, 7/e , Pearson, 2002.

Web Links:

1. https://en.wikipedia.org/wiki/Networking_hardware
2. https://www.ischool.utexas.edu/search-results?query=computer+networks
3. https://en.wikipedia.org/wiki/Transport_layer
4. https://books.google.co.in/books/about/Computer_networks.html?id=yPOeAAAACAAJ&redir_esc=y

Course code		**20300205 Computer Networks**									
Course Designed By		Department of Computer Applications									
Program Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO 7	PO 8	PO 9	PO1 0
Course outcomes	CO1		✓								
	CO2			✓		✓					✓
	CO3		✓		✓				✓		
	CO4					✓					✓
	CO5	✓			✓			✓			
	CO6						✓			✓	
Category	**Programming**		**Core**		**Mathematics Based**		**Non Computer Based**		**Latest Technology**		
			✓								
Mode of Evaluation :Written Examination											

Regulation GRCA-20	Godavari Institute of Engineering & Technology (Autonomous)	I MCA II Sem			
Course Code 20300211	**OOPS Through Java Lab**				
Teaching	**Total Contact Hours 48**	**L**	**T**	**P**	**C**
Prerequisite (s) : Knowledge of fundamental programming concepts		**0**	**0**	**4**	**2**

Course Objective(s):

1. To understand the concepts and features of object oriented programming.
2. To know data centric applications using JDBS.
3. To learn java's exception handling mechanism, multi threading, packages and interfaces.
4. To know about internet programming using applets and swings.

Course outcomes:

On completion of the course, the students will be able to-	
CO1:	Develop interactive programs using applets and swings
CO2:	Implement object oriented programming concepts using java
CO3:	Apply object oriented programming features and concepts for solving given Problem
CO4:	Determine the time complexity of simple algorithms
CO5:	Develop and analyze algorithms for solving simple problems
CO6:	Use current techniques, skills and tools necessary for computing practice

Recommended Systems/Software Requirements:
Intel based desktop PC, JDK 1.5 or more

List of Programs:

1. The Fibonacci sequence is defined by the following rule. The first two values in the sequence are 1, 1. Every subsequent value is the sum of the two values preceding it. Write a Java Program (WAJP) that uses both recursive and non-recursive functions to print the *nth* value of the Fibonacci sequence.**(CO1)**
2. WAJP that prints all real solutions to the quadratic equation $aX^2+bX+c=0$. Read in a, b,c and use the quadratic formula. If the discriminate b^2-4ac is negative, display a message stating that there are no real solution. **(CO1)**
3. WAJP to demonstrate wrapper classes, and to fix the precision.**(CO7)**
4. WAJP that prompts the user for an integer and then prints out all the prime numbers up to that Integer. .**(CO1)**
5. WAJP that checks whether a given string is a palindrome or not. Ex: MALAYALAM is a

palindrome.**(CO2)**

6. WAJP for sorting a given list of names in ascending order. **(CO3)**
7. WAJP to check the compatibility for multiplication, if compatible multiply two matrices and find its transpose. .**(CO1)**
8. WAJP that illustrates how runtime polymorphism is achieved.**(CO5)**
9. WAJP to create and demonstrate packages. .**(CO5)**
10. WAJP, using String Tokenizer class, which reads a line of integers and then displays each integer and the sum of all integers. .**(CO1)**
11. WAJP that reads on file name from the user then displays information about whether the file exists, whether the file is readable/writable, the type of file and the length of the file in bytes and display the content of the using File Input Stream class. .**(CO7)**
12. WAJP that displays the number of characters, lines and words in a text/text file. .**(CO1)**
13. WAJP that reads a file and displays the file on the serene, with a line number before each line **(CO1)**
14. Write an Applet that displays the content of a file. **(CO6)**
15. Write a program using applets for passing parameters.**(CO6)**
16. WAJP that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the + - x / %operations. Add a text field to display the result.**(CO1)**
17. WAJP for handling mouse events.**(CO6)**
18. WAJP demonstrating the life cycle of a thread.**(CO6)**
19. WAJP that correctly implements Producer-Consumer problem using the concept of Inter Thread Communication.**(CO6)**
20. WAJP that lets users create Pie charts. Design your own user interface (with Swings & AWT).**(CO7)**
21. WAJP that allows user to draw lines, rectangles and ovals.**(CO1)**
22. WAJP to generate a set of random numbers between two numbers x1 and x2, and x1>0. .**(CO1)**
23. WAJP to create an abstract class named Shape, that contains an empty method named number Of Sides ().Provide three classes named Trapezoid, Triangle and Hexagon, such that each one of the classes contains only the method number Of Sides (), that contains the number of sides in the given geometrical figure.**(CO5)**
24. WAJP to implement a Queue, using user defined Exception Handling (also make use of throw, throws).**(CO6)**
25. WAJP that creates 3 threads by extending Thread class. First thread displays “Good Morning” every 1 sec, the second thread displays “Hello” every 2 seconds and the third displays “Welcome” every 3 seconds. (Repeat the same by implementing Runnable) .**(CO6)**
26. Create an inheritance hierarchy of Rodent, Mouse, Gerbil, Hamster etc. In the base class provide methods that are common to all Rodents and override these in the derived classes to perform different behaviors, depending on the specific type of Rodent. Create an array of Rodent, fill it with different specific types of Rodents and call your base class methods. **(CO1)**

27. WAJP to create and add 3 scroll bars to the window and handle the event appropriately. **(CO7)**
28. WAJP on key event handling. **(CO7)**
29. WAJP which uses flow layout.**(CO1)**
30. WAJP which uses grid layout .**(CO1)**

Course code		**20300211 OOPS Through Java Lab**									
Course Designed By		Department of Computer Applications									
Program Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
Course outcomes	CO1	✓							✓		
	CO2		✓								
	CO3		✓				✓				
	CO4			✓							
	CO5				✓			✓			
	CO6			✓						✓	
Category	**Programming**	**Core**		**Mathematics Based**		**Non Computer Based**		**Latest Technology**			
	✓										
Mode of Evaluation :Written Examination											

Regulation GRCA-20	Godavari Institute of Engineering & Technology (Autonomous)	I MCA II Sem			
Course Code 20300212	Operating Systems and Unix Lab				
Teaching	Total Contact Hours 48	L	T	P	C
Prerequisite (s) : Fundamentals of scripting and commands of operating system		0	0	3	1.5

Course Objective(s):

1. To know the design and implementation of operating system.
2. To know process management concepts & Techniques.
3. To familiarize students with the Linux environment.
4. To learn the fundamentals of shell scripting programming.

Course Outcomes:

On completion of the course, the students will be able to-	
CO1:	Design different CPU scheduling algorithms and process synchronization methods
CO2:	Implement different page replacement and disk scheduling algorithms
CO3:	Apply Unix utilities and perform basic shell scripting
CO4:	Recognize Unix file system and file access control.
CO5:	Develop a software with the use of an operating system
CO6:	Use Linux environment efficiently

List of Programs

1. Multiprogramming-Memory management- Implementation of fork (), wait (), exec () and exit (), System calls.(CO4)
2. Simulate the following CPU scheduling algorithms.(CO1)
   a) Round Robin b) SJF c) FCFS d) Priority scheduling
3. Simulate Multiprogramming with (CO1)
   a) Fixed number of tasks (MFT).
   b) Variable number of tasks (MVT).
4. Simulate Bankers Algorithm for (CO1)
   a) Dead Lock Avoidance b) Dead Lock Prevention
5. Simulate the following page replacement algorithms.(CO2)
   a) FIFO b) LRU c) LFU
6. Simulate the following File allocation strategies (CO2)
   a) Sequenced File allocation b) Indexed File allocation c) Linked File allocation

LINUX PROGRAMS

1. Study of Unix/Linux general purpose utility command list man,who,cat, cd, cp, ps, ls, mv, rm, mkdir, rmdir, echo, more, date, time, kill, history,chmod, chown, finger, pwd, cal, logout, shutdown.(CO4)
2. Study of Unix/Linux text processing utility commands. (CO4)

3. Study of Unix/Linux Process management utility commands. (CO4)
4. Study of Unix/Linux File system commands. (CO4)
5. Write a program to display the good morning, good afternoon, good evening and good night depending on the users log on time. (CO4)
6. Write a shell script which deletes all lines containing the word "UNIX" in the files supplied as arguments to this shell script(CO3)
7. Write a shell script which displays a list of all files in the current directory to which you have read, write and execute permissions(CO3)
8. Write a menu-driven program performing arithmetic operations. (CO3)
9. Study of Bash shell, Bourne shell and C shell in Unix/Linux operating system.(CO3)
10. Study of Unix/Linux files system (tree structure). (CO4)
11. Study of bashrc, /etc/bashrc and Environment variables.(CO3)
12. Write a C program that makes a copy of a file using standard I/O, and system call (CO4)
13. Write a C program to emulate the Unix ls –l command. (CO6)
14. Write a C program that illustrates how to execute two commands concurrently with a command pipe. Ex: - ls –l | sort.(CO6)
15. Write a C program that illustrates two processes communicating using shared memory.(CO1)
16. Write a C program to simulate producer and consumer problem using semaphores.(CO1)
17. Write C program to create a thread using pthreads library and let it run its function. (CO3)
18. Write a C program to illustrate concurrent execution of threads using pthreads library.(CO3)

Course Code		**20300212 Operating Systems and Unix Lab**									
Course Designed By		Department of Computer Applications									
Program Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
Course outcomes	CO1	✓	✓	✓							
	CO2	✓			✓	✓					
	CO3		✓								
	CO4			✓	✓						
	CO5							✓	✓	✓	✓
	CO6			✓	✓						
Category	**Programming**	**Core**		**Mathematics Based**		**Non Computer Based**		**Latest Technology**			
	✓										
Mode of Evaluation :Written Examination											

Regulation GRCA-20	Godavari Institute of Engineering & Technology (Autonomous)	II MCA II Sem			
Course Code 20300213	Software Engineering Lab				
Teaching	Total Contact Hours 48	L	T	P	C
Prerequisite (s) : Knowledge of object-oriented concepts		0	0	3	1.5

Course Objective(s):

1. To teach the students a solid foundation on object oriented principles.
2. To teach the essential and fundamental aspects of object oriented analysis and design.
3. To explore and analyze different analysis and design models such as OO model, structured analysis and design models etc.
4. To understand the insight and knowledge in to analyzing and designing software using different object oriented modeling techniques.

