ANDHRA KESARI UNIVERSITY

UNIVERSITY COLLEGE OF ARTS, COMMERCE & LAW ONGOLE, PRAKASAM-523001, ANDHRA PRADESH

M.C.A.

Revised syllabus: 2023-24

(Revised Scheme of Instruction and Examination, Syllabus etc.,with effect from the Academic Year 2023-24)

AK UNIVERSITY EXAMINATION 2023

I SEMESTER

MC101

Masters in Computer Application

Paper-I- Problem Solving and Programming using C

Time: Three hours **Maximum: 70 marks**

Answer ALL questions

Any questions carry equal marks.

1. (a)

Or

(b)

2. (a)

Or

(b)

3. (a)

Or

(b)

4. (a)

Or

(b)

5. (a)

Or

(b)

AK UNIVERSITY EXAMINATION 2023

I SEMESTER

MC102

Masters in Computer Application

Paper-II- Database Management Systems

Time: Three hours

Maximum: 70 marks

Answer ALL questions

Any **questions carry equal marks.**

1. (a)

Or

(b)

2. (a)

Or

(b)

3. (a)

Or

(b)

4. (a)

Or

(b)

5. (a)

Or

(b)

AK UNIVERSITY EXAMINATION 2023

I SEMESTER

MC103

Masters in Computer Application

Paper-III- Computer Organization

Time: Three hours **Maximum: 70 marks**

Answer ALL questions

Any **questions carry equal marks.**

1. (a)

Or

(b)

2. (a)

Or

(b)

3. (a)

Or

(b)

4. (a)

Or

(b)

5. (a)

Or

(b)

AK UNIVERSITY EXAMINATION 2023

I SEMESTER

MC104

Masters in Computer Application

Paper-IV- Discrete Mathematics

Time: Three hours **Maximum: 70 marks**

Answer ALL questions

Any **questions carry equal marks.**

1. (a)

Or

(b)

2. (a)

Or

(b)

3. (a)

Or

(b)

4. (a)

Or

(b)

5. (a)

Or

(b)

AK UNIVERSITY EXAMINATION 2023

I SEMESTER

MC105

Masters in Computer Application

Paper-V- Principles and Practice of Management

Time: Three hours **Maximum: 70 marks**

Answer ALL questions

Any questions carry equal marks.

1. (a)

Or

(b)

2. (a)

Or

(b)

3. (a)

Or

(b)

4. (a)

Or

(b)

5. (a)

Or

(b)

AK UNIVERSITY EXAMINATION 2023

II SEMESTER

MC201

Masters in Computer Application

Paper-I- Data Structures

Time: Three hours **Maximum: 70 marks**

Answer ALL questions

Any questions carry equal marks.

1. (a)

Or

(b)

2. (a)

Or

(b)

3. (a)

Or

(b)

4. (a)

Or

(b)

5. (a)

Or

(b)

AK UNIVERSITY EXAMINATION 2023

II SEMESTER

MC202

Masters in Computer Application

Paper-II- Operating Systems

Time: Three hours **Maximum: 70 marks**

Answer ALL questions

Any questions carry equal marks.

1. (a)

Or

(b)

2. (a)

Or

(b)

3. (a)

Or

(b)

4. (a)

Or

(b)

5. (a)

Or

(b)

AK UNIVERSITY EXAMINATION 2023

II SEMESTER

MC203

Masters in Computer Application

Paper-III- Python Programming

Time: Three hours **Maximum: 70 marks**

Answer ALL questions

Any questions carry equal marks.

1. (a)

Or

(b)

2. (a)

Or

(b)

3. (a)

Or

(b)

4. (a)

Or

(b)

5. (a)

Or

(b)

AK UNIVERSITY EXAMINATION 2023

II SEMESTER

MC204

Masters in Computer Application

Paper-IV- Software Engineering

Time: Three hours **Maximum: 70 marks**

Answer ALL questions

Any questions carry equal marks.

1. (a)

Or

(b)

2. (a)

Or

(b)

3. (a)

Or

(b)

4. (a)

Or

(b)

5. (a)

Or

(b)

AK UNIVERSITY EXAMINATION 2023

II SEMESTER

MC205

Masters in Computer Application

Paper-V- Data Communications andNetworking

Time: Three hours **Maximum: 70 marks**

Answer ALL questions

Any questions carry equal marks.

1. (a)

Or

(b)

2. (a)

Or

(b)

3. (a)

Or

(b)

4. (a)

Or

(b)

5. (a)

Or

(b)

AK UNIVERSITY EXAMINATION 2023

II SEMESTER

MC206

Masters in Computer Application

Paper-VI- Gender Sensitization

Time: Three hours **Maximum: 100 Marks**

Answer ALL questions

Any questions carry equal marks.

1.

2.

3.

4.

5.

AK UNIVERSITY EXAMINATION 2023

III SEMESTER

MC301

Masters in Computer Application

Paper-I- Machine Learning

Time: Three hours **Maximum: 70 marks**

Answer ALL questions

Any questions carry equal marks.

