Dr. C. S. RAO P.G. CENTRE,

SRI Y.N. COLLEGE (AUTONOMOUS)

Narsapur-534275, W. G. Dist., A.P.

(Affiliated to Adikavi Nannaya University)

Accredited by NAAC with grade 'A'

BOARD OF STUDIES OF
DEPARTMENT OF COMPUTER SCIENCE (MCA)

MCA PROGRAMME STRUCTURE AND SYLLABUS

(w.e.f. 2020 – 2021 Admitted Batch)

DEPARTMENT OF COMPUTER SCIENCE (MCA)

Dr. C.S. RAO P.G. CENTRE, SRI Y. N. COLLEGE (AUTONOMOUS)

BOARD OF STUDIES (M.C.A)

MCA - SYLLABUS

(With effect from the admitted batch of 2020-2021 academic year)

Name of the Program: **Masters in Computer Applications (MCA)**

Year of Establishment: **1992**

Curriculum developed and implemented have relevance to the local, national, regional and global developmental needs which is reflected in Programme outcomes (POs), Programme Specific Outcomes(PSOs) and Course Outcomes(COs) of the Programmes offered by the University.

Sri Y.N.College has started **Master of Computer Applications (MCA) Programme** in the year 1992 with an intake of 30 seats and is being successfully running, which was subsequently increased to 42 seats in the year 2002-03 and now for the academic year 2020-21 the total available seats are 46. This program gives exposure to its students, not only the regular curriculum but also to the aspirations of today's corporate world by inculcating a professional attitude.

This program has well-defined learning objectives including program outcomes, program specific outcomes and course outcomes. Curriculum development and delivery guidelines and norms relating to Choice Based Credit System (CBCS) are as per AICTE and UGC guidelines and norms. The course has been enriched by offering additional value-added courses and flexibility in choosing elective courses. The final semester students pursue dissertation/project work/internships in National Institutes and Industries.

As a result, the program is well diversified and regularly upgraded to fulfill the needs of the local/ national/regional and global developments. This program is focused towards enhancing employability of the students.

PROGRAM OUT COMES:

PO1: Computational Knowledge: Apply the knowledge of computing fundamentals to various real life applications to any given requirement.

PO2 Problem Analysis: Identify, formulate and solve complex computing problems reaching substantiated conclusions.

PO3 Development of Solutions: Design and evaluate solutions for complex computing problems with appropriate consideration.

PO4 Investigations of complex Computing problems: Use research-based knowledge and research methods for analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5 Modern Tool Usage: Create, identify and apply appropriate techniques, resources, and modern computing tools to complex computing activities.

PO6 Professional Ethics: Understand and commit to professional ethics and cyber regulations for professional computing practices.

PO7 Life-long Learning: Identify the need and have the ability, to engage in independent learning as a computing professional.

PO8 Project management and finance: Understand and apply computing, management principles to manage multidisciplinary projects.

PO9 Communication Efficiency: Communicate effectively with the computing community and with society.

PO10 Societal and Environmental Concern: Understand and assess societal, environmental, health, safety, legal, and cultural issues.

PO11 Individual and Team Work: Function effectively in diverse teams and in multidisciplinary environments.

PO12 Innovation and Entrepreneurship: Identify a timely opportunity and using innovation to pursue that opportunity.

PROGRAM SPECIFIC OUTCOMES

PSO1: Apply the knowledge of computer application to find solutions for real-life application

PSO2: Ability to analyze, design, develop and maintain the software application with latest technologies

PSO3: Utilize skills and knowledge for computing practice with commitment on social, ethical, cyber and legal values.

PSO4: Inculcate employability and entrepreneur skills among students who can develop customized solutions for small to large Enterprises.

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DEPARTMENT OF COMPUTER SCIENCE

Branch/Course: Master of Computer Applications (2020 AB)

Semester I (First Year) Curriculum

Code	Course Title	Max Marks		Total Marks	Hours per week		Credits
		External	Internal		Theory	Practical	
MCA-20101	Discrete Mathematical Structures	75	25	100	4	-	4
MCA-20102	Management Accountancy	75	25	100	4	-	4
MCA-20103	C Programming & Data Structures	75	25	100	4	-	4
MCA-20104	Computer Organization	75	25	100	4	-	4
MCA-20105	Operating Systems	75	25	100	4	-	4
MCA-20106	Design & Analysis of Algorithms	75	25	100	4	-	4
MCA-20107	C Programming & Data Structures Lab	50	50	100	-	3	2
MCA-20108	Operating Systems and Computer Organization Lab	50	50	100	-	3	2
	Total Credits						28

Note: Bridge Course is Mandatory for Non-IT students and the students must pass the course with minimum 50% of marks.

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DEPARTMENT OF COMPUTER SCIENCE

Branch/Course: Master of Computer Applications (2020 AB)

Semester II (First Year) Curriculum

Code	Course Title	Max Marks		Total Marks	Hours per week		Credits
		External	Internal		Theory	Practical	
MCA-20201	Computer Networks	75	25	100	4	-	4
MCA-20202	Object Oriented Programming through JAVA	75	25	100	4	-	4
MCA-20203	Database Management Systems	75	25	100	4	-	4
MCA-20204	Formal Languages and Automata Theory	75	25	100	4	-	4
MCA-20205	Data Mining Concepts and Techniques	75	25	100	4	-	4
MCA-20206	Elective-I 1. Artificial Intelligence and Expert Systems 2. Internet of Things 3.Image Processing	75	25	100	4	-	4
MCA-20207	Object Oriented Programming through JAVA Lab	50	50	100	-	3	2
MCA-20208	Database Management Systems Lab	50	50	100	-	3	2
MCA-20209	Skill Development Course with MOOCS	-	50	50	1	2	0
	Total Credits						28

Note: 2 lab Hrs and 1 Theory Hrs/Week or 2 Theory Hrs/ Week for Skill Development Course. Students must do a mini project using any one Scripting Languages (PERL/Python/PHP) in Skill Development Course.

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DEPARTMENT OF COMPUTER SCIENCE

Branch/Course: Master of Computer Applications (2020 AB)

Semester III (Second Year) Curriculum

Code	Course Title	Max Marks		Total Marks	Hours Per Week		Credits
		External	Internal		Theory	Practical	
MCA-20301	Information Security and Cryptography	75	25	100	4	-	4
MCA-20302	Big Data Analytics	75	25	100	4	-	4
MCA-20303	Object Oriented Software Engineering	75	25	100	4	-	4
MCA-20304	Web Technologies	75	25	100	4	-	4
MCA-20305	Elective II 1.Blockchain Technology 2.Cloud Computing 3.Machine Learning and Deep Learning	75	25	100	4	-	4
MCA-20306	Elective-III 1.Business Intelligence and Visualization 2.Robotics 3.Foundations of Data Science	75	25	100	4	-	4
MCA-20307	Web Technologies and Object Oriented Software Engineering Lab	50	50	100	-	3	2
MCA-20308	Big Data Analytics lab	50	50	100	-	3	2
MCA-20309	Innovation, Entrepreneurship and Intellectual Property Rights	-	50	50	2	-	0
MCA-20310	Summer Internship	-	50	50	-	-	0
	Total Credits						28

Note: Summer Internship 2 Months (Mandatory) after First Year (to be evaluated during IIIrd semester).