Course Outcomes:

On completion of the course, the students will be able to-	
CO1:	Apply practical knowledge on software engineering methods, such as object oriented analysis and design methods with a clear emphasis on UML
CO2:	Analyze and design software systems, components to meet desired needs
CO3:	Able to form and work on multidisciplinary teams to perform multiple faceted tasks from domain analysis
CO4:	Communicate the models and solutions in an effective manner
CO5:	Design and conduct object oriented analysis and design experiments using UML as well as to analyze and evaluate their models
CO6:	Use the graphical UML representation using tools such as IBM's rational rose or Microsoft Visio Viewer

For each case study:

1. Identify and analyze events
2. Identify Use cases
3. Develop event table
4. Identify & analyze domain classes
5. Represent use cases and a domain class diagram using Rational Rose
6. Develop Use case diagrams
7. Develop system sequence diagrams
8. Develop high-level sequence diagrams for each use case
9. Identify MVC classes / objects for each use case
10. Develop Detailed Sequence Diagrams / Communication diagrams for each use case showing
11. Interactions among all the three-layer objects

12. Develop three-layer package diagrams for each case study
    a) Develop Use case Packages
    b) Develop component diagrams
    c) Identify relationships between use cases and represent them
    d) Refine domain class model by showing all the associations among classes
13. Develop sample diagrams for other UML diagrams - state chart diagrams, activity diagrams and deployment diagrams

Suggested Case Studies:

1. ATM Application.
2. Library Management System.
3. Online Book Shop
4. Railway Reservation System
5. Banking System
6. Auction System
7. Point of Sale System
8. Airline Reservation System

COURSE CODE		**20300213 Software Engineering Lab**									
COURSE DESIGNED BY		DEPARTMENT OF COMPUTER APPLICATIONS									
Program Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
Course outcomes	CO1		✓		✓						
	CO2			✓		✓					
	CO3	✓									
	CO4										✓
	CO5			✓				✓	✓		
	CO6	✓									
Category	**Programming**		**Core**		**Mathematices Based**		**Non Computer Based**		**Latest Technology**		
									✓		
Mode of Evaluation :Written Examination											

Regulation GRCA-20	Godavari Institute of Engineering & Technology (Autonomous)	II MCA III Sem			
Course Code 20300301	Full Stack Web Development				
Teaching	Total Contact Hours 64	L	T	P	C
Prerequisite (s) : Basic knowledge in computer programming		3	1	0	4

Course Objective(s):

1. To understand best technologies for solving web client / server problems.
2. To analyze and design real time web applications.
3. To use java script for dynamic effects and to validate from input query
4. To analyze to use appropriate client-side or server-side applications

Course Outcomes:

On completion of the course, the students will be able to-	
CO1:	Choose, understand and analyze any suitable real time web application
CO2:	Integrate javascript and HTML pages to develop web application
CO3:	Develop server side webpages with PHP
CO4:	Make the web pages more dynamic and interactive using PHP.
CO5:	Establish the connection between PHP and MySql to insert, retrieve and modify the data in tables.
CO6:	Develop and deploy real time web applications in web servers

Syllabus

Unit –I
Objective: To know the concepts of HTML and its usage in developing web pages.**(CO1)**

HTML- Basic HML, The document body, Text, Hyperlinks, Adding More Formatting, Lists, Using Color and Images, Images, Tables, Frames, Forms-Toward Interactivity. Cascading Style sheets – Introduction, Inline Styles, Embedded Style Sheets, Linking external sheets, Backgrounds, text flow and box model.

Unit - II
Objective: To understand the concepts in Java Script and know to embed java script file to HTML pages**(CO1, CO2)**

JavaScript- Introduction, simple programming, Obtaining User Input with prompt Dialogs, Operators (arithmetic, Decision making, assignment, logical, increment and decrement) Control Structures - if… else selection statement, while, do… while repetitions statement, for statement,

switch statement, break and continue statements. Functions – program modules in JavaScript, programmer defined functions, function definition, Random-number generator, scope rules, global functions, recursion, JavaScript: Arrays.

Unit - III
Objective: To work with Java Script and its usage in validation of webforms**. (CO2)**

JavaScript: Objects – Math Object, String Object, Date Object, Boolean & Number Object, document and window Objects. Event Model – onclick, onload, onerror, onmouseover, onmouseout, on focus, onblur, onsubmit, onreset, more DHTML events. Filter and Transitions – flipv, fliph, chroma, masks, invert, gray, xray, shadow to text, alpha, glow, wave, dropshadow, light, blendTrans, revealTrans.

Unit - IV
Objective: To know the concepts of PHP and use it for develop Server Pages. **(CO3, CO4)**

PHP Introduction: Syntax, Variables, Strings, Constants, Operators, Echo / Print, If....Else.....Elseif, Switch , Loops For, Foreach, While, Functions, string functions - introduction, user defined functions, Arrays - single and multi dimensional,Array functions
PHP Form, $_GET , $_POST , $_REQUEST, File Upload, Sessions - introduction, start a PHP session, session variables, modify session, destroy session, Cookies, Start a PHP Cookies, Cookie variables, modify Cookie, destroy Cookie, Error handling: try-catch-throw, Exception, Filters

Unit -V
Objective: To gain knowledge of Database and database programming. **(CO5, CO6)**

MySql introduction: database, create, alter, delete, drop tables, insert, update, delete table data, where condition, and, or, in, between, like, distinct, order by, group by, union, sub-queries, left join, right join, inner join, Database Programming: PHP & MySql, PHP MySql functions

Text Books:

1. Internet and World Wide Web: How to program, 5/e, Paul Dietel and Harvey Dietel, Pearson Education, 2011.
2. Learning PHP, MySQL, JavaScript: with jQuery, CSS & HTML5, Nixon Robin, 5/e, O'Reilly Media, 2018.

Reference Books:

1. Web Programming - Building internet applications, 2/e, Chris Bates, Wiley, 2002.
2. Programming World Wide Web, Robert W. Sebesta, 8/e, Pearson, 2014.
3. PHP and MySQLWeb Development, 5 th Edition , Luke Welling, Laura Thomson, Addison-Wesley Professional, 2016.

Web Links:

1. http://auhd.edu.ye/upfiles/elibrary/Azal2020-01-22-01-38-51-40850.pdf
2. https://www.oreilly.com/library/view/learning-php- mysql/9781491979075/preface01.html
3. https://www.oreilly.com/library/view/php-and-mysql/9780133038644/
4. https://www.w3schools.com/php/default.asp

Course code		**20300301 Full Stack Web Development**									
Course Designed By		Department of Computer Applications									
Program Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
Course outcomes	CO1		✓		✓	✓					
	CO2			✓				✓			✓
	CO3		✓		✓	✓					
	CO4	✓								✓	
	CO5						✓	✓	✓		
	CO6									✓	
Category	**Programming**	**Core**		**Mathematics Based**		**Non Computer Based**		**Latest Technology**			
	✓										
Mode of Evaluation :Written Examination											

Regulation GRCA-20	Godavari Institute of Engineering & Technology (Autonomous)	II MCA III Sem			
Course Code 20300302	**Data Science**				
Teaching	**Total Contact Hours 64**	**L**	**T**	**P**	**C**
Prerequisite (s) : Knowledge of concepts related to data and its related activities		**3**	**1**	**0**	**4**

Course Objective(s):

1. To understand the basic concepts of data, methodologies for analyzing structured and unstructured data
2. To understand the relationship between the Data Scientist and the business needs
3. To apply quantitative modelling and data analysis techniques to solve real world business problems
4. To gain knowledge of statistical data analysis techniques utilized in decision making

Course Outcomes:

On completion of the course, the students will be able to-	
CO1:	Apply fundamental algorithmic ideas to process data.
CO2:	Leverage algorithmic insights in order to design novel data science algorithms.
CO3:	Develop a solid background on foundations of data science algorithms.
CO4:	Determine running times for common algorithms that process large-scale data.
CO5:	Usage of terminology related to data science.
CO6:	Apply datascience algorithms to the real world problems

Syllabus

Unit- I
Objective: To address the growing need for data related skills. (**CO1, CO5,CO6**)
Introduction to foundations of Data Science
Data Manipulation at Scale : Map Reduce, Hadoop, and relationship to databases, algorithms, extensions, languages Databases, SQL and the relational algebra.

Unit-II
Objective: To recognize and analyze ethical issues in business related to intellectual property, data security, integrity and privacy. (**CO3)**
Parallel databases, parallel query processing, in-database analytics, Key-value stores and NoSQL, tradeoffs of SQL and NoSQL

Unit-III

Objective: To use data mining software to solve real world problems (**CO1, CO2, CO3**)

Statistical Analytics: Programming in Python and R, Basic Data Mining-Basic statistical modeling, introduction to machine learning, over fitting Supervised learning-Linear and Logistic Regression, Classification, Unsupervised learning-Clustering, Association Rule mining

Unit-IV

Objective: To apply quantitative modeling and data analysis techniques to the solution of business problems communicate finding and present results using data visualization techniques. (**CO2, CO5**)

Graph/Text Data Analysis & Communicating Results : Graph Analytics: Page Rank, community detection, recursive queries, iterative processing

Text Analytics: TF/IDF, conditional random fields, Visualization, data products, visual data analytics.

Unit-V

Objective: To apply ethical practices in everyday business activities and make well reasoned ethical business and data management decisions. (**CO4**)

Parallel Computing : Concurrency and Data Decomposition, Message Based Parallelism –MPI, Thread Based Parallelism – OpenMP

Text Books:

1. An Introduction to Data Science, 1/e, Jeffrey M. Stanton, SAGE Publications, 2017.
2. "Building Data Science Teams", DJ Patil, O'Reilly, 2011.

References

1. Davenport, Thomas H. Patil, D.J. (2012). "Data Scientist: The Sexiest Job of the 21st Century". Harvard Business Review October 2012: 70-76. Retrieved 13 October 2012.
2. Mike Loukides (June 2010). "What is Data Science?" O'Reilly Media, inc. Retrieved 7 July 2012.
3. Longhow Lam (28 October 2010). "Introduction to R" The Comprehensive R Archive Network (CRAN). Retrieved 14 July 2012.
4. Emmanuel Paradis (12 September 2005). "R for Beginners". PDF. The Comprehensive R Archive Network (CRAN). Retrieved 14 July 2012.

Web Resources:

1. http://radar.oreilly.com/2010/06/what-is-data-science.html
2. http://www.nytimes.com/2009/08/06/technology/06stats.html
3. http://gerdleonhard.typepad.com/files/wef_ittc_personaldatanewasset_report_2011.pdf
4. http://radar.oreilly.com/2011/09/building-data-science-teams.html.
5. https://www.coursetalk.com/providers/code-school/courses/try-r?page=2

COURSE CODE		**20300302 Data Science**									
COURSE DESIGNED BY		DEPARTMENT OF COMPUTER APPLICATIONS									
Program Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
Course outcomes	CO1		✓	✓		✓	✓			✓	✓
	CO2	✓		✓	✓	✓				✓	
	CO3	✓				✓	✓			✓	✓
	CO4		✓				✓	✓			
	CO5	✓		✓	✓			✓	✓		✓
	CO6										✓
Category	**Programming**	**Core**	**Mathematics Based**	**Non Computer Based**	**Latest Technology**						
					✓						
Mode of Evaluation :Written Examination											

Regulation GRCA-20	Godavari Institute of Engineering & Technology (Autonomous)	II MCA III Sem			
Course Code 20300303	**Internet of Things**				
Teaching	**Total Contact Hours 64**	**L**	**T**	**P**	**C**
Prerequisite (s) : Basic Electronics and Programming logic		**3**	**1**	**0**	**4**

Course Objective(s):

1. To enable students to understand the basics of Internet of things and protocols.
2. To introduce some of the application areas where Internet of Things can be applied.
3. To learn about the middleware for Internet of Things.
4. To understand the concepts of Web of Things

Course Outcomes:

On completion of the course, the students will be able to-	
CO1:	Analyze basic protocols in wireless sensor networks
CO2:	Design IOT applications in different domains and be able to analyze their performance
CO3:	Identify how IOT differs from traditional data collection systems
CO4:	Explore the relationship between IOT, Cloud computing and Big Data
CO5:	Design and program IOT devices
CO6:	Recognize the factors that contributed to the emergence of IOT

Syllabus

Unit -I
Objective : To enable student to understand the basics of Internet of things **(CO1, CO6)**

IOT - What is the IoT and why is it important? Elements of an IoT ecosystem, Functional view of IoT, Fundamental characteristics, IoT Smart Environment & Smart Space Creation, IoT Applications and Use Case Scenarios.