1. (a)

Or

(b)

2. (a)

Or

(b)

3. (a)

Or

(b)

4. (a)

Or

(b)

5. (a)

Or

(b)

AK UNIVERSITY EXAMINATION 2023

III SEMESTER

MC302

Masters in Computer Application

Paper-II- Python Programming

Time: Three hours **Maximum: 70 marks**

Answer ALL questions

Any questions carry equal marks.

1. (a)

Or

(b)

2. (a)

Or

(b)

3. (a)

Or

(b)

4. (a)

Or

(b)

5. (a)

Or

(b)

AK UNIVERSITY EXAMINATION 2023

III SEMESTER

MC303

Masters in Computer Application

Paper-III- Big Data Analytics

Time: Three hours **Maximum: 70 marks**

Answer ALL questions

Any questions carry equal marks.

1. (a)

Or

(b)

2. (a)

Or

(b)

3. (a)

Or

(b)

4. (a)

Or

(b)

5. (a)

Or

(b)

AK UNIVERSITY EXAMINATION 2023

III SEMESTER

MC304

Masters in Computer Application

Paper-IV- Cloud Computing

Time: Three hours **Maximum: 70 marks**

Answer ALL questions

Any questions carry equal marks.

1. (a)

Or

(b)

2. (a)

Or

(b)

3. (a)

Or

(b)

4. (a)

Or

(b)

5. (a)

Or

(b)

AK UNIVERSITY EXAMINATION 2023

III SEMESTER

MC305

Masters in Computer Application

Paper-V- Design and analysis of algorithms

Time: Three hours **Maximum: 70 marks**

Answer ALL questions

Any questions carry equal marks.

1. (a)

Or

(b)

2. (a)

Or

(b)

3. (a)

Or

(b)

4. (a)

Or

(b)

5. (a)

Or

(b)

AK UNIVERSITY EXAMINATION 2023

III SEMESTER MC306

Masters in Computer Application

Paper-VI- Cryptography and Network Security

Time: Three hours **Maximum: 70 marks**

Answer ALL questions

Any questions carry equal marks.

1. (a)

Or

(b)

2. (a)

Or

(b)

3. (a)

Or

(b)

4. (a)

Or

(b)

5. (a)

Or

(b)

AK UNIVERSITY EXAMINATION 2023

III SEMESTER

MC307

Masters in Computer Application

Paper-VII- Introduction to Artificial Intelligence

Time: Three hours **Maximum: 70 marks**

Answer ALL questions

Any questions carry equal marks.

1. (a)

Or

(b)

2. (a)

Or

(b)

3. (a)

Or

(b)

4. (a)

Or

(b)

5. (a)

Or

(b)

AK UNIVERSITY EXAMINATION 2023

III SEMESTER

MC308

Masters in Computer Application

Paper-VIII- R Programming

Time: Three hours **Maximum: 70 marks**

Answer ALL questions

Any questions carry equal marks.

1. (a)

Or

(b)

2. (a)

Or

(b)

3. (a)

Or

(b)

4. (a)

Or

(b)

5. (a)

Or

(b)

AK UNIVERSITY EXAMINATION 2023

III SEMESTER

MC309

Masters in Computer Application

Paper-IX- Internet of Things

Time: Three hours **Maximum: 70 marks**

Answer ALL questions

Any questions carry equal marks.

1. (a)

Or

(b)

2. (a)

Or

(b)

3. (a)

Or

(b)

4. (a)

Or

(b)

5. (a)

Or

(b)

AK UNIVERSITY EXAMINATION 2023

III SEMESTER

MC310

Masters in Computer Application

Paper-X- Web Technologies

Time: Three hours **Maximum: 70 marks**

Answer ALL questions

Any questions carry equal marks.

1. (a)

Or

(b)

2. (a)

Or

(b)

3. (a)

Or

(b)

4. (a)

Or

(b)

5. (a)

Or

(b)

AK UNIVERSITY EXAMINATION 2023

III SEMESTER

MC311

Masters in Computer Application

Paper-XI- Linux Programming

Time: Three hours **Maximum: 70 marks**

Answer ALL questions

Any questions carry equal marks.

1. (a)

Or

(b)

2. (a)

Or

(b)

3. (a)

Or

(b)

4. (a)

Or

(b)

5. (a)

Or

(b)

AK UNIVERSITY EXAMINATION 2023

IV SEMESTER

MC401

Masters in Computer Application

Paper-I- Fundamentals of Cyber Security

Time: Three hours **Maximum: 70 marks**

Answer ALL questions

Any questions carry equal marks.

1. (a)

Or

(b)

2. (a)

Or

(b)

3. (a)

Or

(b)

4. (a)

Or

(b)

5. (a)

Or

(b)

AK UNIVERSITY EXAMINATION 2023

IV SEMESTER

MC402

Masters in Computer Application

Paper-II- Data Science

Time: Three hours **Maximum: 70 marks**

Answer ALL questions

Any questions carry equal marks.

1. (a)

Or

(b)

2. (a)

Or

(b)

3. (a)

Or

(b)

4. (a)

Or

(b)

5. (a)

Or

(b)

AK UNIVERSITY EXAMINATION 2023

IV SEMESTER

MC403

Masters in Computer Application

Paper-III- Block chain Technology

Time: Three hours **Maximum: 70 marks**

Answer ALL questions

Any questions carry equal marks.