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Branch/Course: Master of Computer Applications (2020 AB)

Semester IV (Second Year) Curriculum

Code	Course Title	Max Marks		Total Marks	Hours Per Week		Credits
		External	Internal		Theory	Practical	
MCA-20401	Project	200	200	400	-	-	12
	Total Credits						12

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Branch/Course: Master of Computer Applications (2020 AB)

Semester I (First Year) Curriculum

Code	Course Title	Max Marks		Total Marks	Hours per week		Credits
		External	Internal		Theory	Practical	
MCA-20101	Discrete Mathematical Structures	75	25	100	4	-	4
MCA-20102	Management Accountancy	75	25	100	4	-	4
MCA-20103	C Programming & Data Structures	75	25	100	4	-	4
MCA-20104	Computer Organization	75	25	100	4	-	4
MCA-20105	Operating Systems	75	25	100	4	-	4
MCA-20106	Design & Analysis of Algorithms	75	25	100	4	-	4
MCA-20107	C Programming & Data Structures Lab	50	50	100	-	3	2
MCA-20108	Operating Systems and Computer Organization Lab	50	50	100	-	3	2
	Total Credits						28

Note: Bridge Course is Mandatory for Non-IT students and the students must pass the course with minimum 50% of marks.

Course &Title: BRIDGE COURSE (FUNDAMENTALS OF COMPUTER SCIENCE)
Semester: I
Course Index: BC1

Course Objectives:
The learning objectives of this course are:

Course Objectives
Explain the concepts of computers and classify based on type and generation
Demonstrate the techniques of writing algorithms pseudo codes & schematic flow of logic in software development process.
Teach about Operating Systems and its concepts.
Teach about the purpose of networks and types of networks and media to connect the computers and learn about introduction to internet and email

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
BC1.1	Explain the concept of input and output devices of Computers and how it works and recognize the basic terminology used in computer programming
BC1.2	Able to develop techniques of writing algorithms pseudo codes and logic
BC1.3	Summarize the concepts of Operating Systems
BC1.4	Recognize the Computer networks, types of networks and topologies, network devices and get introduction to internet and email.

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MCA-BC: BRIDGE COURSE (FUNDAMENTALS OF COMPUTER SCIENCE)
Int Marks:50

UNIT I

Introduction to Computers: History of Computers, Central processing unit, Characteristics and limitations of computer, Types of Computers, Types of memories. Block diagram of Computer, Peripheral Devices: Input, Output and storage, Input devices, Output devices, Secondary devices, Communication between the CPU and Input/ Output devices. Software: Types of software. Number Systems (Binary, Octal, Hexadecimal).

UNIT II

Problem Solving and Programming: Algorithm development, Flowcharts, Looping, some programming features, Pseudo code, structured programming concepts.

Programming Languages: Machine Language and assembly language, high-level and low level languages, Assemblers, Compilers and Interpreters.

UNIT-III

Operating System: Introduction to OS, Types of OS, Functions of OS, Evolution of Operating Systems - Simple Batch, Multi programmed, time-shared, Parallel, Distributed Systems, Real- Time Systems. MSDOS Internal Commands: chdir, cls, path, prompt, label, ver, vol, echo, set. External Commands: scandisk, discopy, diskcomp, format, backup, restore, Operating System installation steps.

MS-Office Tools (Word, Excel & PowerPoint): Introduction of Word Processing, MSWord: Creating, Editing, printing, page formatting, inserting tables, pictures, Mail Merge. MS Excel: Introduction to spreadsheet, creating, formatting, printing, usage of formulae, Graphs of worksheets. MS PowerPoint: Creating a presentation with designs and animations.

UNIT IV

Computer Networks: Introduction to computer Networks, Network topologies -Bus topology, star topology, Ring topology, Mesh topology, Hybrid topology. Types of Networks: Local area Network, Wide Area Networks, Metropolitan Networks, Campus/ Corporate Area Network, Personal Area Network. Network Devices: Hub, Repeater, Switch, Bridge, Router, Gateway, Network interface Card.

Introduction to Internet: Web Browsers, Searching and Surfing, Creating an E-Mail account, sending and receiving E-Mails. Web Browsers, Searching and Surfing, Creating an E-Mail account, sending and receiving E-Mails.

TEXT BOOKS:

1. An Introduction to Computer studies –Noel Kalicharan-Cambridge
2. Fundamentals of Computers –Reema Thareja-Oxford higher education
3. Silberschatz, Galvin and Gagne, "Operating Systems Concepts", Wiley
4. Computer Fundamentals, Anita Goel, Pearson Education, 2017

REFERENCE BOOKS:

1. Peter Norton_s, Introductions to Computers, Tata McGraw Hill.
2. Computer Networks: Tannenbaum

Course Code &Title: MCA-20101 DISCRETE MATHEMATICAL STRUCTURES
Semester: I
Course Index: C101

Course Objectives:
The learning objectives of this course are:

Course Objectives
Learn about introduction of discrete mathematical structures.
Learn the Counting Techniques and Recurrence relations.
Learn about in detail about Graphs and Trees.
Learn about Boolean Algebra and Models of Computation.

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C101.1	Understand about introduction of discrete mathematical structures.
C101.2	Understand the Counting Techniques and Recurrence relations.
C101.3	Understand about in detail about Graphs and Trees.
C101.4	Understand about Boolean Algebra and Models of Computation.

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MCA-20101 DISCRETE MATHEMATICAL STRUCTURES

UNIT I

Introduction: Logic-Prepositional Equivalences-Truth tables-Totalogies-Predicates and Quantifiers-Sets-Operations on sets-Sequences and Summations -Growth functions - relations and their properties- n-ary relations and their applications - Representation of relations-Closures of relations-Equivalence relations-Partial Orderings.

UNIT II

Counting Techniques: Basics of Counting- Pigeonhole Principle- Combinations and Permutations-Generalized Permutations and Combinations

Recurrence relations: Solving Recurrence Relations-Divide and Conquer relations - Inclusion and Exclusion-Applications of Inclusion-Exclusion.

UNIT III

Graphs: Introduction to Graphs-Terminology-Relations and Directed Graphs - Representations of Graphs- Isomorphism-Connectivity- Euler and Hamiltonian Paths- Shortest Path problems- Planar Graphs- Graph Coloring.

Trees: Introduction to trees- Applications of trees- Traversals-Trees and sorting Spanning Trees-Minimum Spanning Trees.

UNIT IV

Boolean Algebra and Models of Computation: Boolean Functions - Representing Boolean Functions-Logic Gates-Minimizations of Circuits-Languages and Grammars- Finite State Machines with and with no output.

Text Book:

Discrete mathematics and its applications, Keneth. H. Rosen, Tata McGraw-Hill Publishing Company, New Delhi

Reference Books:

1) Discrete Mathematics for computer scientists & Mathematicians, Joe L. Mott, Abraham Kandel &
T. P. Baker,Prentice Hall of India Ltd, New Delhi
2) Discrete mathematics, Richard Johnsonbaug, Pearson Education, New Delhi

Course Code &Title: MCA-20102 MANAGEMENT ACCOUNTANCY
Semester: I
Course Index: C102

Course Objectives:
The learning objectives of this course are:

Course Objectives
Learn the basic concept of Principles Of Accounting and Final Accounts.
Learn about in detail about Ratio Analysis.
Learn about the concepts of Costing, Budget and Budgetary Control, Marginal Costing.
Learning the Introduction To Computerized Accounting System.

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C102.1	Understand the basic concept of Principles Of Accounting and Final Accounts.
C102.2	Understand about in detail about Ratio Analysis.
C102.3	Understand about the concepts of Costing, Budget and Budgetary Control, Marginal Costing.
C102.4	Understanding the Introduction To Computerized Accounting System.