Unit -II
Objective : To enable student to understand the concepts of protocols **(CO1)**

IOT Protocols: Protocol Standardization for IoT:
Wired Protocols – I2C, SPI, RS232, RS485, UART, USART, USB
Wireless Protocols-Bluetooth, Zigbee, WiFi-ah, NFC, RFID, MQTT, HTTP, COAP

Unit - III
Objective : To learn how IOT Archtecture works & modules **(CO6)**

IOT Architecture: IoT Open source architecture (OIC)- OIC Architecture & Design

principles- IoT Devices and deployment models- IoTivity : An Open source IoT stack - Overview- IoTivity stack architecture

Modules- Arduino Board, Node MCU Board, Raspberry-Pi & Arduino IDE

Unit - IV

Objective : To understand the concepts of Web of Sensor Things **(CO3, CO4)**

Web of Things : Classification of Sensors,Temperature Sensor,Humidity Sensors,UV Sensor,IR Sensor,PIR Sensor, Gas sensor, Vibration Sensor,Resistive Sensors, Capacitive Sensors, Inductive Sensors

Unit -V

Objective : To enable student to learn the wide variety of Applications **(CO2, CO5)**

IOT Applications: IoT applications for industry: Future Factory Concepts, Brownfield IoT, Smart Objects, Smart Applications. Study of existing IoT platforms /middleware, IoT- A, Hydra etc.

Text books:

1. Honbo Zhou, "The Internet of Things in the Cloud: A Middleware Perspective", CRC Press,2012.
2. Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), "Architecting the Internet ofThings", Springer, 2011.
3. David Easley and Jon Kleinberg, "Networks, Crowds, and Markets: Reasoning About a HighlyConnected World", Cambridge University Press, 2010.
4. Olivier Hersent, David Boswarthick, Omar Elloumi , "The Internet of Things – Key applicationsand Protocols", Wiley, 2012.

Reference Books:

1. Vijay Madisetti and ArshdeepBahga, "Internet of Things (A Hands-on-Approach)",1st Edition, VPT, 2014
2. Francis daCosta, "Rethinking the Internet of Things: A Scalable Approach to ConnectingEverything", 1st Edition, Apress Publications, 2013
3. CunoPfister, Getting Started with the Internet of Things, O"Reilly Media, 2011, ISBN: 978-1- 4493-9357-1
4. O.Vermesan, P.Friess, "IoT-From Research and Innovationto Market Deployment",River Publications, 2014

Web Links:

1. http://docshare04.docshare.tips/files/23353/233530586.pdf
2. https://mitmecsept.files.wordpress.com/2018/08/architecting_the_internet_of_things.pdf
3. https://www.cs.cornell.edu/home/kleinber/networks-book/networks-book.pdf

Course code		**20300303**	**Internet of Things**								
Course Designed By		Department of Computer Applications									
Program Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
Course outcomes	CO1		✓								
	CO2			✓	✓	✓					
	CO3	✓	✓								
	CO4							✓			✓
	CO5			✓			✓		✓	✓	
	CO6		✓								✓
Category	**Programming**		**Core**		**Mathematics Based**		**Non Computer Based**		**Latest Technology**		
									✓		
Mode of Evaluation :Written Examination											

Regulation GRCA-20	Godavari Institute of Engineering & Technology (Autonomous)	II MCA III Sem			
Course Code 20300364A	Cyber Security and Forensics				
Teaching	Total Contact Hours 64	L	T	P	C
Prerequisite (s) : Knowledge in Computer networks concepts		4	0	0	4

Course Objective(s):

1. To understand the threats in networks and security concepts
2. To apply authentication applications in different networks
3. To understand security services for email
4. To awareness of firewall and it applications

Course Outcomes:

On completion of the course, the students will be able to-	
CO1:	Apply various cryptographic techniques
CO2:	Implement Hashing and Digital Signature techniques
CO3:	Implement system level security applications
CO4:	Digitally sign emails and files
CO5:	Provide security of the data over the network
CO6:	Provide any network from the threats in the world

Syllabus

Unit – I
Objective: To learn various cryptographic techniques (CO1, CO2)

Ethical hacking, Attack Vectors, Cyberspace and Criminal Behaviour, Clarification of Terms, Traditional Problems associated with Computer Crimes, Realms of Cyber world, brief history of the internet, contaminants and destruction of data, unauthorized access, computer intrusions, white-collar crimes, viruses and malicious code, virus attacks, pornography, software piracy, mail bombs, exploitation, stalking and obscenity in internet, Cyber psychology, Social Engineering.

Unit – II
Objective: To understand the importance of Digital forensics (CO3)

Introduction to Digital forensics, Forensic software and handling, forensic hardware and handling, analysis and advanced tools, forensic technology and practices, Biometrics: face, iris and fingerprint recognition, Audio-video evidence collection, Preservation and Forensic Analysis.

Unit – III
Objective: To learn different investigation tools (CO3, CO4)

Investigation Tools, e-discovery, EDRM Models, digital evidence collection and preservation, email investigation, email tracking, IP tracking, email recovery, searc and seizure of computer systems, password cracking

Unit – IV
Objective: To understand forensic artifacts (CO5)

Forensic Analysis of OS artifact, Internet Artifacts, File System Artifacts, Registry Artifacts, Application Artifacts

Unit – V
Objective: To know application of forensic on real situations (CO6)

Report Writing, Mobile Forensic- identification, collection and preservation of mobile evidences, social media analysis, data retrival, Email analysis from mobile phones.

Text Books:

1. Security in Computing, Charles P. Fleeger, Prentice Hall, New Delhi, 2009.
2. Digital Forensics with Open Source Tools, C. Altheide& H. Carvey , Syngress, 2011
3. Cryptography & Network Security‖, BehrouzA.Forouzan, Tata McGraw Hill, India, New Delhi, 2009.

Reference books:

1. Cryptography and Network Security, William Stallings, Prentice Hall, New Delhi, 2006
2. Network Security: Private Communication in a Public Network, Chalie Kaufman, Radia Perlman, Mike Speciner, Pearson Education, New Delhi, 2004.
3. Introduction to Network Security‖, Neal Krawetz, Thomson Learning, Boston, 2007.
4. Applied Cryptography, Bruce Schneier, John Wiley & Sons, New York, 2004.

Web Links :

1. https://dl.hiva-network.com/Library/security/Cryptography-and-network-security-principles-and-practice.pdf
2. http://micft.unsl.edu.ar/cryptography_and_network_security_by_behrouz_a_forouzan_tata_mcgraw_hill.pdf
3. http://www.inf.ufsc.br/~bosco/ensino/ine5680/material-cripto-seg/2014-1/Stallings/Stallings_Cryptography_and_Network_Security.pdf
4. http://sharif.edu/~amini/files/stallings.pdf

COURSE CODE		**20300364A Cyber Security and Forensics**									
COURSE DESIGNED BY		DEPARTMENT OF COMPUTER APPLICATIONS									
Program Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
Course outcomes	CO1	✓	✓								
	CO2		✓	✓							
	CO3			✓		✓					
	CO4						✓	✓	✓	✓	✓
	CO5						✓		✓	✓	
	CO6			✓	✓	✓			✓		
Category		**Programming**	**Core**		**Mathematics Based**		**Non Computer Based**		**Latest Technology**		
									✓		
Mode of Evaluation :Written Examination											

Regulation GRCA-20	Godavari Institute of Engineering & Technology (Autonomous)	II MCA III Sem			
Course Code 20300364B	Software Testing and Quality Management				
Teaching	Total Contact Hours 64	L	T	P	C
Prerequisite (s) : Knowledge in Software engineering concepts		4	0	0	4

Course Objective(s):

1. To understand software testing and quality assurance as a fundamental component of software life cycle
2. To define the scope of SW T & QA projects
3. To efficiently perform T & QA activities using modern software tools
4. To develop T & QA project staffing requirements

Course Outcomes:

On completion of the course, the students will be able to-	
CO1:	Understand software lifecycle
CO2:	Identify the needs of testing
CO3:	Prepare test plans and schedules for a T&QA project
CO4:	Estimate cost of a T & QA project and manage budgets
CO5:	Operate different testing tools
CO6:	Effectively manage a T & QA project

Syllabus

Unit-I
Objective: To understand software quality and software quality assurance (CO1)

Software Quality Assurance and Standards:The Software Quality challenge, What is Software Quality, Software Quality factors, The components of Software Quality Assurance system, Software Quality Metrics, Costs of Software Quality, Quality Management Standards, Management and its role in Software Quality Assurance, SQA unit and other actors in SQA system.

Quality Standards: ISO 9000 and Companion ISO Standards, CMM, CMMI, PCMM, Malcom Balridge, 3 Sigma, 6 Sigma and other latest quality standards

Unit-II
Objective: To learn the importance of testing and software testing techniques (CO2)

Software Testing Strategy and Environment: Minimizing Risks, Writing a Policy for Software Testing, Economics of Testing, Testing-an organizational issue, Management Support for Software Testing, Building a Structured Approach to Software Testing, Developing a Test Strategy

Building Software Testing Proces: Software Testing Guidelines, workbench concept, Customizing the Software Testing Process, Process Preparation checklist.

Software Testing Techniques: Dynamic Testing – Black Box testing techniques, White Box testing techniques, Static testing, Validation Activities, Regression testing

Unit-III
Objective: To learn different automation testing tools (CO5)

Software Testing Tools:Selecting and Installing Software Testing tools , Automation and Testing Tools :Load Runner, Win runner and Rational Testing Tools, Silk test, Java Testing Tools, JMetra, JUNIT and Cactus.

Unit-IV
Objective: To know how to prepare test plans and schedules (CO3)

Testing Process : Seven Step Testing Process, Overview of the Software Testing Process, Organizing of Testing, Developing the Test Plan, Verification Testing, Validation Testing.

Unit-V
Objective: To analysis and report the test results and software development methodologies (CO4, CO6)

Seven Step Testing Process – II:Analyzing and Reporting Test results, Acceptance and Operational Testing, Post-Implementation Analysis Specialized Testing Responsibilities: Software Development Methodologies, Testing Client/Server Systems

Text books:

1. Effective Methods for Software Testing, Third edition, William E. Perry, Wiley India, 2009
2. Software Testing – Principles and Practices, Naresh Chauhan, Oxford University Press, 2010.
3. Software Quality Assurance – From Theory to Implementation, Daniel Galin, Pearson Education, 2009.