1. (a)

Or

(b)

2. (a)

Or

(b)

3. (a)

Or

(b)

4. (a)

Or

(b)

5. (a)

Or

(b)

AK UNIVERSITY EXAMINATION 2023

IV SEMESTER

MC404

Masters in Computer Application

Paper-IV- Deep Learning

Time: Three hours **Maximum: 70 marks**

Answer ALL questions

Any questions carry equal marks.

1. (a)

Or

(b)

2. (a)

Or

(b)

3. (a)

Or

(b)

4. (a)

Or

(b)

5. (a)

Or

(b)

AK UNIVERSITY EXAMINATION 2023

IV SEMESTER

MC405

Masters in Computer Application

Paper-V- Professional Ethics

Time: Three hours **Maximum: 70 marks**

Answer ALL questions

Any questions carry equal marks.

1. (a)

Or

(b)

2. (a)

Or

(b)

3. (a)

Or

(b)

4. (a)

Or

(b)

5. (a)

Or

(b)

AK UNIVERSITY EXAMINATION 2023

IV SEMESTER

MC406

Masters in Computer Application

Paper-VI- Accounting and FinancialManagement

Time: Three hours **Maximum: 70 marks**

Answer ALL questions

Any questions carry equal marks.

1. (a)

Or

(b)

2. (a)

Or

(b)

3. (a)

Or

(b)

4. (a)

Or

(b)

5. (a)

Or

(b)

AK UNIVERSITY EXAMINATION 2023

IV SEMESTER

MC407

Masters in Computer Application

Paper-VII- Entrepreneurship Development

Time: Three hours **Maximum: 70 marks**

Answer ALL questions

Any questions carry equal marks.

1. (a)

Or

(b)

2. (a)

Or

(b)

3. (a)

Or

(b)

4. (a)

Or

(b)

5. (a)

Or

(b)

AK UNIVERSITY EXAMINATION 2023

IV SEMESTER

MC408

Masters in Computer Application

Paper-VIII- Essential English and Employability Skills

Time: Three hours **Maximum: 70 marks**

Answer ALL questions

Any questions carry equal marks.

1. (a)

Or

(b)

2. (a)

Or

(b)

3. (a)

Or

(b)

4. (a)

Or

(b)

5. (a)

Or

(b)

Program Structure and Syllabus of

MCA I & II Years

AK UNIVERSITY MCA Course Structure

MCA I YEAR I SEMESTER

S. No	CourseCode	Category	Course	Max Marks		Hours per week			Credits
				I	E	L	T	P	
1	MC101	PC	Problem Solving and Programming using C	30	70	3	0	0	3
2	MC102	PC	Database Management Systems	30	70	3	0	0	3
3	MC103	PC	Computer Organization	30	70	3	0	0	3
4	MC104	BS	Discrete Mathematics	30	70	3	0	0	3
5	MC105	HS	Principles and Practice of Management	30	70	2	0	0	2
6	MC106	HS	English for Professionals	50	-	2	0	0	2
7	MC107	PC Lab	Problem Solving and Programming Lab	30	70	0	0	4	0
8	MC108	PC Lab	Database Management Systems Lab	30	70	0	0	4	2
9	MC109	MC	Environmental Studies	50	-	2	0	0	0
			TOTAL	310	490	16	0	12	20

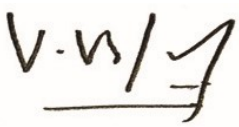
MCA I YEAR II SEMESTER

S. No	CourseCode	Category	Course	Max Marks		Hours per week			Credits
				I	E	L	T	P	
1	MC201	PC	Data Structures	30	70	3	0	0	3
2	MC202	PC	Operating Systems	30	70	3	0	0	3
3	MC203	PC	JAVA Programming	30	70	3	0	0	3
4	MC204	PC	Software Engineering	30	70	3	0	0	3
5	MC205	PC	Data Communications and Networking	30	70	2	0	0	2
6	MC207	PC Lab	Data Structures Lab	30	70	0	0	4	2
7	MC208	PC Lab	JAVA Programming Lab	30	70	0	0	4	2
8	MC209	Mini Project	Summer Internship /project *	100	-	-	-	-	-
9	MC206	MC	Gender Sensitization	100	-	2	0	0	0
			TOTAL	310	490	18	0	8	20

*Summer Internship / Project will begin during the semester break just after the completion of the 2nd semester and evaluation shall be done during the 3rd semester.