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MCA-20102 MANAGEMENT ACCOUNTANCY

UNIT I

Introduction to Management Accountancy – Definition – Objectives, need & scope of Management Accountancy.
Principles Of Accounting: Nature And Scope Of Accounting, Double Entry System Of accounting (introduction To Basic Books Of Accounts Of Sole Proprietary Concern), closing of books of accounts and Preparation Of Trial Balance.
Final Accounts: Trading, Profit And Loss Accounts And Balance Sheet Of Sole Proprietary Concern with Normal Closing Entries.(With numerical problems)

UNIT II
Costing: Nature, Importance And Basic Principles. Budget and Budgetary Control: Nature And Scope, Importance, Method Of Finalization And Master Budget, Functional Budgets.
Marginal Costing: Nature, Scope, Importance, Construction Of Break Even Chart, Limitations And Uses Of Break Even Chart, Practical Applications Of Marginal Costing.(with numerical problems)

UNIT III
Ratio Analysis: Meaning, Advantages, Limitations, Types of Ratio and Their Usefulness. (Theory only)Fund Flow Statement: Meaning Of The Term Fund, Flow Of Fund, Working Capital Cycle, Preparation and Inter-preparation Of Statement.

UNIT IV
Introduction To Computerized Accounting System: Coding Logic And Codes Required, Master Files, Transaction Files, Introduction To Documents Used For Data Collection, Processing Of Different Files And Outputs Obtained.

Text Books:

1. Introduction to Accountancy. T.S. Grewal.
2. Management Accountancy, S.P.Jain.

Reference Book:
Introduction To Accounting, G.Agarwal.

Course Code &Title: MCA-20103 C PROGRAMMING AND DATA STRUCTURES
Semester: I
Course Index: C103

Course Objectives:
The learning objectives of this course are:

Course Objectives
Learn the Fundamentals and Basic concepts of C Programming.
Learn about in detail about Arrays, Functions and Pointers.
Learn the concepts of Derived Data Types and Data Structures.
Learn the concepts of Linked Lists, Trees, Graphs, Searching and Sorting.

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C103.1	Understand the Fundamentals and Basic concepts of C Programming.
C103.2	Understand about in detail about Arrays, Functions and Pointers.
C103.3	Understand the concepts of Derived Data Types and Data Structures.
C103.4	Understand the concepts of Linked Lists, Trees, Graphs, Searching and Sorting.

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(W.e.f. 2020 – 2021 Admitted Batch)

MCA-20103: C PROGRAMMING AND DATA STRUCTURES

UNIT-I

Introduction to Computers, Algorithm, flowchart, program development steps, Structure of C program, A Simple C program, identifiers, basic data types and sizes, Constants, variables, arithmetic, relational and logical operators, increment and decrement operators, conditional operator, bit-wise operators, assignment operators, expressions, type conversions, conditional expressions, precedence and order of evaluation. Control structures such as if, go to, labels, and switch statements. Loops- while, do-while and for statements, break, continue.

UNIT-II

Arrays - declaration, definition, accessing elements, storing elements, Strings and string manipulations, 1- D arrays, 2-D arrays – 2-D and character arrays – Multidimensional arrays.
Functions: basics, parameter passing, storage classes- scope rules, user defined functions, standard library functions, recursive functions, header files, C pre processor**. Pointers:** Concepts, initialization of pointer variables, pointers and Function arguments, passing by address –dangling memory, Character pointer s and functions, pointer s to pointer s, pointer s and multidimensional arrays, dynamic memory managements functions, command line arguments.

UNIT-III

Derived types: structures- declaration, definition and initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self referential structures, unions, typed of, bit-fields, Input and output – concept of a file, text files and binary files, Formatted I/o, file I/o operations.
Data Structures: Introduction to Data Structures – Time Complexity –Space Complexity – Pattern matching – naive method – Robin Karp Algorithm .

UNIT-IV

Searching – Linear and binary search methods, sorting –Bubble sort, selection sort, Insertion sort, Quick sort, merge sort. Single linked lists, doubly linked lists, circular list, representing stacks and queues in C using arrays and linked lists, infix to post fix conversion, postfix expression evaluation. Trees- Binary tress, terminology, representation, traversals, Graphs - terminology, representation, graph versals (dfs & bfs) –Warshalls – Dijkstra – Kruskal – Prims Algorithms.

TEXT BOOKS:

1. C and Data Structures: A snapshot oriented treatise using live engineering examples, N B Venkateswarlu, E. V Prasad, S Chand & Co.
2. Let Us C ,YashwantKanetkar, BPB Publications, 5th Edition.
3. Computer science, A structured programming approach using C, B.A. Forouzan and R.F.Gilberg, Third edition, Thomson.

REFERENCE BOOKS:

1. Fundamentals of Data Structures in C , Horowitz, Sahni, Anderson-Freed, 2nd ed, 2008.
2. The C Programming Language, B.W. Kernighan, Dennis M.Ritchie, PHI/ Pearson.

Course Code &Title: MCA-20104 COMPUTER ORGANIZATION
Semester: I
Course Index: C104

Course Objectives:
The learning objectives of this course are:

Course Objectives
Learn the basics of Digital Logic Circuits and Digital Components.
Learn about the Concepts of Data Representation, Register Transfer and Micro Operations.
Learn the concept of Basic Computer Organization and Design and Central Processing Unit.
Learn about the concept of Input /Output Organization and Memory Organization.

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C104.1	Understand the basics of Digital Logic Circuits and Digital Components.
C104.2	Understand about the Concepts of Data Representation, Register Transfer and Micro Operations.
C104.3	Understand the concept of Basic Computer Organization and Design and Central Processing Unit.
C104.4	Understand about the concept of Input /Output Organization and Memory Organization.

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MCA-20104 COMPUTER ORGANIZATION

UNIT-1

Digital Logic Circuits : Digital Computers, Logic Gates, Boolean Algebra, Map Simplification, Combinational Circuit, Flip-flops Sequential Circuits.

Digital Components: Integrated Circuits, Decoders, Multiplexes, Registers ,Shift Registers, counters, Memory Unit.

UNIT-II

Data Representation: Data Types, Complements, Fixed-point Representation, Floating point Representation

Register Transfer and Micro Operations: Register Transfer Language, Register Transfer, Bus and Memory Transfer, Arithmetic Micro Operations, Assembly language Instructions, 8085 Microprocessor Instruction Set Architecture.

UNIT-III

Basic Computer Organization and Design: Instruction Codes, Computer Register, Computer Instructions, Timing and Control, Instruction Cycle memory reference Instructions, Input-Output , Interrupt.

Central Processing Unit: Introduction, General Register Organization, Stack Organization, Instruction formats, addressing modes.

UNIT-IV

Input /Output Organization: Peripherals Devices, I/O Interface, Asynchronous Data Transfer, Mode of Transfer, Priority Interrupt, Direct memory access, Input – Output Processor(IOP).

Memory Organization: Memory Hierarchy, Main memory, Auxiliary Memory, Associate Memory, Cache Memory and Virtual Memory.