Reference Books:

1. Testing Computer Software, Cem Kaner, Jack Falk, Hung Quoc Nguyen, Wiley India, rp2012.
2. Software Testing – Principles, Techniques and Tools, M.G.Limaye, Tata McGraw-Hill, 2009.
3. Software Testing – A Craftsman's approach, Paul C. Jorgensen, Third edition, Auerbach Publications, 2010.
4. Foundations of Software Testing, Aditya P. Mathur, Pearson Education, 2008.

Web Links:

1. https://www.tutorialspoint.com/software_testing/index.htm
2. http://ce.sharif.edu/courses/8485/1/ce474/resources/root/Pressman_Sofware%20Engineering.pdf
3. http://www.slideshare.net/rhspcte/software-engineering-ebook-roger-s-pressman
4. https://onlinecourses.nptel.ac.in/explorer/search?category=COMP_SCI_ENGG

Course code		**20300364B Software Testing and Quality Management**									
Course Designed By		Department of Computer Applications									
Program Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
Course outcomes	CO1			✓				✓	✓		✓
	CO2		✓	✓		✓		✓	✓		✓
	CO3					✓					
	CO4	✓									
	CO5	✓	✓		✓						
	CO6						✓	✓		✓	✓
Category	**Programming**	**Core**	**Mathematics Based**	**Non Computer Based**	**Latest Technology**						
					✓						
Mode of Evaluation :Written Examination											

Regulation GRCA-20	Godavari Institute of Engineering & Technology (Autonomous)	II MCA III Sem			
Course Code 20300364C	Design Patterns				
Teaching	Total Contact Hours 64	L	T	P	C
Prerequisite (s) : Software Engineering Principles		4	0	0	4

Course Objective(s)*:*

1. To understand and be able to apply incremental / iterative development.
2. Understand common design patterns.
3. Be able to identify appropriate design patterns for various problems.
4. Be able to refactor poorly designed program by using appropriate design patterns.

Course Outcomes:

On completion of the course, the students will be able to-	
CO1:	Construct a design consisting of a collection of modules
CO2:	Exploit well-known design patterns (such as Iterator, Observer, Factory and Visitor)
CO3:	Distinguish between different categories of design patterns
CO4:	Apply common design patterns to incremental/iterative development
CO5:	Identify appropriate patterns for design of given problem
CO6:	Design the software using Pattern Oriented Architectures

Syllabus

Unit –I
Objective: To add functionality to designs while minimizing complexity.**(CO1, CO2)**

Introduction: What Is a Design Pattern?, Design Patterns in Smalltalk MVC, Describing Design Patterns, The Catalog of Design Patterns, Organizing the Catalog, How Design Patterns Solve Design Problems, How to Select a Design Pattern, How to Use a Design Pattern.

Unit –II
Objective: To describe a software development problem and express it. **(CO5, CO6)**

A Case Study: Designing a Document Editor: Design Problems, Document Structure, Formatting, Embellishing the User Interface, Supporting Multiple Look-and-Feel Standards, Supporting Multiple Window Systems, User Operations Spelling Checking and Hyphenation, Summary.

Creational Patterns: Abstract Factory, Builder, Factory Method, Prototype, Singleton, Discussion of Creational Patterns.
Unit –III
Objective: To understand the common structural patterns. **(CO2, CO3)**

Structural Pattern Part-I: Adapter, Bridge, Composite.

Structural Pattern Part-II: Decorator, açade, Flyweight, Proxy.

Unit –IV
Objective: To identify the appropriate patterns for design problems. **(CO2, CO3)**

Behavioral Patterns Part-I : Chain of Responsibility, Command, Interpreter, Iterator.

Behavioral Patterns Part-II: Mediator, Memento, Observer.

Unit –V
Objective: To understand the behavioral patterns. **(CO2, CO3)**

Behavioral Patterns Part-II (cont'd): State, Strategy, Template Method, Visitor, Discussion of Behavioral Patterns. What to Expect from Design Patterns, A Brief History, The Pattern Community An Invitation, A Parting Thought.

Text Books:

1. Design Patterns by Erich Gamma, Pearson Education, 1995.
2. Design Patterns Explained By Alan Shalloway, Pearson Education.

Reference Books:

1. Pattern's in JAVA Vol - I By Mark Grand, Wiley DreamTech.
2. Pattern's in JAVA Vol-II By Mark Grand, Wiley DreamTech.
3. JAVA Enterprise Design Patterns Vol-III By Mark Grand, Wiley DreamTech.

Web Links:

1. https://sourcemaking.com/design_patterns/structural_patterns
2. https://sourcemaking.com/design_patterns/bridge
3. www.tutorialspoint.com/design_pattern/design_pattern_overview.htm
4. https://www.cs.umd.edu/class/spring2005/cmsc838p/.../designPatterns.pp.
5. https://www.pluralsight.com/courses/patterns-library

COURSE CODE		**20300364C Design Patterns**									
COURSE DESIGNED BY		DEPARTMENT OF COMPUTER APPLICATIONS									
Program Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
Course outcomes	CO1	✓	✓	✓							
	CO2					✓					
	CO3			✓							
	CO4				✓	✓			✓		✓
	CO5								✓		
	CO6						✓			✓	✓
Category	**Programming**		**Core**		**Mathematices Based**		**Non Computer Based**		**Latest Technology**		
									✓		
Mode of Evaluation :Written Examination											

Regulation GRCA-20	Godavari Institute of Engineering & Technology (Autonomous)	II MCA III Sem			
Course Code 20300364D	Simulation Modelling				
Teaching	Total Contact Hours 64	L	T	P	C
Prerequisite (s) : Software Engineering Principles		4	0	0	4

Course Objective(s)*:*

1. To explain the basic system concept and definitions of system.
2. To discuss techniques to model and to simulate various systems.
3. To analyze a system and to make use of the information to improve the performance.
4. *To* Explain the system concept and apply functional modeling method to model the activities of a static system

Course Outcomes:

On completion of the course, the students will be able to-	
CO1:	Explain the system concept and apply functional modeling method to model the activities of a static system
CO2:	Describe the behavior of a dynamic system and create an analogous model for a dynamic system;
CO3:	Simulate the operation of a dynamic system and make improvement according to the simulation results.
CO4:	Explain the basic system concept and definitions of system
CO5:	Analyze a system and to make use of the information to improve the performance
CO6:	Discuss techniques to model and to simulate various systems

Syllabus

Unit –I
Objective: To know the basics of Simulation Modelling (CO1, CO4)

Introduction: When simulation is the appropriate tool and when it is not appropriate, Advantages and disadvantages of Simulation; Areas of application, Systems and system environment; Components of a system; Discrete and continuous systems, Model of a system; Types of Models, Discrete-Event System Simulation Simulation examples: Simulation of queuing systems.
General Principles, Simulation Software: Concepts in Discrete-Event Simulation. The Event-Scheduling / Time-Advance Algorithm, Manual simulation Using Event Scheduling

Unit –II
Objective: To learn statistical models and queing models (CO2, CO3)

Statistical Models in Simulation :Review of terminology and concepts, Useful statistical models,Discrete distributions. Continuous distributions,Poisson process, Empirical distributions.

Queuing Models: Characteristics of queuing systems,Queuing notation,Long-run measures of performance of queuing systems,Long-run measures of performance of queuing systems cont…,Steady-state behavior of M/G/1 queue, Networks of queues,

Unit –III
Objective: To know how to generate random numbers and random variates (CO3)

Random-NumberGeneration: Properties of random numbers; Generation of pseudo-random numbers, Techniques for generating random numbers,Tests for Random Numbers
Random-Variate Generation: ,Inverse transform technique Acceptance-Rejection technique.

Unit –IV
Objective: To understand usage of input analyzer and output analyzer in simulation models (CO3, CO5)

Input Modeling: Data Collection; Identifying the distribution with data, Parameter estimation, Goodness of Fit Tests, Fitting a non-stationary Poisson process, Selecting input models without data, Multivariate and Time-Series input models.
Estimation of Absolute Performance: Types of simulations with respect to output analysis ,Stochastic nature of output data, Measures of performance and their estimation,

Unit –V
Objective: To know verification and validation of simulation model (CO6)

Measures of performance and their estimation,Output analysis for terminating simulations Continued..,Output analysis for steady-state simulations.
Verification, Calibration And Validation: Optimization: Model building, verification and validation, Verification of simulation models, Verification of simulation models,Calibration and validation of models, Optimization via Simulation.

Text Books:

1. Discrete-Event System Simulation, Jerry Banks, John S. Carson II, Barry L. Nelson, David M. Nicol 5 th Edition, Pearson Education, 2010.

Reference Books:

1. Discrete – Event Simulation: A First Course, Lawrence M. Leemis, Stephen K. Park Pearson Education, 2006.
2. Simulation Modeling and Analysis, Averill M. Law, 4 th Edition, Tata McGraw-Hill, 2007

Web Links:

1. https://www.tutorialspoint.com/modelling_and_simulation/index.htm
2. https://www.sciencedirect.com/topics/computer-science/simulation-modeling
3. https://www.wiley.com/en-us/Modeling+and+Simulation%3A+The+Computer+Science+of+Illusion-p-9780470030172

COURSE CODE		**20300364D Simulation Modelling**									
COURSE DESIGNED BY		DEPARTMENT OF COMPUTER APPLICATIONS									
Program Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
Course outcomes	CO1	✓	✓	✓							
	CO2					✓					
	CO3			✓							
	CO4				✓	✓			✓		✓
	CO5								✓		
	CO6						✓			✓	✓
Category	**Programming**		**Core**		**Mathematices Based**		**Non Computer Based**		**Latest Technology**		
									✓		
Mode of Evaluation :Written Examination											

Regulation GRCA-20	Godavari Institute of Engineering & Technology (Autonomous)	II MCA III Sem			
Course Code 20309305	Professional Ethics				
Teaching	Total Contact Hours 64	L	T	P	C
Prerequisite (s) : Reading and writting skills in english		4	0	0	4

Course Objective(s)*:*

1. To enable the students to create an awareness on Engineering Ethics and Human Values,
2. To instill Moral and Social Values and Loyalty and to appreciate the rights of others.
3. To explain interaction between evolution of moral and social instruction
4. To understand the moral theories

Course Outcomes:

On completion of the course, the students will be able to-	
CO1:	Apply ethics in society
CO2:	Discuss the ethical issues related to engineering and realize the responsibilities and rights in the society
CO3:	Explain the concept of ethics
CO4:	Define historical periods of the term moral
CO5:	Talk about the unethical issues in work life
CO6:	Questonize her / himself from the respect of the ethic

Syllabus

Unit- I
Objective : To understand humanvalues and the importance of yoga **(CO1, CO3)**

Human values : Morals, values and Ethics – Integrity – Work ethic – Service learning – Civic virtue – Respect for others – Living peacefully – Caring – Sharing – Honesty – Courage – Valuing time – Cooperation – Commitment – Empathy – Self confidence – Character – Spirituality – Introduction to Yoga and meditation for professional excellence and stress management.