PC : Program Course **BS: Basic Science**

HS: Humanities **MC: Mandatory Course without Credits**



Dr. V.Vijaya Kumar, Chairperson BoS Dept of Computer Sciences, AKU Ongole, AP
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Dean School of Engineering & Professor Department of CSE ; Anurag University, Hyderabad; Telangana state; India

MCA II YEAR I SEMESTER [5T + 4 P]

S. No	Course Code	Category	Course	Max Marks		Hours per week			Credits
				I	E	L	T	P	
1	MC301	PC	Machine Learning	30	70	3	0	0	4
2	MC302	PC	Python Programming	30	70	2	0	0	3
3	MC303	PC	Big Data Analytics	30	70	3	0	0	3
4	MC304	PE-I	1.Cloud Computing	30	70	2	0	0	2
	MC305		2.Design and analysis of algorithms						
	MC306		3.Cryptography and Network Security						
	MC307		4. Introduction to Artificial Intelligence						
5	MC308	PE-II	1. R Programming	30	70	2	0	0	2
	MC309		2.Internet of Things						
	MC310		3.Web Technologies						
	MC311		4. Linux Programming						
6	MC312	PC Lab	Machine Learning Lab	30	70	0	0	4	2
7	MC313	PC Lab	Python Programming Lab	30	70	0	0	4	2
8	MC314	PE-II-Lab	Professional Elective-II Lab any course choose from PE-III need to have a Lab	30	70	0	0	4	2
9	MC315								
10	MC316	PROJ*	Summer Internship / Project			0	0	4	2
			TOTAL			12	0	16	22

MCA II YEAR II SEMESTER [2T + 1 P]

S. No	Course Code	Category	Course	Max Marks		Hours per week			Credits
				I	E	L	T	P	
1	MC401	PE-III	1. Fundamentals of Cyber Security	30	70	3	0	0	3
	MC402		2. Data Science						
	MC403		3. Block chain Technology						
	MC404		4. Deep Learning						
2	MC405	OE-I	1. Professional Ethics			3	0	0	3
	MC406		2. Accounting and FinancialManagement						
	MC407		3. Entrepreneurship Development						
	MC408		4. Essential English and Employability Skills						
3	MC409	PROJ	Major Project			0	0	24	12
			TOTAL			6	0	24	18

OE: Open Elective

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Syllabus of MCA 1st Semester								
Problem Solving and Programming using C						MCA 1st year 1st semester		
Code	Category	Hours / Week			Credits	Marks		
MC101	Program Core	L	T	P	C	Internal	End Exam	Total
		3	0	0	3	-	-	100

Course Objectives

Course Objectives of Problem solving and programming are to:

1. Introduce the basic concepts of Computing environment, number systems and flowcharts
2. Compare the different types of decision making and looping constructs and solve problems usingthem.
3. Summarize the use of arrays, strings, functions in real world situations
4. Describe the concepts of pointers and structures
5. Compare various searching and sorting techniques

Course Outcomes

At the end of this Problem solving and programming course, students will be able to:

1. Design algorithms and flowcharts for real world applications using 'C'
2. Design programs involving decision and iteration structures
3. Apply the concepts of Arrays, Strings and code reusability using functions
4. Analyze the concepts of pointers and structures
5. Examine various sorting techniques and file operations

UNIT I

Problem Solving Using Computers: Introduction, Algorithms, Flowcharts and Pseudocode.

C Language Preliminaries: Keywords and Identifiers, Constants, Variables, Data Types, and Input Output Statements with suitable illustrative "C" Programs. [TB-1]

Operators and Expressions: Assignment Operators, Relational and Logical Operators, Increment and Decrement Operators, Bitwise Operators, Ternary Operator, Type Conversion, Precedence and Associativity with suitable illustrative "C" Programs. [TB-2]

UNIT II

Conditional/Decision Statements: if, if-else, Nested if-else, else-if ladder, and Switch-Statement with suitable illustrative "C" Programs.

Loop Control Statements: while, do-while and for with suitable illustrative "C" Programs. [TB-2]

UNIT III

Functions: Introduction to Functions, benefits of functions, types of functions, Function calls, ParameterPassing mechanisms, Call-by-Value, Recursion, Storage Classes.

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Hyderabad; Telangana state; India

Arrays: Introduction to Arrays, One-Dimensional Arrays, Two-Dimensional Arrays, Arrays and Functions
Strings: Introduction to Strings, String I/O, String Operations with and without built-in functions -strlen (),strcmp( ), strcat( ),strcpy( ), and strrev( )) [TB-2]

UNIT IV

Pointers: Introduction to Pointers, Pointer Arithmetic, Pointers and Arrays, Pointers to Structures, Pointers and Strings, Function - Call by Reference, Pointers to Pointers, Dynamic Memory Allocation.
Structures: Definition and Initialization of Structures, accessing structure members, Nested Structures,Array of Structures, Structures and Functions, Unions, typedef, Enumerated Data types [TB-2]

UNIT V

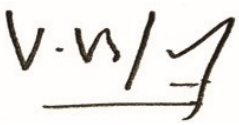
Searching and Sorting: Linear Search, Binary Search, Bubble Sort, Insertion Sort and Quick sort.
Files: Input and Output – Concept of a file, streams, text files and binary files, Differences between text and binary files, State of a file, Opening and Closing files, file input / output functions (standard library input / output functions for files) [TB-2]

Text Books

1. Pradip Dey and Manas Ghosh, Programming in C, Oxford University Press, 2nd Edition 2011.
2. Brian W. Kernighan, Dennis M. Ritchie, “The C Programming Language”, Second Edition.