Text Books:

1. Computer System Architecture, M.Morris Mano, Prentice Hall of India Pvt.ltd. Third Edition, Sept. 2008.

Reference Books:

1. Computer Architecture and Organization, William Stallings, PHI Pvt. Ltd. Eastern Economy Edition, Sixth Edition, 2003.
2. Computer System Architecture John P. Hayes.
3. Computer Architecture A Quantitative approach 3rd Edition John L. Hennessy & David A. Patterson Morgan Kufmann (An Imprint of Elseveir)

Course Code &Title: MCA-20105 OPERATING SYSTEMS
Semester: I
Course Index: C105

Course Objectives:
The learning objectives of this course are:

Course Objectives
Learn the concept of Introduction to Operating Systems and Process Management.
Learn about Process Synchronization and Deadlocks in detail.
Learn about the concept of Memory Management, File System Implementation, Mass-storage structure.
Learn the concept of Protection and Case Study.

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C105.1	Understand the concept of Introduction to Operating Systems and Process Management.
C105.2	Understand about Process Synchronization and Deadlocks in detail.
C105.3	Understand about the concept of Memory Management, File System Implementation, Mass-storage structure.
C105.4	Understand the concept of Protection and Case Study.

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MCA-20105 OPERATING SYSTEMS

UNIT I

Introduction: Definition of Operating System, Types Of Operating Systems, Operating System Structures, Operating-System Services, System Calls, Virtual Machines, Operating System Design and Implementation.

Process Management: Process Concepts, Operations on Processes, Cooperating Processes, Threads, Inter Process Communication, Process Scheduling, Scheduling Algorithms, Multiple - Processor Scheduling. Thread Scheduling.

UNIT II

Process Synchronization: The Critical Section Problem, Semaphores, And Classical Problems of Synchronization, Critical Regions.

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

UNIT III

Memory Management: Logical Versus Physical Address, Swapping, Contiguous Memory Allocation, Paging, Structure of the Page Table, Segmentation, Virtual Memory, Demand Paging, Page Replacement Algorithms, Thrashing

File System Implementation: Concept of a file, Access Methods, Directory Structure, File System Structure, Allocation Methods, Free Space Management, Directory Management, Device Drivers.

Mass-storage structure: overview of Mass-storage structure, Disk structure, disk attachment, disk scheduling, swap-space management.

UNIT IV

Protection: Goals and Principles of Protection, Access matrix implementation, Access control, Revocation of access rights.

Text Book:

1. Operating System Principles by Abraham Silberschatz, Peter Galvin, Greg Gagne. Seventh Edition, Wiley Publication.

Reference Books:

1. Operating Systems, William Stallings 5th Edition – PHI
2. Modern Operating Systems, Andrew S.Tanenbaum, , 2nd edition, 1995, PHI.
3. Operating Systems - A concept based approach, Dhamdhere, 2nd Edition, TMH, 2006.
4. Understanding the Linux Kernel, Daniel P Bovet and Marco Cesati, 3rd Edition,' Reilly, 2005.

Course Code &Title: MCA-20106 DESIGN AND ANALYSIS OF ALGORITHMS **Semester: I** **Course Index: C106**	
Course Objectives: The learning objectives of this course are:	
Course Objectives	
To learn about the Asymptotic Notations, Mathematical Analysis of Non-recursive and recursive Algorithms and sorting techniques.	
To learn about the Divide-and-Conquer technique, Decrease-and-Conquer and Transform-and-Conquer techniques.	
To learn about the Dynamic Programming and Greedy Technique	
To learn about the Decision Trees, P, NP and NP- complete problems, Backtracking, Branch-and-Bound, Approximation Algorithms for NP-hard Problems.	
Course Outcomes: By the end of the course, the student will be	
C106.1	Understand about the Asymptotic Notations, Mathematical Analysis of Non-recursive and recursive Algorithms and Selection Sort and Bubble sort, Sequential Search and Exhaustive Search.
C106.2	Understand about the Divide-and-Conquer technique, Decrease-and-Conquer and Transform-and-Conquer techniques.
C106.3	Understand the Optimal Binary Search Trees, The Knapsack Problem Prim's Algorithm, Kruskal's Algorithm, Dijkstra's Algorithm.
C106.4	Understand about the Decision Trees, P, NP and NP- complete problems, Backtracking, Branch-and-Bound, Approximation Algorithms for NP-hard Problems.

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DEPARTMENT OF COMPUTER SCIENCE
MCA I YEAR SEMESTER I
(W.e.f. 2020 – 2021 Admitted Batch)

MCA-20106 DESIGN AND ANALYSIS OF ALGORITHMS

UNIT I

Introduction: Fundamentals of algorithmic problem solving, important problem types, Fundamental data structures.

Fundamentals of analysis of algorithms and efficiency: Analysis framework, Asymptotic Notations and Basic Efficiency classes, Mathematical Analysis of Non-recursive Algorithms, Mathematical Analysis of recursive Algorithms, Empirical Analysis of Algorithms, Algorithm Visualization

Brute Force: Selection Sort and Bubble sort, Sequential Search and Exhaustive Search.

UNIT II

Divide-and-Conquer: Merge Sort, Quick sort, Binary Search, Binary Tree Traversals and Related Properties.

Decrease-and-Conquer: Insertion Sort, Depth-First Search and Breadth-First SearchTopological Sorting, Decrease-by-a-Constant-Factor Algorithms, Variable-Size-Decrease Algorithms.

Transform-and-Conquer: Presorting, Balanced Search Trees, Heaps and Heap sort, Problem Reduction.

UNIT III

Space and Time Tradeoffs: Sorting by Counting, Hashing, B-Trees.

Dynamic Programming: Warshall's and Floyd's Algorithm, Optimal Binary Search Trees, The Knapsack Problem and Memory Functions.

Greedy Technique: Prim's Algorithm, Kruskal's Algorithm, Dijkstra's Algorithm, Huffman Trees

UNIT IV

Limitations of Algorithm Power: Lower-Bound Arguments, Decision Trees, P, NP and NPcomplete problems.

Coping with the Limitations of Algorithms Power: Backtracking, Branch-and-Bound, Approximation Algorithms for NP-hard Problems.

Text Book: 1. Introduction to Design & Analysis of Algorithms by Anany Levitin, Pearson Education, New Delhi, 2003

Reference Books:

1. Introduction to Algorithms by Thomas H. Corman, Charles E. Leiserson, Ron ald R. Rivest& Clifford Stein, Prentice Hall of India, NewDelhi.
2. The Design and Analysis of computer Algorithms, Aho, Hopcroft & Ullman, Pearson Education, New Delhi, 2003
3. Fundamentals of algorithmics, Gilles Brassard & Paul Bratley, Prentice Hall of India,

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MCA I YEAR SEMESTER I
(W.e.f. 2020 – 2021 Admitted Batch)

MCA-20106: C PROGRAMMING AND DATA STRUCTURES LAB

1. Write a C program to read x, y coordinates of 3 points and then calculate the area of a triangle formed by them and print the coordinates of the three points and the area of the triangle. What will be the output from your program if the three given points are in a straight line.
2. Write a C program which generates 100 random numbers in the range of 1 to 100. Store them in an array and then print the array. Write 3 versions of the program using different loop constructs (eg. for, while and do-while).
3. Write a program which determines the largest and the smallest number that can be stored in different data types like short, int, long, float and double. What happens when you add 1 to the largest possible integer number that can be stored?
4. Write a C program which generates 100 random real numbers in the range of 10.0 to 20.0 and sort them in descending order.
5. Write a C function for transporting a square matrix in place (in place means that you are not allowed to have full temporary matrix).
6. Write a C function which will invert a matrix.
7. Write a set of string manipulation functions eg. for getting a sub-string from a given position, copying one string to another, reversing a string and adding one string to another.
8. Write a C program for sorting a list using Bubble sort and then apply binary search.
9. Write a C program to implement the operations on stacks.
10. Write a C program to implement the operations on circular queues.
11. Write a C program for the representation of polynomials using circular linked list and for the addition of two such polynomials.
12. Write a C program for quick sort.
13. Write a C program for Merge sort.
14. Write a C program to create a binary search tree and for implementing the in order, preorder, Post order traversal using recursion.
15. Write a C program for finding the Depth First Search of a graph.
16. Write a C program for finding the Breadth First Search of a graph.