Unit-II
Objective : To learn ethical theories (CO2)

Engineering ethics : Senses of 'Engineering Ethics' – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg's theory – Gilligan's theory – Consensus and Controversy – Models of professional roles - Theories about right action – Self-interest – Customs and Religion – Uses of Ethical Theories

Unit- III
Objective : To know code of ethics to help professionals conduct business honestly and with integrity (CO2)

Engineering as social experimentation : Engineering as Experimentation – Engineers as responsible Experimenters – Codes of Ethics – A Balanced Outlook on Law.

Unit-IV

Objective : To understand employee rights and intellectual property rights (CO2, CO5)

Safety, responsibilities and rights : Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis and Reducing Risk - Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) – Discrimination

Unit-V

Objective : To Know the ethics in different domains (CO3, CO5, CO6)

Global issues : Multinational Corporations – Environmental Ethics – Computer Ethics – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Moral Leadership –Code of Conduct – Corporate Social Responsibility

Text Books:

1. Mike W. Martin and Roland Schinzinger, “Ethics in Engineering”, Tata McGraw Hill, New Delhi, 2003.
2. Govindarajan M, Natarajan S, Senthil Kumar V. S, “Engineering Ethics”, Prentice Hall of India, New Delhi, 2004.

Reference Books:

1. Charles B. Fleddermann, “Engineering Ethics”, Pearson Prentice Hall, New Jersey, 2004.
2. Charles E. Harris, Michael S. Pritchard and Michael J. Rabins, “Engineering Ethics – Concepts and Cases”, Cengage Learning, 2009
3. John R Boatright, “Ethics and the Conduct of Business”, Pearson Education, New Delhi, 2003
4. Edmund G Seebauer and Robert L Barry, “Fundametals of Ethics for Scientists and Engineers”, Oxford University Press, Oxford, 2001
5. Laura P. Hartman and Joe Desjardins, “Business Ethics: Decision Making for Personal Integrity and Social Responsibility” Mc Graw Hill education, India Pvt. Ltd.,New Delhi 2013.
6. World Community Service Centre, " Value Education", Vethathiri publications, Erode, 2011

Web Links:

1. www.onlineethics.org
2. www.nspe.org
3. www.globalethics.org
4. www.ethics.org

COURSE CODE		**20309305 Professional Ethics**									
COURSE DESIGNED BY		DEPARTMENT OF COMPUTER APPLICATIONS									
Program Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
Course outcomes	CO1		✓								
	CO2			✓	✓	✓					
	CO3	✓	✓								
	CO4							✓			✓
	CO5			✓			✓		✓	✓	
	CO6		✓								✓
Category	**Programming**		**Core**		**Mathematices Based**		**Non Computer Based**		**Latest Technology**		
							✓				
Mode of Evaluation :Written Examination											

Regulation GRCA-20	Godavari Institute of Engineering & Technology (Autonomous)	II MCA III Sem			
Course Code 20300311	Full Stack Web Development Lab				
Teaching	Total Contact Hours 48	L	T	P	C
Prerequisite (s) : Knowledge about basic computer programming		0	0	4	2

Course Objective(s):

1. To understand the web technologies to create adaptive web pages for web application.
2. To use CSS to implement a variety of presentation effects to the web application.
3. To develop interactive webpages using PHP.
4. To design a sophisticated web application with database interaction.

Course Outcomes:

On completion of the course, the students will be able to-	
CO1:	Use client-side technologies (HTML, CSS, and JavaScript)
CO2:	Use server-side technologies (PHP) to implement websites
CO3:	Design and implement a basic website
CO4:	Facilitate interface between frontend and backend of a web application
CO5:	Develop simple back-end database to support a website
CO6:	Debug, test and deploy web applications in different web servers

List of Programs

1. Write HTML code for creating a Weather Forecasting table with cities, their maximum and minimum temperatures. .(CO1)
2. Write HTML code for displaying a Restaurant Menu with images of food items and their costs. .(CO1)
3. Write HTML code for internal linking .(CO1)
4. Write HTML code for external linking.(CO1)
5. Write HTML code for Login Form validation using Javascript. .(CO1)
6. Write HTML code for creating a Student Registration Form .It should display “Thanks “ Message in the end with students name. .(CO1)
7. Write an HTML page including any required JavaScript that takes a number from one text field in the range of 0 to 999 and shows it in another text field in words. If the number is out of range, it should show “out of range” and if it is not a number, it should show “not a number” message in the result box. .(CO1)

8. Write an HTML page that contains a list of 5 countries. When the user selects a country, its capital should be printed next to the list. Add CSS to customize the properties of the font of the capital (color, bold and font size). .(CO1)
9. Write a calculator program in HTML that performs basic arithmetic operations (+,, /, * and %). Use CSS to change the foreground and background color of the values, buttons and result display area separately. Validate the input strings using JavaScript regular expressions. Handle any special cases like division with zero reasonably.(CO1)
10. Develop static pages (using Only HTML) of an online Book store. The pages should resemble: www.amazon.comThe website should consist the following pages.Home page, Registration and user Login, Books catalog, Shopping Cart, Payment By credit card, Order Confirmation. .(CO1)
11. Validate the Registration, user login, and payment by credit card pages designed in above program using JavaScript. .(CO1)
12. Write HTML code showing the use of filters. .(CO1)
13. Write HTML code showing the working of frames. .(CO1)
14. Write HTML code for Inline style sheet.(CO1)
15. Write HTML code for Embedded style sheet.(CO1)
16. Write HTML code for External style sheet.(CO1)
17. Write code for a number guessing game using Javascript. .(CO1)
18. Write code for performing arithmetic operations on numbers entered by user based on operation selection done by the user using Javascipt. .(CO1)
19. Write a Simple Hello Program in PHP by Installing & Configuring XAMPP (CO2, CO6)
20. Write a Program in PHP for type Casting Of a Variables (CO2)
21. Write a Program In PHP to Display Multiplication Table Using Nested For Loop (CO2)
22. Write a program In PHP to Sort an array using function (Bubble Sort) (CO2)
23. Write a program in PHP to validate e-mail using filters. (CO2)
24. Design a personal Information form , then Submit & Retrieve the Form Data Using $_GET(), $_POST() and $_REQUEST() Variables (CO2)
25. Design A Login Form and Validate that Form using PHP Programming (CO2)
26. Create Admin Login ,Logout form using session variables (CO2)
27. Installation of MYSQL on windows and Executes their basic Commands (CO4)
28. Write a PHP Code to make database connection, Create Data Base, Create Table In Mysql (CO4, CO5)
29. Write a PHP code Insert, Delete, Update, Select the Data From Data Base (CO4, CO5)
30. Design A from which upload And Display Image in PHP (CO4, CO5)

Course Code		**20300311 Full Stack Web Development Lab**									
Course Designed By		Department of Computer Applications									
Program Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
Course outcomes	CO1			✓			✓	✓			✓
	CO2	✓	✓								
	CO3			✓	✓	✓					
	CO4			✓						✓	
	CO5			✓					✓		
	CO6									✓	✓
Category	**Programming**	**Core**		**Mathematics Based**		**Non Computer Based**		**Latest Technology**			
	✓										
Mode of Evaluation :Written Examination											

Regulation GRCA-20	Godavari Institute of Engineering & Technology (Autonomous)	II MCA III Sem			
Course Code 20300312	Data Science with R Programming Lab				
Teaching	Total Contact Hours 48	L	T	P	C
Prerequisite (s) : Knowledge about programming in Java		0	0	3	1.5

Course Objective(s):

1. To write and execute programs in R
2. To solve various data types for dealing practical problems using such as Mathematical Functions and statistical problems
3. To write and execute programs in R to analyze and implement various solutions for data related problems.
4. To apply different algorithms to solve real world problems

Course Outcomes:

On completion of the course, the students will be able to-	
CO1:	Apply concepts of data inputting and basic statistics in R
CO2:	Implement statistical modeling in R
CO3:	Implement various functions and programming in R
CO4:	Familiar with R echosystem
CO5:	Solve common data analysis tasks
CO6:	Summarize and visualize data

List of Programs

R as a calculator application

1. Using with and without R objects on console (CO1)
2. Using mathematical functions on console (CO1)
3. Write an R script, to create R objects for calculator application and save in disk (CO1, CO4)

Descriptive statistics in R

4. Write an R script to find basic descriptive statistics using summary, str, quartile function on mtcars & cars database (CO2)
5. Write an R script to find subset of dataset by using subset(), aggregate() functions on iris dataset (CO2)

Reading and writing different types of datasets

6. Reading different types of data sets (.txt, .csv) from web and disk and writing in file (CO1)
7. Reading Excel data sheet in R (CO1)
8. Reading XML dataset in R (CO1)

Visualizations

9. Find the data distributions using box and scatter plot (CO6)
10. Find the outliers using plot (CO6)
11. Plot the histogram, bar chart and pie chart on sample data (CO6)

Correelation and Covariance

12. Find the correlation matrix (CO5)
13. Plot the correlation plot on dataset and visualize giving an overview of relationships among data on iris data (CO5)

Regression model

14. Import a data from web storage. Name the dataset and now do Logistic Regression to find out relation between variables that are affecting the admission of a student in a institute based on his or her GRE score, GPA obtained and rank of the student. Also check the model is fit or not. require (foreign), require(MASS). (CO5)
15. Apply regression model techniques to predict the data on above dataset (CO5)

Classification model

16. Install relevant package for classification (CO6)
17. Choose classifier for classification problem (CO6)
18. Evluate the performance of classifier (CO6)

Clustering model

19. Clustering algorithms for unsupervised classification
20. Plot the cluster data using R visualizations (CO6)

Text books:

1. R for Everyone: Advanced Analytics and Graphics , Jared P.Lander (2014),Pearson

2. Beginning R: The Statistical Programming Language , Dr. Mark Gardener (2013),Wiley

3. R and Data mining: Examples and case studies, Elsevier, 1st edition (2012)

COURSE CODE		**20300312 Data Science with R Programming Lab**									
COURSE DESIGNED BY		DEPARTMENT OF COMPUTER APPLICATIONS									
Program Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
Course outcomes	CO1	✓					✓			✓	
	CO2	✓	✓			✓					
	CO3	✓	✓					✓			
	CO4			✓						✓	
	CO5			✓					✓		
	CO6									✓	✓
Category	**Programming**		**Core**		**Mathematics Based**		**Non Computer Based**		**Latest Technology**		
					✓						
Mode of Evaluation :Written Examination											

Regulation GRCA-20	Godavari Institute of Engineering & Technology (Autonomous)	II MCA III Sem			
Course Code 20300313	Internet of Things Lab				
Teaching	Total Contact Hours 48	L	T	P	C
Prerequisite (s) : Knowledge about programming		0	0	3	1.5

Course Objective(s)*:*

1. To apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. To identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions
3. To design solutions for complex engineering problems and design system components or processes that meet the specified needs
4. To use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

Course Outcomes:

On completion of the course, the students will be able to-	
CO1:	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools
CO2:	Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
CO3:	Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
CO4:	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
CO5:	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
CO6:	Demonstrate knowledge and understanding of the engineering and management principles and apply these to one’s own work

List of Programs

1. Study and install Python in Eclipse and WAP for data types in python.
2. Write a Program for arithmetic operation in Python.
3. Write a Program for looping statement in Python.
4. Study and Install IDE of Arduino and different types of Arduino.
5. Write program using Arduino IDE for Blink LED.
6. Write Program for RGB LED using Arduino.
7. Study the Temperature sensor and Write a program for monitor temperature using Arduino.
8. Study and Configure Raspberry Pi.
9. WAP for LED blink using Raspberry Pi.