Reference Books

1. Byron Gottfried, “Programming with C “, Schaum’s Outlines, 2nd Edition, TATA McGraw-Hill.
2. M. T. Somashekara, “Problem Solving Using C”, PHI, 2nd Edition 2009.
3. A. K. Sharma, Computer Fundamentals and Programming in C, 2nd Edition, University Press
4. Rajaraman V., "The Fundamentals of Computers", 4th Edition, Prentice Hall of India, 2006.



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Database Management Systems						MCA 1st year 1st semester		
Code	Category	Hours / Week			Credits	Marks		
MC102	Program Core	L	T	P	C	Internal	End Exam	Total
		3	0	0	3	-	-	100

Course Objectives

Course Objectives of Database Management Systems are to:

1. Discuss Database management systems, databases and its applications.
2. Familiarize the students with a good formal foundation on the relational model.
3. Outline the various systematic database design approaches.
4. Describe the concepts of transactions and transaction processing and the issues, techniques relatedto concurrency and recovery manager.
5. Explore the File organizations, indexing and hashing mechanisms.

Course Outcomes

At the end of this Database Management Systems course, students will be able to:

1. Model Entity-Relationship diagrams for enterprise level databases.
2. Formulate Queries using SQL and Relational Formal Query Languages.
3. Apply different normal forms to design the Database.
4. Summarize concurrency control protocols and recovery algorithms.
5. Identify suitable Indices and Hashing mechanisms for effective storage and retrieval of Data.

UNIT I

Introduction to Database System Concepts: Database-System Applications, Purpose of Database Systems, View of Data, Database Language,Database Architecture, Database Users and Administrator.

Introduction to the Relation Models and Database Design using ER Model: Structure of Relational Databases, Database Schema, Keys, Relational Query Languages, Overview of the Design Process, The Entity-Relationship Model, Constraints, Entity-Relationship Diagrams- Unary, Binary.

UNIT II

Introduction to SQL: Overview of the SQL Query Language, SQL Data Definition, Basic Structure of SQL Queries, Additional Basic Operations, Set Operations, Aggregate Functions, Nested Sub queries.

Formal Relational Query Languages: The Relational Algebra, Tuple Relational Calculus

UNIT III

Relational Database Design: Features of Good Relational Designs, Atomic Domains and First Normal Form, Functional Dependencies, Closure set of Functional dependencies, Boyce Codd Normal form, Third Normal Form

Transactions: Transaction Concept, A Simple Transaction Model, Transaction Atomicity and Durability, Serializability

UNIT IV

Concurrency Control: Lock-Based Protocols, Deadlock Handling, Timestamp-Based Protocols

Recovery System: Failure Classification, Storage, Recovery and Atomicity, ARIES, Remote Backup Systems.

UNIT V

File Organization: Fixed and variable length records, Sequential file organization, Data Dictionary

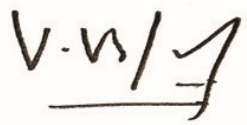
Indexing and Hashing: Basic Concepts, Ordered Indices, B+-Tree Index Files, , Static Hashing, Extendible Hashing, Comparison of Ordered Indexing and Hashing,

Text Book

1. Abraham Silberschatz, Henry F. Korth, S. Sudarshan, Database System Concepts, Sixth Edition, TataMcGraw-Hill 2006.

Reference Books

1. Raghu Rama Kirshna, Johannes Gehrke, Database Management System, Third Edition, TATA MCGraw Hill, 2003.
2. C J Date, AKannan, S Swamynathan, An Introduction to Database Systems, Eight Edition, Pearson2006
3. P Raja Sekhar Reddy, A Mallikarjuna Reddy, Foundations of Database Management Systems, LambertAcademic Publishing, 2020 (e-Book)
4. https://www.pdfdrive.com/fundamentals-of-database-systems-pdf-e51477130.html



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Computer Organization						MCA 1st year 1st semester		
Code	Category	Hours / Week			Credits	Marks		
MC103	Program Core	L	T	P	C	Internal	End Exam	Total
		3	0	0	3	-	-	100

Course Objectives

Course Objectives of Computer Organization are to:

1. Demonstrate different types of Instructions and addressing modes.
2. Describe the concepts of pipelining techniques.
3. Compare different Modes of Transfer.
4. Summarize the concepts of Memory organization.
5. Outline Multiprocessor systems and buses.

Course Outcomes

1. Differentiate Instruction formats and addressing modes.
2. Analyze the concept of pipelining and parallel processing.
3. Distinguish various modes of data transfer between CPU and I/O devices.
4. Elaborate the organization of Memory hierarchy.
5. Examine various interconnection structures of the Multiprocessor system.

UNIT I

Basic Computer Organization and Design: Instruction Code Definition, Instruction cycle, types of instruction formats (Zero, one, two and three address). Addressing modes: mode field, implied, immediate register, register direct, register indirect, auto increment, decrement, indexed, relative, base address mode, Numerical examples and problems.

UNIT II

Pipeline and Vector Processing: Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline,RISC Pipeline Vector Processing, Array Processors.

UNIT III

Input – Output Organization: I/O interface: I/O Bus and Interface modules, I/O versus Memory Bus, isolated vs Memory-mapped I/O. Asynchronous data transfer-strobe control, Hand shaking; Modes of Transfer: Example of programmed I/O, interrupt-initiated I/O, software considerations. Daisy-Chaining priority. DMA: DMA Controller, DMA Transfer, Intel 8089 IOP.