REFERENCE BOOKS:

1. Let Us C ,YashwantKanetkar, BPB Publications, 5th Edition.
2. Computer Science, A structured programming approach using C", B.A.Forouzan and R.F.Gilberg, " 3rd Edition, Thomson, 2007.
3. The C –Programming Language' B.W. Kernighan, Dennis M. Ritchie, PHI
4. Data Structures and Algorithms, 2008,G.A.V.Pai, TMH
5. Classic Data Structures, 2/e, Debasis ,Samanta,PHI,2009
6. Fundamentals of Data Structure in C, 2/e, Horowitz,Sahni, Anderson Freed,University

Course Code &Title: MCA-20107 C PROGRAMMING AND DATA STRUCTURES LAB **Semester: I** **Course Index: C107**
Course Objectives: The learning objectives of this course are:
Course Objectives
Learn how to write code for different types of programs using C Programming.
Learn how to write code programs of Data Structures.
Learn how to write/code and own programs using C Programming.
Course Outcomes: By the end of the course, the student will be

Course Index	Course Outcomes
C107.1	Able to write code for different types of programs using C Programming.
C107.2	Able to write code programs of Data Structures.
C107.3	The students are able to write/code and own programs using C Programming.

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DEPARTMENT OF COMPUTER SCIENCE
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MCA-20107 OPERATING SYSTEMS LAB

List of Experiments:

1. Basic UNIX commands

Implement the following using Shell Programming

2. Input number even or odd
3. Count the number of lines in the input text
4. Print the pattern

```
*
***
*****
```

5. File encryption

Implement the following using C/C++/JAVA

6. FCFS CPU scheduling algorithm
7. SJF CPU scheduling algorithm
8. Round Robin CPU scheduling algorithm
9. Priority CPU scheduling algorithm
10. Implement Semaphores
11. Sequential file allocation strategy
12. Indexed file allocation strategy
13. Bankers Algorithm for Dead Lock Avoidance
14. Algorithm for Dead Lock Detection
15. FIFO Page Replacement Algorithm
16. LRU Page Replacement Algorithm
17. LFU Page Replacement Algorithm

REFERENCE BOOKS:

1. Operating System Principles by Abraham Silberschatz, Peter Galvin, Greg Gagne. Seventh Edition, Wiley Publication
2. Understanding the Linux Kernel, Daniel P Bovet and Marco Cesati, 3rd Edition, Reilly, 2005.
3.Unix programming, Stevens, Pearson Education.
4. Shell programming, Yashwanth Kanetkar.

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DEPARTMENT OF COMPUTER SCIENCE

Semester II (First Year) Curriculum
(W.e.f. 2020 – 2021 Admitted Batch)

Code	Course Title	Max Marks		Total Marks	Hours per week		Credits
		External	Internal		Theory	Practical	
MCA-20201	Computer Networks	75	25	100	4	-	4
MCA-20202	Object Oriented Programming through JAVA	75	25	100	4	-	4
MCA-20203	Database Management Systems	75	25	100	4	-	4
MCA-20204	Formal Languages and Automata Theory	75	25	100	4	-	4
MCA-20205	Data Mining Concepts and Techniques	75	25	100	4	-	4
MCA-20206	Elective-I 1. Artificial Intelligence and Expert Systems 2.Internet of Things 3.Image Processing	75	25	100	4	-	4
MCA-20207	Object Oriented Programming through JAVA Lab	50	50	100	-	3	2
MCA-20208	Database Management Systems Lab	50	50	100	-	3	2
MCA-20209	Skill Development Course with MOOCS	-	50	50	1	2	0
	Total Credits						28

Note: 2 lab Hrs/Week and 1 Theory Hrs/Week for Skill Development Course or 2 Theory Hrs/ Week Students must do a mini project using any one Scripting Languages (PERL/Python/PHP) in Skill Development Course.

Course Code &Title: MCA-20201 COMPUTER NETWORKS **Semester: II** **Course Index: C201**	
Course Objectives: The learning objectives of this course are:	
Course Objectives	
To learn about the basics of computer networks and Data Communication.	
To learn about Data Link Layer, IEEE Standards, design issues in networks.	
To learn about Internet Transport Protocols and different types of protocols.	
To learn about various types of Network Devices and different types of Networks	
Course Outcomes: By the end of the course, the student will be	
C201.1	Understand the basics of computer networks and Data Communication.
C201.2	Understand about Data Link Layer, IEEE Standards, design issues in networks.
C201.3	Understand Internet Transport Protocols and different types of protocols.
C201.4	Overview of various types of Network Devices and different types of Networks

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MCA-20201 COMPUTER NETWORKS

Instruction: 4Hrs/week	**Time: 3 Hours**	**Credits: 4**
Internal: 25Marks	**External: 75Marks**	**Total: 100Marks**

UNIT I

Introduction to Computer Networks: Introduction, Network Hardware, Network Software, Reference Models, Data Communication Services & Network Examples, Internet Based Applications.
Data Communications: Transmission Media, Wireless Transmission, Multiplexing, Switching, Transmission in ISDN, Broad Band ISDN, ATM Networks

UNIT II

Data Link Control, Error Detection & Correction, Sliding Window Protocols, LANs & MANs: IEEE Standards for LANs & MANs-IEEE Standards 802.2, 802.3, 802.4, 802.5, 802.6, High Speed LANs.
Design Issues in Networks: Routing Algorithms, Congestion Control Algorithms, Network Layer in the Internet, IP Protocol, IP Address, Subnets, and Internetworking.

UNIT III

Internet Transport Protocols: Transport Service, Elements of Transport Protocols, TCP and UDP Protocols, Quality of Service Model, Best Effort Model, Network Performance Issues.
Over View of DNS, SNMP, Electronic Mail, FTP, TFTP, BOOTP, HTTP Protocols, World Wide Web, Firewalls.

UNIT IV

Network Devices: Over View of Repeaters, Bridges, Routers, Gateways, Multiprotocol Routers, Brouters, Hubs, Switches, Modems, Channel Service Unit CSU, Data Service Units DSU, NIC, Wireless Access Points, Transceivers, Firewalls, Proxies.
Overview of Cellular Networks, Ad-hoc Networks, Mobile Ad-hoc Networks, Sensor Networks

Text Books:

1. Computer Networks, Andrews S Tanenbaum, Edition 5, PHI, ISBN: -81-203-1165-5
2. Data Communications and Networking, Behrouz A Forouzan, Tata McGraw-Hill Co Ltd, Second Edition

Reference Books:

1. Computer networks, Mayank Dave,Cengage.
2. Computer Networks, A System Approach, 5th ed, Larry L Peterson and Bruce S Davie,Elsevier.
3. An Engineering Approach to Computer Networks-S.Keshav, 2nd Edition, Pearson Education.
4. Understanding Communications and Networks, 3rd Edition, W.A. Shay, Thomson.