Course Code		**20300313 Internet of Things Lab**									
Course Designed By		Department of Computer Applications									
Program Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
Course outcomes	CO1			✓			✓	✓			✓
	CO2	✓	✓								
	CO3			✓	✓	✓					
	CO4			✓						✓	
	CO5			✓					✓		
	CO6									✓	✓
Category	**Programming**	**Core**		**Mathematics Based**		**Non Computer Based**		**Latest Technology**			
								✓			
Mode of Evaluation :Written Examination											

Regulation GRCA-20	Godavari Institute of Engineering & Technology (Autonomous)	II MCA III Sem			
Course Code 20300321	Mini Project	L	T	P	C
Prerequisite (s)	Knowledge of general programming concepts	0	0	0	2

Course Objectives:

1. To provide students for knowledge of Computer applications and soldering techniques.
2. To apply Knowledge for the developing and design a webpage.
3. Design and development of Small software project based on hardware and software for online systems.
4. To let the students apply the programming knowledge into a real- world situation/problem

Course Outcomes:

On completion of the course, the students will be able to-	
CO1:	Practice acquired knowledge within the chosen area of technology for project development
CO2:	Identify, discuss and justify the technical aspects of the chosen project with a comprehensive and systematic approach
CO3:	Reproduce, improve and refine technical aspects for engineering projects
CO4:	Work as an individual or in a team in development of technical projects
CO5:	Conduct a survey of several available literatures in the preferred field of study
CO6:	Communicate and report effectively project related activities and findings

Guidelines for Completing the Project:

1. The Project will consist of the work on the topic selected.
2. The Project must be done by single student
3. The student is expected to select the Project, do the requirement analysis, and carry out the necessary design procedure

Regulation GRCA-20	Godavari Institute of Engineering & Technology (Autonomous)	II MCA IV Sem			
Course Code 20300461A	Digital Image Processing				
Teaching	Total Contact Hours -58	L	T	P	C
Prerequisite(s)	Knowledge of concepts related to data and its related activities	4	0	0	4

Course objectives:

1. To understand the fundamentals concepts of Digital Image Processing System.
2. To know about various segmentation techniques and object descriptions.
3. To understand the concepts of image enhancement techniques.
4. To know the color models and various applications of image processing.

Course Outcomes:

On completion of the course, the students will be able to-	
CO1:	To develop Fourier transformation for image processing in frequency domain
CO2:	Analyze images in the frequency domain using various transforms
CO3:	Apply image processing algorithm: in practical applications
CO4:	Analyze the basic algorithm: used for image processing and image compression with morphological image processing
CO5:	Design and Synthesize color image processing and its real world applications
CO6:	Implement image process and analysis algorithms.

Syllabus

Unit-I

Objective: To Describe and explain basic principles of digital image processing (CO1).

Fundamentals: Need for DIP- Fundamental steps in DIP – Elements of visual perception -Image sensing and Acquisition – Image Sampling and Quantization – Imaging geometry, discrete image mathematical characterization.

Unit-II

Objective: To design and implement algorithms that perform basic image processing (e.g. noise removal and image enhancement) (CO2)

Image Transforms: Two dimensional Fourier Transform- Properties – Fast Fourier Transform – Inverse FFT, Discrete cosine transform and KL transform.-Discrete Short time Fourier Transform- Wavelet Transform- Discrete wavelet Transform- and its application in Compression.

Unit-III

Objective: To design and implement algorithms for advanced image analysis (e.g. image compression, image segmentation) (CO3)

Image Enhancement: Spatial Domain: Basic relationship between pixels- Basic Gray level Transformations – Histogram Processing – Smoothing spatial filters- Sharpening spatial filters.

Frequency Domain: Smoothing frequency domain filters- sharpening frequency domain filters Homomorphic filtering.

Unit -IV

Objective: To assess the performance of image processing algorithms and systems. (CO4)

Image Restoration: Overview of Degradation models –Unconstrained and constrained restorations-Inverse Filtering ,WienerFilter.

Feature Extraction: Detection of discontinuities – Edge linking and Boundary detection-Thresholding- -Edge based segmentation-Region based Segmentation- matching-Advanced optimal border and surface detection- Use of motion in segmentation. Image Morphology – Boundary descriptors- Regional descriptors.

Unit -V

Objective: To apply image processing algorithms in practical applications (CO5).

Image Reconstruction from Projections: Need- Radon Transform – Back projection operator-Projection Theorem- Inverse Radon Transform.

Text Books:

1. Principles of Digital Image Processing: Advanced methods, Wilhelm Burger, Mark J. Burge, 1/e, Springer-Verlag London, 2013.
2. Digital Image Processing, Rafael C Gonzalez, Prentice Hall, 2/e, 2002.

Reference Books:

1. B.Chanda & D.Dutta Majumder – Digital Image Processing and Analysis – Prentice Hall of India – 2002
2. William K. Pratt – Digital Image Processing – John Wiley & Sons, 3/e, 2001.

Web Links:

1. https://www.springer.com/gp/book/9781848829183
2. http://sdeuoc.ac.in/sites/default/files/sde_videos/Digital%20Image%20Processing%203rd%20ed.%20-%20R.%20Gonzalez%2C%20R.%20Woods-ilovepdf-compressed.pdf
3. https://content.kopykitab.com/ebooks/2016/03/6189/sample/sample_6189.pdf
4. http://nana.lecturer.pens.ac.id/index_files/referensi/image_processing/Digital%20Image%20Processing.pdf

<table>
<tr><td colspan="2">COURSE CODE</td><td colspan="10">20300461A Digital Image Processing</td></tr>
<tr><td colspan="2">COURSE DESIGNED BY</td><td colspan="10">DEPARTMENT OF COMPUTER APPLICATIONS</td></tr>
<tr><td colspan="2">Program Outcomes</td><td>PO1</td><td>PO2</td><td>PO3</td><td>PO4</td><td>PO5</td><td>PO6</td><td>PO7</td><td>PO8</td><td>PO9</td><td>PO10</td></tr>
<tr><td rowspan="6">Course outcomes</td><td>CO1</td><td>✓</td><td></td><td></td><td>✓</td><td></td><td>✓</td><td></td><td>✓</td><td></td><td></td></tr>
<tr><td>CO2</td><td></td><td>✓</td><td></td><td></td><td>✓</td><td></td><td></td><td></td><td></td><td>✓</td></tr>
<tr><td>CO3</td><td></td><td></td><td></td><td>✓</td><td></td><td></td><td></td><td></td><td>✓</td><td></td></tr>
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<tr><td>CO5</td><td>✓</td><td></td><td></td><td>✓</td><td></td><td></td><td></td><td></td><td></td><td>✓</td></tr>
<tr><td>CO6</td><td></td><td></td><td>✓</td><td></td><td></td><td>✓</td><td></td><td></td><td>✓</td><td></td></tr>
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<tr><td></td><td colspan="2"></td><td colspan="2"></td><td colspan="2"></td><td colspan="3">✓</td></tr>
<tr><td colspan="12">Mode of Evaluation :Written Examination</td></tr>
</table>

Regulation GRCA-20	Godavari Institute of Engineering & Technology (Autonomous)	II MCA IV Sem			
Course Code 20300461B	Machine Learning				
Teaching	Total Contact Hours:58	L	T	P	C
Prerequisite (s)	Mathematical statistics, Algorithm Analysis, Artificial Intelligence	4	0	0	4

Course Objectives:

1. To understand the need for machine learning for various problem solving
2. To study the various supervised, semi-supervised and unsupervised learning algorithms in machine learning.
3. To understand the latest trends in machine learning
4. To design appropriate machine learning algorithms for problem solving

Course Outcomes:

On completion of the course, the students will be able to-	
CO1:	Differentiate between supervised, unsupervised, semi-supervised machine learning approaches
CO2:	Solve non-linear problems using SVM
CO3:	Apply the back propagation algorithm and genetic algorithms to various problems
CO4:	Apply the Bayesian concepts to machine learning
CO5:	Get knowledge about advanced learning methods
CO6:	Solve problems of moderate complexity

Syllabus

Unit- I

Objective: To know the Basic and different machine learning approaches and to use algorithms in machine learning (CO1, CO3)

Introduction : Learning Problems – Perspectives and Issues – Concept Learning – Version Spaces and Candidate Eliminations – Inductive bias – Decision Tree learning – Representation – Algorithm – Heuristic Space Search.

Unit-II

Objective: To discuss how to apply Genetic algorithms to various problems. (CO3)

Neural Networks and genetic algorithms: Neural Network Representation – Problems – Perceptrons – Multilayer Networks and Back Propagation Algorithms – Advanced Topics – Genetic Algorithms – Hypothesis Space Search – Genetic Programming – Models of Evaluation and Learning.

Unit-III

Objective: To discuss how to apply Bayesian algorithms or concepts to machine learning (CO4)

Bayesian and Computational Learning: Bayes Theorem – Concept Learning – Maximum Likelihood – Minimum Description Length Principle – Bayes Optimal Classifier – Gibbs Algorithm – Naive Bayes Classifier – Bayesian Belief Network – EM Algorithm – Probability Learning – Sample Complexity – Finite and Infinite Hypothesis Spaces – Mistake Bound Model.

Unit- IV

Objective: To know about the various machine learning approaches. (CO1)

Instant based Learning :K- Nearest Neighbour Learning – Locally weighted Regression – Radial Basis Functions – Case Based Learning.

Unit-V

Objective: To understand appropriate machine learning approaches for machine learning (CO5)
Advanced Learning: Learning Sets of Rules – Sequential Covering Algorithm – Learning Rule Set – First Order Rules – Sets of First Order Rules – Induction on Inverted Deduction – Inverting Resolution – Analytical Learning – Perfect Domain Theories – Explanation Base Learning – FOCL Algorithm – Reinforcement Learning – Task – Q-Learning – Temporal Difference Learning

Text Books:

1. Tom M. Mitchell, ―Machine Learning, McGraw-Hill Education (India) Private Limited, 2013.

Reference Books:

1. Ethem Alpaydin, ―Introduction to Machine Learning (Adaptive Computation and Machine Learning), 3/e, The MIT Press - 2014.
2. Stephen Marsland, ―Machine Learning: An Algorithmic Perspective, 2/e, CRC Press, 2014.