UNIT IV

Memory Organization: Memory Hierarchy, Main memory, memory address map, memory connection to

CPU; auxiliary memory, Magnetic disks, magnetic tapes; cache memory, hit and miss ratio, direct, associative and set associative mapping; Micro-programmed control: Control memory, address sequencing.

UNIT V

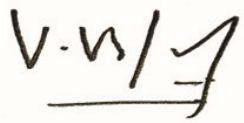
Multi Processors: Characteristics of Multiprocessor; Interconnection structures: Time shared common bus, multiport memory, crossbar switch, multi-stage switching network; Inter processor Arbitration; Inter processor Communication and Synchronization.

Text Book

1. M. Morris Mano, Computer System Architecture, Third Edition, Pearson/PHI, 2011.

Reference Books

1. Carl Hamacher, Zvonks Vranesic, SafeaZaky, Computer Organization, Fifth Edition, McGraw Hill,2002.
2. William Stallings, Computer Organization and Architecture, Sixth Edition, Pearson/PHI, 2007.



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Discrete Mathematics						MCA 1st year 1st semester		
Code	Category	Hours / Week			Credits	Marks		
MC104	BS	L	T	P	C	Internal	End Exam	Total
		3	0	0	3	-	-	100

Course Objectives

Course Objectives of Discrete Mathematics are to:

1. Interpret the Sets, syntax and semantics of propositional and predicate logic
2. Solve applications involving Permutations and Combinations
3. Formulate Recurrence relations to solve problems involving an unknown sequence
4. Explain the concepts of Relations and Graphs
5. Illustrate the Algebraic Structures

Course Outcomes

1. Distinguish between Statement Logic and Predicate Logic
2. Apply the principles of Permutations and Combinations with repetition & without repetitions
3. Solve Recurrence Relations by using generating functions
4. Demonstrate the use of Relations and Graph Theory
5. Analyze the Algebraic Structures with their properties

UNIT I

Foundations: Basics, Sets and Operations of Sets, Fundamentals of Logic, Logical Inferences, First order logic and other methods of Proof, Rules of Inference for Quantified Propositions. (Problems only and Theorems without proofs) [TB:1, CH:1]

UNIT II

Elementary Combinatorics: Basics of Counting, Combinations and Permutations, Enumerating Combinations and Permutations with & without repetitions, constrained repetitions, and Principle of Inclusion and Exclusion. (Problems only and Theorems without proofs) [TB:1, CH:2]

UNIT III

Recurrence Relations: Generating Functions, calculating coefficient of Generating Function, Solving Recurrence relations by substitution method and Generating Functions, The Method of Characteristic Roots, Solutions to inhomogeneous recurrence relations. (Problems only and Theorems without proofs)

UNIT IV

Relations and Digraphs: Relations and Directed Graphs, Special Properties of Binary Relations, Equivalence Relations, Ordering Relations, Lattices, Operations on Relations, Paths and Closures, Directed Graphs and adjacency matrices. (Problems only and Theorems without proofs)

Graphs: Basic Concepts, Isomorphism and Subgraphs, Planar Graphs, Euler's Formula, Multi-graphs and

Euler Circuits, Hamiltonian Graphs. (Problems only and Theorems without proofs) [TB:1, CH:4&5]

UNIT V

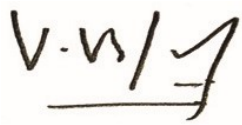
Algebraic structures: Algebraic systems, examples and general properties, semi groups and monoids, groups, sub groups, homomorphism, isomorphism, rings. (Problems only and Theorems without proofs) [TB:2, CH:3]

Text Books

1. Joe L. Mott, Abraham Kandel, Theodare P. Baker, "Discrete Mathematics for Computer Scientists andMathematicians", Second Edition, PHI, 2019.
2. J. P. Tremblay and P. Manohar, "Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw Hill, 2007.

Reference Books

1. K. H. Rosen, "Discrete Mathematics and its Applications with Combinatorics and Graph Theory", Seventh Edition, Tata McGraw Hill, 2012.
2. S. K. Chakraborthy and B.K. Sarkar," Discrete Mathematics ", Oxford, 2011.
3. C. L. Liu and D. P. Mohapatra, "Elements of Discrete Mathematics-A Computer Oriented Approach", Third Edition, Tata McGraw Hill, 2008.



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Principles and Practice of Management						MCA 1st year 1st semester		
Code	Category	Hours / Week			Credits	Marks		
MC105	HS	L	T	P	C	Internal	End Exam	Total
		2	0	0	2	-	-	100

Course Objectives

The course is designed with the objective of familiarizing the students with the basic concepts of Management.

Course Outcomes

At the end of this Discrete Mathematics course, students will be able to:

1. Appreciate the managerial functions and have same basic knowledge on international aspect ofmanagement
2. Understand the planning process in the organization
3. Organizational structure and authority
4. Demonstrate the abilities of leadership
5. Analyze the isolate issues and formulate best control methods.