Course Code & Title: MCA-20202 Object Oriented Programming through JAVA

Semester: II

Course Index: C202

Course Objectives:

The learning objectives of this course are:

Course Objectives
Learn Introduction to OOP and concept of Inheritance.
Learn about Interfaces, Packages and Enumeration, Exceptions & Assertions.
Learn about MultiThreading and Applets.
Learn the concept of Event Handling and Abstract Window Toolkit.

Course Outcomes:

By the end of the course, the student will be

Course Index	Course Outcomes
C202.1	Understand Introduction to OOP and concept of Inheritance.
C202.2	Understand about Interfaces, Packages and Enumeration, Exceptions & Assertions.
C202.3	Understand about MultiThreading and Applets.
C202.4	Understand the concept of Event Handling and Abstract Window Toolkit.

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MCA-20202 OBJECT ORIENTED PROGRAMMING THROUGH JAVA

Instruction: 4 Periods/week	**Time: 3 Hours**	**Credits: 4**
Internal: 25 Marks	**External: 75 Marks**	**Total: 100 Marks**

UNIT I

Introduction to OOP : Introduction, Principles of Object Oriented Languages, Applications of OOP, Programming Constructs: Variables, Primitive Datatypes, Identifiers- Naming Coventions, Keywords, Literals, Operators-Binary, Unary and ternary, Expressions, Precedence rules and Associativity, Primitive TypeConversion and Casting, Flow of control-Branching, Conditional, loops. Classes and Objects- classes, Objects, Creating Objects, Methods, constructorsConstructor overloading, cleaning up unused objects-Garbage collector, Class variable and Methods-Static keyword, this keyword, Arrays, Command line arguments.
Inheritance: Types of Inheritance, Deriving classes using extends keyword, Method overloading, super keyword, final keyword, Abstract class.

UNIT II

Interfaces, Packages and Enumeration: Interface-Extending interface, Interface Vs Abstract classes, Packages-Creating packages, using Packages, Access protection, java.lang package. **Exceptions & Assertions** – Introduction, Exception handling techniques- try… catch, throw, throws, finally block, user defined exception, Exception Encapsulation and Enrichment, Assertions.

UNIT III

MultiThreading: java.lang.Thread, The main Thread, Creation of new threads, Thread priority, Multithreading- Using isAlive () and join (), Syncronization, suspending and Resuming threads, Communication between Threads Input/Output: reading and writing data, java.io package, **Applets**– Applet class, Applet structure, An Example Applet Program, Applet : Life Cycle, paint(), update() and repaint(),

UNIT IV

Event Handling -Introduction, Event Delegation Model, java.awt.event Description, Sources of Events, Event Listeners, Adapter classes, Inner classes.
Abstract Window Toolkit : Why AWT?, java.awt package, Components and Containers, Button, Label, Checkbox, Radio buttons, List boxes, Choice boxes, Text field and Text area, container classes, Layouts, Menu, Scroll bar, Swing: Introduction, JFrame, JApplet, JPanel, Components in swings, Layout Managers, JList and JScroll Pane, Split Pane, JTabbedPane, Dialog Box Pluggable Look and Feel.

Text Books:

1. The Complete Refernce Java, 8ed, Herbert Schildt, TMH
2. Programming in JAVA, Sachin Malhotra, Saurabh choudhary, Oxford.

References:

1. JAVA for Beginners, 4e, Joyce Farrell, Ankit R. Bhavsar, Cengage Learning.\
2. Introduction to Java rogramming, 7th ed, Y Daniel Liang, Pearson.

Course Code &Title: MCA-20203 DATABASE MANAGEMENT SYSTEMS **Semester: II** **Course Index: C203**	
Course Objectives: The learning objectives of this course are:	
Course Objectives	
To learn about the Introduction of Database System, Data Modeling Using the Entity-Relationship Model	
To learn about Relational Data Model and Relational Database Constraints, Relational Algebra and Relational Calculus, Schema Definition, Basic Constraints and Queries	
To learn about Relational Database Design, Indexing Structures for files	
To learn about Transaction Processing, Concurrency Control Techniques	
Course Outcomes: By the end of the course, the student will be	
C203.1	Able to understand the Introduction of Database System, Data Modeling Using the Entity-Relationship Model
C203.2	Able to understand Relational Data Model and Relational Database Constraints, Relational Algebra and Relational Calculus, Schema Definition, Basic Constraints and Queries
C203.3	Able to understand Relational Database Design, Indexing Structures for files
C203.4	Able to understand Transaction Processing, Concurrency Control Techniques

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MCA-20203 DATABASE MANAGEMENT SYSTEMS

Instruction: 4 Periods/week	**Time: 3 Hours**	**Credits: 4**
Internal: 25 Marks	**External: 75 Marks**	**Total: 100 Marks**

UNIT I

Introduction to Database and Database Users: Introduction, An Example, Characteristics of the Database Approach, Applications of DBMS, Actors on Scene, Workers behind the scene, Advantages of Using the DBMS Approach, Data models, schemas, and instances, three-schemas architecture and data independence, database languages and interfaces, the database system environment, Centralized and client/server architectures for DBMSs, Classification of database management system.

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

Relational data model and relational database constraints: Introduction to the Relational Model, Integrity Constraints over Relations, Enforcing Integrity Constraints, Querying Relational Data, Logical Database Design: ER to Relational.

UNIT II

Relational Algebra and Relational Calculus: Unary Relational operations, Relational Algebra operations, Binary Relational operation, Additional Relational operation, Examples of Queries in Relational Algebra, Tuple and Domain Relational Calculus.

Schema Definition, Basic Constraints and Queries: SQL Data definition, Specifying basic constraints in SQL, Schema change Statements in SQL, Basic queries in SQL, More complex SQL queries, INSERT DELETE UPDATE queries in SQL, Views in SQL, Data base stored Procedures

UNIT III

Relational Database Design: Informal design Guide lines for Relation Schema, Functional Dependences, Normal forms based on Primary keys, General definitions of Second and Third Normal form, BOYCE-CODE Normal form, Algorithm for Relational database schema design, Multi-valued dependencies and fourth Normal forms,

UNIT IV

Algorithm for query processing and Optimization: Translating SQL Queries into Relational Algebra, Algorithms for SELECT and JOIN Operations, Algorithms for PROJECT and SET Operations,

Introduction to Transaction Processing Concepts and Theory: Transaction Concept, A Simple Transaction Model, Storage Structure, ACID Properties, Serializability, Transaction Isolation Levels, Concurrency Control, Lock-Based Protocols, Validation-Based Protocols.

Text Book:

1. Fundamentals of Database System, Elmasri, Navathe, Pearson Education.

References Books:

1. Database Management Systems, Raghu Ramakrishnan, Johannes Gehrke, McGraw- Hill.

2. Database Concepts, Abraham Silberschatz, Henry F Korth, S Sudarshan, McGraw-Hill

Additional Inputs:

Introduction, An Example, Characteristics of the Database Approach, Applications of DBMS, Actors on Scene, Workers behind the scene, Advantages of Using the DBMS Approach,

Course Code & Title: MCA-20204 FORMAL LANGUAGES & AUTOMATA THEORY
Semester: II
Course Index: C204

Course Objectives:
The learning objectives of this course are:

Course Objectives
Learn the concept of Finite Automata and Regular Expressions, Regular sets &Regular Grammars.
Learn the concept of Context Free Grammars and Languages, Push down Automata
Learn about Turing Machines, Universal Turing Machines and Undecidability in detail.
Learn the concept of The Propositional calculus and The Predicate calculus.