Web Links:

1. http://profsite.um.ac.ir/~monsefi/machine-learning/pdf/Machine-Learning-Tom-Mitchell.pdf
2. https://kkpatel7.files.wordpress.com/2015/04/alppaydin_machinelearning_2010.pdf
3. http://dai.fmph.uniba.sk/courses/ICI/marsland.ml-alg-perspect.09.pdf
4. https://seat.massey.ac.nz/personal/s.r.marsland/mlbook.html

COURSE CODE		**20300461B Machine Learning**									
COURSE DESIGNED BY		DEPARTMENT OF COMPUTER APPLICATIONS									
Program Outcomes		PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10
Course outcomes	CO1		✓						✓		✓
	CO2			✓				✓			✓
	CO3		✓		✓		✓				
	CO4	✓			✓					✓	
	CO5	✓		✓						✓	
	CO6		✓		✓				✓		
Category	**Programming**		**Core**		**Mathematices Based**		**Non Computer Based**		**Latest Technology**		
									✓		
Mode of Evaluation :Written Examination											

Regulation GRCA-20	Godavari Institute of Engineering & Technology (Autonomous)	II MCA IV Sem			
Course Code 20300461C	BIG DATA ANALYTICS				
Teaching	Total Contact Hours 58	L	T	P	C
Prerequisite (s)	knowledge of Programming Language (Java preferably), Practice of SQL (queries and sub queries)	4	0	0	4

Course Objectives:

1. To understand the computational approaches to Modeling, Feature Extraction.
2. To know the need and application of Map Reduce
3. To apply the various search algorithms applicable to Big Data
4. To analyze and interpret streaming data

Course Outcomes:

On completion of the course, the students will be able to-	
CO1:	Understand how to leverage the insights from big data analytics
CO2:	Analyze data by utilizing various statistical and data mining approaches
CO3:	Perform analytics on real-time streaming data
CO4:	Understand the various NoSQL alternative database models
CO5:	To Understand how to handle large data sets in main memory
CO6:	To Understand various clustering techniques applicable to Big Data

Syllabus

Unit –I

Objective: Learn ways of storing data that allow for efficient processing and analysis, and gain the skills you need to store, manage, process, and analyze massive amounts of unstructured data**.(CO1)**

Introduction to Big data

Big Data – Definition, Characteristic Features – Big Data Applications, Big Data vs Traditional Data - Risks of Big Data, Structure of Big Data, Challenges of Conventional Systems, Web Data ,Evolution of Analytic Scalability, Evolution of Analytic Processes, Tools and methods, Analysis vs Reporting, Modern Data Analytic Tools.

Unit –II

Objective: To process large data sets using Hadoop to extract values **(CO3)**

Hadoop framework

Distributed File Systems, Large-Scale File System Organization, HDFS concepts, MapReduce Execution, Algorithms using MapReduce, Matrix-Vector Multiplication,Hadoop YARN. Introduction to SPARK, Features of Apache SPARK, Components of SPARK, Resilient Distributed Data Sets.

Unit –III
Objective: To understand the statistical and classification methods in data analytics. **(CO4)**

Data analysis
Statistical Methods: Regression modeling, Multivariate Analysis , Classification: SVM & Kernel Methods, Rule Mining, Cluster Analysis, Types of Data in Cluster Analysis, Partitioning Methods, Hierarchical Methods, Density Based Methods, Grid Based Methods, Model Based Clustering Methods, Clustering High Dimensional Data, Predictive Analytics, Data analysis using R.

Unit –IV
Objective: To know utilization of data by various statistical and data mining approaches.**(CO2)**
Mining data streams
Streams: Concepts, Stream Data Model and Architecture, Sampling data in a stream, Mining Data Streams and Mining Time-series data, Real Time Analytics Platform (RTAP) Applications, Case Studies - Real Time Sentiment Analysis, Stock Market Predictions.

Unit –V
Objective: To know the concepts of Querying large data sets in near real time with Pig and Hive. **(CO1, CO3)**

Big data frameworks

Introduction to NoSQL, Aggregate Data Models, Hbase: Data Model and Implementations, Hbase Clients, Examples. Cassandra: Data Model, Examples - Cassandra Clients, Hadoop Integration. Pig, Grunt, Pig Data Model, Pig Latin, developing and testing Pig Latin scripts. Hive, Data Types and File Formats, HiveQL Data Definition, HiveQL Data Manipulation, HiveQL Queries

Text Books:

1. Bill Franks, ―Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics, Wiley, 1e, 2012.
2. David Loshin, "Big Data Analytics: From Strategic Planning to Enterprise Integration with Tools, Techniques, NoSQL, and Graph", 1/e, Morgan Kaufmann, 2013.

References:

1. Michael Berthold, David J. Hand, ―Intelligent Data Analysis‖, Springer, Second Edition, 2007.
2. Michael Minelli, Michelle Chambers, and Ambiga Dhiraj, "Big Data, Big Analytics:

Emerging Business Intelligence and Analytic Trends for Today's Businesses", Wiley, 2013.
3. P. J. Sadalage and M. Fowler, "NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence", Addison-Wesley Professional, 2012.
4. Richard Cotton, "Learning R – A Step-by-step Function Guide to Data Analysis, , O'Reilly Media, 2013.
5. Tom White " Hadoop: The Definitive Guide" Third Edit on, O'reily Media, 2012.
6. Seema Acharya, Subhasini Chellappan, "Big Data Analytics" Wiley 2015

Web Links:

1. https://link.springer.com/content/pdf/bfm%3A978-3-540-48625-1%2F1.pdf
2. https://www.dagstuhl.de/Reports/00/00331.pdf
3. https://www.sas.com/storefront/aux/en/spbdaa/64794_excerpt.pdf

COURSE CODE		**20300461C BIG DATA ANALYTICS**									
COURSE DESIGNED BY		DEPARTMENT OF COMPUTER APPLICATIONS									
Program Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
Course outcomes	CO1	✓					✓				✓
	CO2		✓	✓				✓	✓		✓
	CO3	✓			✓						
	CO4			✓		✓			✓	✓	
	CO5										
	CO6										
Category	**Programming**		**Core**		**Mathematics Based**		**Non Computer Based**		**Latest Technology**		
	✓								✓		
Mode of Evaluation :Written Examination											

Regulation GRCA-20	Godavari Institute of Engineering & Technology (Autonomous)	II MCA IV Sem			
Course Code 20300462A	Software Project and Process Management				
Teaching	Total Contact Hours -58	L	T	P	C
Prerequisite (s)	Knowledge of general programming concepts	4	0	0	4

Course Objectives:

1.To acquire knowledge on software process management
2.To acquire managerial skills for software project development
3.To understand software economics
4.To implement a software project management activity, and to complete a specific project in time with the available budget.

Course Outcomes:

On completion of the course, the students will be able to-	
CO1:	Gain knowledge of software economics, phases in the life cycle of software development, project organization, project control and process instrumentation
CO2:	Analyze the major and minor milestones, artifacts and metrics from management and technical perspective
CO3:	Design and develop software product using conventional and modern principles of software project management
CO4:	Identify and describe the key phases of project management.
CO5:	Determine an appropriate project management approach through an evaluation of the business context and scope of the project
CO6:	Practice the role of professional ethics insuccessful software development.

Syllabus

UNIT - I

Software Process Maturity

Software maturity Framework, Principles of Software Process Change, Software Process Assessment, The Initial Process, The Repeatable Process, The Defined Process, The Managed Process, The Optimizing Process. Process Reference Models, Capability Maturity Model (CMM), CMMI, PCMM, PSP, TSP).

UNIT - II

Software Project Management Renaissance

Conventional Software Management, Evolution of Software Economics, Improving Software Economics, The old way and the new way.

Life-Cycle Phases and Process artifacts

Engineering and Production stages, inception phase, elaboration phase, construction phase, transition phase, artifact sets, management artifacts, engineering artifacts and pragmatic artifacts, model-based software architectures.

UNIT - III

Workflows and Checkpoints of process

Software process workflows, Iteration workflows, Major milestones, minor milestones,

periodic status assessments.

Process Planning

Work breakdown structures, Planning guidelines, cost and schedule estimating process,

iteration planning process, Pragmatic planning**.**

UNIT - IV

Project Organizations

Line-of- business organizations, project organizations, evolution of organizations, process

automation.

Project Control and process instrumentation

The seven-core metrics, management indicators, quality indicators, life-cycle expectations,

Pragmatic software metrics, metrics automation.

UNIT - V

CCPDS-R Case Study and Future Software Project Management Practices

Modern Project Profiles, Next-Generation software Economics, Modern Process Transitions.

Text Books:

1. Managing the Software Process, Watts S. Humphrey, Pearson Education
2. Software Project Management, Walker Royce, Pearson Education, 1/e, 1998.

Reference Books:

1. An Introduction to the Team Software Process, Watts S. Humphrey, Pearson
2. Education,2000 Process Improvement essentials, James R. Persse, O'Reilly,2006
3. Software Project Management, Bob Hughes & Mike Cotterell, fourth edition,TMH,2006
4. Applied Software Project Management, Andrew Stellman & Jennifer Greene, O'Reilly, 2006.
5. Head First PMP, Jennifer Greene & Andrew Stellman, O'Reilly,2007
6. Software Engineering Project Managent, Richard H. Thayer & Edward Yourdon, 2nd edition, Wiley India, 2004.
7. Agile Project Management, Jim Highsmith, Pearson education, 2004.

Web Links:

1. https://www.tutorialspoint.com/software_enineering/software_project_management.htm
2. https://www.projectmanager.com/blog/project-management-process-phases
3. https://www.wrike.com/project-management-guide/faq/what-is-software-project-management/
4. http://blog.zilicus.com/software-project-management-process-introduction/
5. https://www.wrike.com/project-management-guide/faq/what-is-software-project-management/

COURSE CODE	**20300462A software project and project management**									
COURSE DESIGNED BY	DEPARTMENT OF COMPUTER APPLICATIONS									
Program Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
Course outcomes	CO1	✓					✓				✓
	CO2		✓	✓				✓	✓		✓
	CO3	✓			✓						
	CO4			✓		✓			✓	✓	
	CO5:										
	CO6:										
Category	**Programming**		**Core**		**Mathematics Based**		**Non Computer Based**		**Latest Technology**	
	✓								✓	
Mode of Evaluation :Written Examination										

Regulation GRCA-20	**Godavari Institute of Engineering & Technology (Autonomous)**	**II MCA IV Sem**
Course Code 20300462B	**Multimedia Applications and Development**	

Teaching	Total Contact Hours -58	L	T	P	C
Prerequisite (s)	Knowledge of general programming concepts	4	0	0	4

Course Objectives:

1. To understand the Fundamental concepts in Text and Image
2. To understand the Fundamental concepts in Video and Digital Audio
3. To know the Application framework application development
4. To know the Multimedia data and video conversion techniques

Course Outcomes:

On completion of the course, the students will be able to-	
CO1:	Design and create interactive multimedia products
CO2:	Identify and produce various typography related techniques
CO3:	Identify issues and obstacles encountered by web authors in deploying web based Applications
CO4:	Create a well designed interactive website with respect to current standards and Practices
CO5:	Create time based and interactive multimedia components
CO6:	Describe and produce the relational aspects of video, motion graphics, audio and Interaction

Syllabus

Unit - I

Objective: To Understand Fundamental concepts in Text and Image (CO1)

Multimedia and hypermedia, world wide web, overview of multimedia software tools. Graphics and image data representation graphics/image data types, file formats, Color in image and video: color science, color models in images, color models in video.