Unit 1 – Conceptual Frame work of Management

Introduction to Management, Development of management thought, Management challenges and opportunities, Social Responsibility and Ethics, Social responsibility of business, ethical dilemma.

Unit 2 – Planning

Fundamentals of Planning, Management by Objectives, Organizational plans, Decision Making, approaches for decision making, Techniques of decision making.

Unit 3 – Organizing

Fundamentals of organizing, Design of organization structure, Forms of organization structure, Power of authority, Delegation of authority, Empowerment, Authority relationship, Conflict and coordination, Organization change.

Unit 4 – Staffing and Directing

Fundamentals of staffing, Recruitment, Selection, training and development, Performance appraisal, Employee development and Performance appraisal, Fundamentals of staffing, Motivation, theories of motivation, Job design, Leadership, Communication.

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Unit 5 – Controlling

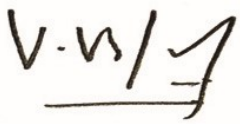
Fundamentals of controlling, types of control, Design effective control system, overall control Techniques, Management practice of prominent business leaders.

Text Books

Principles a

Reference Books

1. Harold Koontz, Cyril Odonnel and melitrich, Management McGraw-Hill, Publications.
2. P.C. Tripathi and P.NReddy, Principles of Management, TataMcGraw-Hill Publishing co., Ltd., NewDelhi.
3. Gene Burton and Manab Thakur, Management Today Principles and Practice, Tata McGrawHill,Publishing Co., Ltd., New Delhi.



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English for Professionals						MCA 1st year 1st semester		
Code	Category	Hours / Week			Credits	Marks		
MC106	HS	L	T	P	C	Internal	End Exam	Total
		2	0	0	2	-	-	100

Introduction

The course aims at preparing the students with the tools needed for successful communication at the professional front. It is designed to improve students' academic and professional skills which the employers are currently looking for.

Course Objective

Course Outcomes

At the end of this Computer Networks course, students will be able to:

1. Analyze the language use in communicative process
2. Describe the process and product
3. Interpret the ideas in group activities
4. Apply different approaches to comprehend the written text
5. Write any technical and official correspondence within the framework

UNIT I

Essentials of Communication:
Essentials of Grammar-Rudiments of Communications Skills (Listening, Speaking, Reading, and Writing)-Applied Grammar and Usage- Non-Verbal Communication.

UNIT II

Listening Skills:
Art of Listening- Developing Effective Listening Skills-Process of Listening, Intensive & Extensive Listening Podcasts, Vodcasts (ICT enabled) - Five steps to Active Listening-Effective and Ineffective Listening Skills- Listening & Note-taking

UNIT III

Speaking Skills:

Dynamics of Effective Speaking -Group Discussion-Simulated Presentations, Process & ProductDescriptions- Proxemics, Paralinguistic Features

UNIT IV

Reading Skills:
The Art of Effective Reading- Basic steps to Effective Reading-Extensive and Intensive Reading - Approaches to Efficient Reading-Reading Comprehension

UNIT V

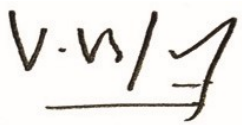
Writing Skills:
Art of Condensation-Descriptive Writing Techniques-Writing & Answering Memos, Circulars -Inter & IntraOfficial Communication -Writing Minutes of Meeting-Netiquette - E-mail & Blog Writing - Note-making

Text Book

1. Kumar, Sanjay and Pushpa Lata, Communication Skills, Second edition, Oxford University Press,2015.

Reference Books

1. Adair, John. The Effective Communicator. Jaico Publishing House.1995.
2. Adler, B. Ronald. Communicating at Work (Seventh edition.) McGraw Hill.2004.
3. Aruna, Koneru. Professional Communication. McGraw Hill.2017.
4. Ibbotson, Mark. Cambridge English for Engineering Professionals. Cambridge University.2008.
5. Oxford English for Careers. Oxford University Press.



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Problem Solving and Programming Lab						MCA 1st year 1st semester		
Code	Category	Hours / Week			Credits	Marks		
MC107	Program Core	L	T	P	C	Internal	End Exam	Total
		0	0	4	2	-	-	100

Course Outcomes

At the end of this Problem solving and programming lab course, students will be able to:

1. Apply the specification of syntax rules for numerical constants & variables and data types
2. Know the Usage of various operators and other C constructs
3. Design programs on decision and control constructs
4. Develop programs on code reusability using functions
5. Implement various concepts of arrays and strings

List of Experiments

Week 1

Programs on Operators.

Week 2

Programs on Conditional Statements.

Week 3

Programs on Control Statements.

Week 4

Programs on Functions.

Week 5

Programs on One Dimensional & Two-Dimensional Arrays.

Week 6

Programs on Accessing Structures, and Nested Structures

Week 7

Array of Structures, Structures and Functions

Week 8

Unions, typedef and enum

Week 9

Programs on pointers with its implementation, pointer arithmetic, pointer expression and Single Dimensional and Two-dimensional array programs

Week 10

Pointer to structures, Programs on Call by Value and Reference, Pointers to Pointers

Week 11

Programs on Dynamic Memory Allocation Functions

Week 12

Programs on File Operations

Week 13

Programs on Searching Techniques

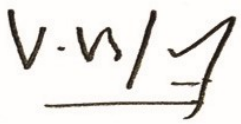
Week 14

Programs on Sorting Techniques

Week 15

Internal Assessment

Note: The above experiments are for indicative purposes only. However, the concerned faculty member can add a few more experiments in addition to the existing. In such cases the concerned faculty member should get the syllabus approved by the BoS.