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C204.1	Understand the concept of Finite Automata and Regular Expressions, Regular sets &Regular Grammars.
C204.2	Understand the concept of Context Free Grammars and Languages, Push down Automata
C204.3	Understand about Turing Machines, Universal Turing Machines and Undecidability in detail.
C204.4	Understand the concept of The Propositional calculus and The Predicate calculus.

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MCA-20204 FORMAL LANGUAGES & AUTOMATA THEORY

UNIT-I

Finite Automata and Regular Expressions: Basic Concepts of Finite State Systems, Chomsky Hierarchy of Languages, Deterministic and Non-Deterministic Finite Automata, Finite Automata with ϵ-moves, Regular Expressions.

Regular sets &Regular Grammars: Basic Definitions of Formal Languages and Grammars, Regular Sets and Regular Grammars, Closure Properties of Regular Sets, Pumping Lemma for Regular Sets, Decision Algorithm for Regular Sets.

UNIT-II

Context Free Grammars and Languages: Context Free Grammars and Languages, Derivation Trees, simplification of Context Free Grammars, Normal Forms, Pumping Lemma for CFL, Closure properties of CFL's.

Push down Automata: Informal Description, Definitions, Push-Down Automata and Context free Languages, Parsing and Push-Down Automata.

UNIT-III

Turing Machines: The Definition of Turing Machine, Design and Techniques for Construction of Turing Machines, Combining Turing Machines.

Universal Turing Machines and Undecidability: Universal Turing Machines. The Halting Problem, Decidable & Undecidable Problems - Post Correspondence Problem.

UNIT-IV

The Propositional calculus: The Prepositional Calculus : Introduction – Syntax of the Prepositional Calculus – Truth-Assignments – Validity and Satisfiability – Equivalence and Normal Forms – resolution in Prepositional Calculus.

The Predicate calculus: Syntax of the Predicate Calculate Calculus – Structures and Satisfiability – Equivalence – Un-solvability.

TEXT BOOKS:

1. Introduction to Automata Theory, Languages and Computations – J.E. Hopcroft, & J.D. Ullman , Pearson Education Asia.
2. Elements of The Theory Of Computation, Harry R Lewis, Cristos h. Papadimitriou, Pearson Education / Prentice-Hall of India Private Limited.

REFERENCE BOOKS:

1. Introduction to languages and theory of computation – John C. Martin (MGH)
2. Theory of Computation, KLP Mishra and N. Chandra Sekhar, IV th Edition, PHI
3. Introduction to Theory of Computation – Michael Sipser (Thomson Nrools/Cole)

Course Code &Title: MCA-20205 DATA MINING CONCEPTS AND TECHNIQUES **Semester: II** **Course Index: C205**
Course Objectives: The learning objectives of this course are:
Course Objectives
To learn about the overview of Data Warehouse Basic Concepts, Data Warehouse Modelling, Pre-processing
To learn about the Introduction to Data Mining , Basic Statistical Descriptions of Data, Data Visualization, Measuring data Similarity and Dissimilarity
To learn about the Concept Description, Generalization by AOI , Mining Frequent Patterns, Associations and Correlations, Mining Frequent Itemset
To learn about the Basic Concepts of Classification ,Different Methods of Classification
Course Outcomes: By the end of the course, the student will be

Course Index	Course Outcomes
C205.1	Able to understand about the overview of Data Warehouse Basic Concepts, Data Warehouse Modelling, Pre-processing
C205.2	Able to understand about the Introduction to Data Mining , Basic Statistical Descriptions of Data, Data Visualization, Measuring data Similarity and Dissimilarity
C205.3	Able to understand about the Concept Description, Generalization by AOI , Mining Frequent Patterns, Associations and Correlations, Mining Frequent Item set
C205.4	Able to understand about the Basic Concepts of Classification ,Different Methods of Classification

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MCA-20205 DATA MINING CONCEPTS AND TECHNIQUES

Instruction: 4 Periods/week	**Time: 3 Hours**	**Credits: 4**
Internal: 25 Marks	**External: 75 Mark**	**Total: 100 Marks**

UNIT I

Data Warehouse and OLAP Technology: An overview Data Warehouse Basic Concepts, Data Warehouse Modeling: Data Cube and OLAP, Data Warehouse Implementation Data Preprocessing: An Overview, Data Cleaning, Data Integration, Data Reduction, Data Transformation and Data Discretization, From Data Warehousing to Data Mining

UNIT II

Introduction to Data Mining: Motivation and importance, what is Data Mining, Data Mining on what kind of data, what kinds of patterns can be mined, which technologies are used, which kinds of applications are targeted, major issues in Data Mining. Getting to know your Data: Data Objects and Attribute Types, Basic Statistical Descriptions of Data, Data Visualization.

UNIT III

Concept Description: Characterization and comparison What is Concept Description, Data Generalization by Attribute-Oriented Induction(AOI), AOI for Data Characterization, Efficient Implementation of AOI. Mining Frequent Patterns, Associations and Correlations: Basic Concepts, Frequent Itemset Mining Methods: Apriori method, generating Association Rules, Improving the Efficiency of Apriori, Pattern-Growth Approach for mining Frequent Item sets, Mining Frequent Itemsets using vertical data format, Mining Closed and Max Patterns.

UNIT IV

Classification Basic Concepts: Basic Concepts, Decision Tree Induction: Decision Tree Induction, Attribute Selection Measures, Tree Pruning, Bayes Classification Methods, Classification by Back Propagation, Support Vector Machines. Cluster Analysis: Cluster Analysis, Partitioning Methods, Hierarchal methods, Density based methods-DBSCAN and OPTICS.

Text Book:

1. Data Mining Concepts and Techniques—Jiawei Han, Micheline Kamber and Jian Pei, Morgan Kaufman Publications 3rd edition.

Reference Books:

1. Introduction to Data Mining –Pang-Ning Tan, Michael Steinbach, Vipin Kumar
2. Introduction to Data Mining, Adriaan, Addison Wesley Publication
3. Data Mining Techniques, A.K.Pujari, University Press.

Additional Inputs in Unit II:

Syntax for Task-relevant Data Specification, Syntax for Specifying the kind of knowledge to be mined,
Syntax for Concept Hierarchy Specification, Syntax for Interestingness Measure Specification, Syntax for Pattern Presentation and Visualization specifications, putting it All Together – An Example of a DMQL Query.

ourse Code &Title: MCA-20206 INTERNET OF THINGS (Elective-I)
Semester: II
Course Index: C206

Course Objectives:
The learning objectives of this course are:

Course Objectives
To learn about the Introduction to Internet of Things, IoT Enabling Technologies, IoT Levels & Deployment Templates Domain Specific IoTs
To learn about the IOT & M2M, SNMP
To learn about the IoT Platforms Design Methodology
To learn about the IoT Physical Devices & Endpoints

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C206.1	Able to understand about the Introduction to Internet of Things, IoT Enabling Technologies, IoT Levels & Deployment Templates Domain Specific IoTs
C206.2	Able to understand about the IOT & M2M, SNMP
C206.3	Able to understand about the IoT Platforms Design Methodology
C206.4	Able to understand about the IoT Physical Devices & Endpoints

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MCA-20206 INTERNET OF THINGS (Elective-I)

Instruction: 4 Periods/week	**Time: 3 Hours**	**Credits: 4**
Internal: 25 Marks	**External: 75 Marks**	**Total: 100 Marks**

UNIT-I

Introduction to Internet of Things: Definition & Characteristics of IoT, Physical Design of IoT, Logical Design of IoT, IoT Enabling Technologies, IoT Levels & Deployment Templates Domain Specific IoTs: Home, Cities, Environment, Energy systems, Logistics, Agriculture, Health & Lifestyle.