Unit – II

Objective: To understand Fundamental Concepts in Video and Digital Audio (CO2)

Types of video signals, analog video, digital video, digitization of sound, MIDI, quantization and transmission of audio.

Unit -III

Objective: To understand various action scripts (CO3, CO4)

Action Script I: Action Script Features, Object-Oriented Action Script, Datatypes and Type Checking, Classes, Authoring an Action Script Class.

Action Script II : Inheritance, Authoring an Action Script 2.0 Subclass, Interfaces, Packages, Exceptions. Application Development: An OOP Application Frame work, Using Components with Action Script Movie Clip Subclasses.

Unit - IV

Objective: To understand Multimedia Data Compression (CO4,CO5)

Lossless compression algorithm: Run-Length Coding, Variable Length Coding, Dictionary Based Coding, Arithmetic Coding, Lossless Image Compression.

Lossy compression algorithm: Quantization, Transform Coding, Wavelet-Based Coding, Embedded Zerotree of Wavelet Coefficients Set Partitioning in Hierarchical Trees (SPIHT).

Basic Video Compression Techniques: Introduction to video compression, video compression based on motion compensation, search for motion vectors, MPEG, Basic Audio Compression Techniques.

Unit- V

Objective: To understand Multimedia Network communications and applications **(CO6)**

Basics of Multimedia Networks, Multimedia Network Communications and Applications: Quality of Multimedia Data Transmission, Multimedia over IP, Multimedia over ATM Networks, Transport of MPEG- 4, Media-on- Demand (MOD).

Text Books:

1. Fundamentals of Multimedia , Ze-Nian Li , Mark S. Drew, Springer, 2/e, 2014.
2. Multimedia Systems, Parag Havaldar, Gerard Medioni, cengage,2009. 3. Essentials Action Script 3.0, Colin Moock, SPD O, Reilly,2007.

Reference Books:

1. Multimedia Applications, Steinmetz, Nahrstedt, Springer.
2. Digital Multimedia, Nigel Chapman, Jenny Chapman, Wiley, 1/e, 2000.
3. Multimedia & Communications Technology, Steve Heath, Elsevier.
4. Multimedia Technology & Applications, David Hilman , Galgotia.
5. Multimedia Technologies, Banerji, Mohan Ghosh, MGH

Web Links:

1. https://users.dimi.uniud.it/~antonio.dangelo/MMS/materials/Fundamentals_of_Multimedia.pdf
2. https://link.springer.com/book/10.1007/978-3-662-08876-0
3. https://www.oreilly.com/library/view/multimedia-and-communications/9781136025693/
4. https://www.worldcat.org/title/multimedia-technologies/oclc/605412451

COURSE CODE	**20300462B Multi Media Applications & Development**									
COURSE DESIGNED BY	DEPARTMENT OF COMPUTER APPLICATIONS									
Program Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
Course outcomes	CO1	✓			✓		✓		✓		
	CO2		✓			✓					✓
	CO3				✓					✓	
	CO4			✓		✓		✓			
	CO5	✓			✓						✓
	CO6			✓			✓			✓	
Category	**Programming**		**Core**		**Mathematices Based**		**Non Computer Based**		**Latest Technology**	
									✓	
Mode of Evaluation :Written Examination										

Regulation GRCA-20	**Godavari Institute of Engineering & Technology (Autonomous)**	**II MCA IV Sem**			
Course Code 20300462C	**Cloud Computing**				
Teaching	**Total Contact Hours -58**	**L**	**T**	**P**	**C**
Prerequisite (s)	**Knowledge of general programming concepts**	**4**	**0**	**0**	**4**

Course Objectives:

1: To understand the Basic concepts of cloud computing.

2: To know the key concepts of virtualization.
3: To understand the Different Cloud Computing services
4: To know the design issues and challenges of Cloud Computing

Course Outcomes:

On completion of the course, the students will be able to-	
CO1:	Identify resource management fundaments in resource abstraction, sharing and sand boxing and their role in managing infrastructure in cloud computing
CO2:	Describe importance of virtualization along with their technologies
CO3:	Use and Examine different cloud computing services
CO4:	Analyze the components of open stack & Google Cloud platform and understand Mobile Cloud Computing
CO5:	Describe the key components of Amazon web Service
CO6:	Design & develop backup strategies for cloud data based on features

Syllabus

Unit -I
Objective: To know the introduction and characteristics of cloud computing (CO1, CO2)

Introduction: Introduction to Cloud Computing - Definition - Cloud Types : IaaS – PaaS - SaaS – Public - Private and Hybrid clouds – Characteristics of Cloud Computing.

Unit -II
Objective: To know the concepts of virtualization (CO2)
Virtualization : Basics of Virtualization - Types of Virtualization - Implementation Levels of Virtualization - Virtualization Structures - Tools and Mechanisms - Virtualization of CPU – Memory - I/O Devices - Server Virtualization.

Unit -III
Objective: To know the Architecture and storage of cloud computing (CO2, CO3)

Architecture: NIST Cloud Computing Reference Architecture - Architectural Design of Compute and Storage Clouds – Layered Cloud Architecture Development.

Unit -IV
Objective: To know the design issues and challenges of cloud computing (CO4)

Cloud Resource: Design Challenges - Inter Cloud Resource Management – Resource Provisioning and Platform Deployment – Global Exchange of Cloud Resources.

Unit -V
Objective: To know the different security issues of cloud (CO5, CO6)

Security : Security Overview – Cloud Security Challenges – Software-As-A-Service Security – Security Governance – Risk Management – Security Monitoring – Security Architecture Design – Data Security – Application Security – Virtual Machine Security.

Text Books:

1. Cloud Computing from Beginning to End by Ray J Rafaels
2. Cloud Computing for Dummies by Judith S. Hurwitz, Robin Bloor, Marcia Kaufman, Fern Halper, 2/e, 2020.
3. Cloud Computing: Concepts, Technology & Architecture by Zaigham Mahmood, Ricardo Puttini, Thomas Erl, 2013.

Reference Books:

1. Kai Hwang, Geoffrey C Fox, Jack G Dongarra, "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, 2012.
2. Cloud Computing Bible, Barrie Sosinsky, Wiley India Pvt. Ltd, 2013.
3. John W.Rittinghouse and James F.Ransome, Cloud Computing: Implementation, Management, and Security, CRC Press, 2010.
4. Roger Jennings, Cloud Computing with Windows Azure Platform, Wiley India Pvt. Ltd, 2009

Web Links:

1. https://ptaillify.firebaseapp.com/aa883/cloud-computing-from-beginning-to-end-by-mr-ray-j-rafaels-1511404582.pdf
2. https://arpitapatel.files.wordpress.com/2014/10/cloud-computing-bible1.pdf
3. http://www.asecib.ase.ro/cc/carti/Cloud%20Computing%20with%20the%20Windows%20Azure%20Platforme%20[2009].pdf
4. https://data-flair.training/blogs/featuers0of0cloud-computing/

COURSE CODE		**20300462C Cloud Computing**									
COURSE DESIGNED BY		DEPARTMENT OF COMPUTER APPLICATIONS									
Program Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
Course outcomes	CO1	✓			✓		✓		✓		
	CO2		✓			✓					✓
	CO3				✓					✓	
	CO4			✓		✓		✓			

	CO5	✓			✓						✓
	CO6			✓			✓			✓	
Category	**Programming**		**Core**		**Mathematics Based**		**Non Computer Based**		**Latest Technology**		
									✓		
Mode of Evaluation :Written Examination											

Regulation GRCA-20	Godavari Institute of Engineering & Technology (Autonomous)	II MCA IV Sem			
Course Code 20300431	Seminar				
Teaching	Total Contact Hours -58	L	T	P	C
Prerequisite (s)	Knowledge of general programming concepts	0	0	0	0

Course Objectives:

1. To implement values for bridging and harmonizing of employees
2. To learn about personal and communication styles for team building
3. To learn management values
4. To increase knowledge of emotional intelligence

Course Outcomes:

On completion of the course, the students will be able to-	
CO1:	Collect , Organize & Analyze information about emerging technologies /market demands/current trends
CO2:	Exhibit effective communication skills, stage courage, and confidence.
CO3:	Demonstrate intrapersonal skills
CO4:	Awareness in keeping with new innovations and inventions
CO5:	Build and support great and valuable talent
CO6:	Control and manage the emotions of others

Guidelines for presenting a seminar:

- The seminar will consist of a typewritten report covering the topic related to his area of final year project.
- Weekly report of students topic of seminar should be submitted to the faculty during designated hours meant for seminar
- Format of weekly report should be finalized by the department with sufficient inputs received from the students.
- It is expected that the candidate prepares a report based on outcomes of literature studies, field visits, observation schedules, focus group meetings etc related to a problem in relevant technology area.
- The report shall be tested for any plagiarism out of books, journals and internet based articles and reports by appropriate web based tool.
- The candidate shall deliver seminar on the topic on first two occasions to students of his class for peer assessment.
- Final presentation for term work should be attended by minimum TWO faculty members. Each candidate may be given time minimum of 8 to 10 minutes.
- Assessment criteria for seminar delivery for term work should be designed by the faculty with inputs received from students of the class. It should include provision for peer group assessment as per the norm stated above.

- Assessment Criteria so designed will be displayed on the department notice board with the approval from department along with these guidelines.

Teaching	Total Contact Hours -58	L	T	P	C
Prerequisite (s)	Knowledge of general programming concepts	0	0	0	10

Course Objectives:

1. To identify problem statement by surveying variety of domains.
2. To perform requirement analysis and identify design methodologies
3. To apply advanced programming techniques
4. To present technical report by applying different visualization tools and Evaluation metrics.

Course Outcomes:

On completion of the course, the students will be able to-	
CO1:	Demonstrate a sound technical knowledge of their selected project topic
CO2:	Review the literature and develop solutions for framed problem statement
CO3:	Implement hardware and/or software techniques for identified problems
CO4:	Test and analyze the modules of planned project
CO5:	Write technical report and deliver presentation
CO6:	Apply engineering and management principles to achieve project goal

Guidelines for Completing the Project:

1. The Project will consist of the work on the topic selected.
2. The Project must be done by single student
3. The student is expected to select the Project, do the requirement analysis, and carry out the necessary design procedure
4. Weekly report of student work for finalization of his/her area of work and topic of Project should be submitted to the guide during designated hours.
5. It should have following stage wise tasks:
    i. Title submission by 3rd week
    ii. 1st Internal review by 5th week
    iii. 2nd Internal review by 8th week
    iv. 3rd Internal review by 12th week
    v. Submission of documentation for plagiarism by 14th week
    vi. Submission of project thesis by 15th week
    vii. Project Viva Voce by 16th week