UNIT-II

IOT & M2M: Introduction, M2M, Difference between IoT and M2M, SDN and NFV for IoT, Need for IoT Systems Management, Simple Network Management Protocol (SNMP), Limitations of SNMP, Network Operator Requirements, NETCONF, YANG, IoT Systems Management with NETCONF-YANG, NETOPEER

UNIT-III

IoT Platforms Design Methodology: IoT Design Methodology, Case Study on IoT System for Weather Monitoring, Motivation for Using Python, IoT Systems - Logical Design using Python, Installing Python , Python Data Types & Data Structures ,Control Flow , Functions, Modules, Packages , File Handling, Date/Time Operations , Classes ,Python Packages of Interest for IoT.

UNIT-IV

IoT Physical Devices & Endpoints: Raspberry Pi , About the Board , Linux on Raspberry Pi, Raspberry Pi Interfaces , Programming Raspberry Pi with Python , Other IoT Devices, IoT Physical Servers & Cloud Offerings , Introduction to Cloud Storage Models & Communication APIs , WAMP - AutoBahn for IoT, Xively Cloud for IoT, Python Web Application Framework - Django, Designing a RESTful Web API, Amazon Web Services for, SkyNetIoTMessagingPlatform.

Text Book:

1. Internet of Things, A.Bahgya and V.Madisetti, Univesity Press, 2015

Reference Book:

1. Fundamentals of Python, K.A.Lambert and B.L.Juneja, Cengage Learning, 2012

Course Code & Title: MCA-20207 Object Oriented Programming through JAVA Lab **Semester: II** **Course Index: C207**
Course Objectives: The learning objectives of this course are:
Course Objectives
Learn how to write programs in Java using OOP.
Learn how to write programs related to real life scenario.
Learn how to write programs in Java using Inheritance and using Adapter classes.
Course Outcomes: By the end of the course, the student will be

Course Index	Course Outcomes
C207.1	Students can able to write programs in Java using OOP.
C207.2	Students can able to code programs related to real life scenario.
C207.3	Students can able to code programs in Java using Inheritance and using Adapter classes.

Dr. C.S.RAO P.G. CENTRE
SRI Y.N.COLLEGE (AUTONOMOUS), NARSAPUR W.G. Dt., A.P.
NAAC Accredited 'A' Grade College Affiliated to Adikavi Nannaya University
DEPARTMENT OF COMPUTER SCIENCE
MCA I YEAR SEMESTER II
(W.e.f. 2020 – 2021 Admitted Batch)

MCA-20207 Object Oriented Programming through JAVA Lab

Practical: 3 Periods /week	**Time: 3 Hours**	**Credits: 2**
Internal: 50 Marks	**External: 50 Marks**	**Total: 100 Marks**

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1. a) Write A Java Program to print Quadratic roots using command line arguments.

   b) Write a java program to print multiplication table using arrays.

2. Write a java program to find the volume of a Box using method overloading with different number of parameters.
3. Develop an applet in Java that receives an integer in one text field, and computes its factorial Value and returns it in another text field, when the button is clicked.
4. Write a Java program that creates a user interface to perform integer divisions. If Num1 or Num2 is not an integer, the program would throw a Number Format Exception. If Num2 is Zero, program would throw an Arithmetic Exception. Display the exception in a message dialog box.
5. Write a Java program that implements a multi-thread application that has three threads. First thread generates random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of cube of the number.
6. Write a Java program that simulates a traffic light. The program lets the user select one three lights: red, yellow, or green with radio buttons. On selecting a button, an appropriate message with "Stop" or "Ready" or "Go" should appear above the buttons in selected color. Initially, there is no message shown.
7. Write a Java program to create an abstract class named Shape that contains two integers and an empty method named print Area (). Provide three classes named Rectangle, Triangle, and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method print Area () that prints the area of the given shape.
   1. Write a java package for book class and then import and display the result.
   2. Write a Java program to illustrate the multiple inheritance by using Interfaces.
   3. Write a Java program that handles all mouse events and shows the event name at the center of the window when a mouse event is fired (Use Adapter classes).

TEXT BOOKS

1. Java The complete reference, 9th edition, Herbert Schildt, McGraw Hill Education Pvt. Ltd.
2. Understanding Object-Oriented Programming with Java, updated edition, T. Budd, Pearson Education

Course Code &Title: MCA-20208 DATABASE MANAGEMENT SYSTEMS LAB **Semester: II** **Course Index: C208**	
Course Objectives: The learning objectives of this course are:	
Course Objectives	
Learn how to write SQL queries using DDL, DML, DCL commands	
Learn how to write SQL queries on aggregate and conversion functions	
Learn how to write PL/SQL programs on exception handling, control structures	
Learn how to write PL/SQL programs on cursors, procedures, triggers.	
Course Outcomes: By the end of the course, the student will be	
C208.1	Able to write SQL queries using DDL, DML, DCL commands
C208.2	Able to write SQL queries on aggregate and conversion functions
C208.3	Able to write PL/SQL programs on exception handling, control structures
C208.4	Able to write PL/SQL programs on cursors, procedures, triggers.

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MCA I YEAR SEMESTER II
(W.e.f. 2020 – 2021 Admitted Batch)

MCA-20208 DATABASE MANAGEMENT SYSTEMS LAB

Practical: 3 Periods /week	**Time: 3 Hours**	**Credits: 2**
Internal: 50 Marks	**External: 50 Marks**	**Total: 100 Marks**

SQL

1) Simple queries to understand DDL, DML and DCL commands
2) Creation, altering and dropping of tables and inserting rows in to a table (use constraints while creating tables) examples using SELECT command.
3) Queries (along with sub Queries) using ANY, ALL, IN, EXISTS, NOTEXISTS, UNION, INTERSET, Constraints.
4) Queries using Aggregate functions (COUNT, SUM, AVG, MAX and MIN), GROUP BY, HAVING and Creation and dropping ofViews.
5) Queries using Conversion functions like (to_char, to_number and to_date), string functions (Concatenation, lpad, rpad, ltrim, rtrim, lower, upper, initcap, length, substr and instr), date functions like (Sysdate,next_day, add_months, last_day, months_between, least, greatest, trunc, round, to_char, to_date)

PL/SQL

1) Simple programs to understand PL/SQL
2) Write a PL/SQL program to demonstrate exception–handling
3) Demonstrate the working of COMMIT, ROLLBACK and SAVEPOINT in PL/SQL block.
4) Develop a program that includes the features NESTED IF, CASE and CASE expression.
5) Program development using WHILE LOOPS, numeric FOR LOOPS, nested loops using ERROR Handling, BUILT –IN Exceptions, USE defined Exceptions, RAISE- APPLICATIONERROR.
6) Programs using CURSORS
7) Programs development using creation of procedures and functions.
8) Develop Programs using BEFORE and AFTER Triggers, Row and Statement Triggers

Text Books:

1. Oracle Database 11g, Jason Price, Oracle Press
2. Oracle PL/SQL for Dummies, Michael Rosenblum, Paul Dorsey, Wiley Publications.