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Database Management Systems Lab						MCA 1st year 1st semester		
Code	Category	Hours / Week			Credits	Marks		
MC108	Program Core	L	T	P	C	Internal	End Exam	Total
		0	0	4	2	-	-	100

Course Outcomes

At the end of this Lab course, students will be able to:

1. Apply different types of SQL commands to create, manipulate and access data from the database.
2. Construct a database by using various integrity constraints.
3. Develop basic PL/SQL programs.
4. Implement PL/SQL Programs using procedures, functions and cursors.
5. Create a trigger for a given problem.

List of Experiments

Week 1

1. Database user creation, Data definition Language commands, Data Manipulation commands, DataControl Language Commands, Transaction Control Language commands.

Week 2

1. Database Schema for a customer-sale scenario Customer (Cust id: integer, cust_name: string)
Item (item_id: integer,item_name: string, price: integer)
Sale (bill_no: integer, bill_data: date, cust_id: integer, item_id: integer, qty_sold: integer) For the above schema, perform the following–

a. Create the tables with the appropriate integrity constraints
b. Insert around 10 records in each of the tables
c. List all the bills for the current date with the customer names and item numbers
d. List the total Bill details with the quantity sold, price of the item and the final amount
e. List the details of the customer who have bought a product which has a price>200
f. Give a count of how many products have been bought by each customer
g. Give a list of products bought by a customer having cust_id as 5
h. List the item details which are sold as of today
i. Create a view which lists out the bill_no, bill_date, cust_id, item_id, price, qty_sold, amount
j. Create a view which lists the daily sales date wise for the last one week

Week 3

2. Database Schema for a Student Library Scenario
Student (Stud_no : integer,Stud_name: string) ,Membership (Mem_no: integer,Stud_no: integer)
Book (book_no: integer, book_name:string, author:string) Iss_rec (iss_no:integer, iss_date: date, Mem_no: integer, book_no: integer)

For the above schema, perform the following:

a. Create the tables with the appropriate integrity constraints
b. Insert around 10 records in each of the tables
c. List all the student names with their membership numbers

d. List all the issues for the current date with student and Book names
e. List the details of students who borrowed book whose author is CJDATE
f. Give a count of how many books have been bought by each student
g. Give a list of books taken by student with stud_no as 5
h. List the book details which are issued as of today
i. Create a view which lists out the iss_no, iss _date, stud_name, book name
j. Create a view which lists the daily issues-date wise for the last one week

Week 4

3. Database Schema for a Employee-pay scenarioemployee (emp_id : integer,emp_name: string)
Department (dept_id: integer,dept_name:string)
Paydetails (emp_id : integer,dept_id: integer, basic: integer, deductions: integer, additions: integer, DOJ: date)
Payroll (emp_id : integer, pay_date: date)

For the above schema, perform the following:
Create the tables with the appropriate integrity constraints
a. Insert around 10 records in each of the tables
b. List the employee details department wise
c. List all the employee names who joined after particular date
d. List the details of employees whose basic salary is between 10,000 and 20,000
e. Give a count of how many employees are working in each department
f. Give a name of the employees whose netsalary>10,000
g. List the details for an employee_id=5
h. Create a view which lists out the emp_name, department, basic, deductions, netsalary
i. Create a view which lists the emp_name and his netsalary

Week 5

4. Database Schema for a Video Library scenario

Customer (cust_no: integer,cust_name: string) Membership (Mem_no: integer, cust_no: integer) Cassette (cass_no:integer, cass_name:string, Language: String) Iss_rec(iss_no: integer, iss_date: date, mem_no: integer, cass_no: integer)

For the above schema, perform the following–
a. Create the tables with the appropriate integrity constraints
b. Insert around 10 records in each of the tables
c. List all the customer names with their membership numbers
d. List all the issues for the current date with the customer names and cassette names
e. List the details of the customer who has borrowed the cassette whose title is " The Legend"
f. Give a count of how many cassettes have been borrowed by each customer
g. Give a list of books which has been taken by the student with mem_no as 5
h. List the cassettes issues for today
i. Create a view which lists outs the iss_no, iss_date, cust_name, cass_name
j. Create a view which lists issues-date wise for the last one week

Week 6

5. Database Schema for a student-Lab scenarioClass (class_no: string,descrip: string)
Student (stud_no: integer, stud_name: string, class_no: string)
Lab (mach_no: integer, Lab_no: integer, description: String)

Allotment (Stud_no: Integer, mach_no: integer, dayof week: string)

For the above schema, perform the following:

a. Create the tables with the appropriate integrity constraints
b. Insert around 10 records in each of the tables
c. List all the machine allotments with the student names, lab and machine numbers
d. List the total number of lab allotments day wise
e. Give a count of how many machines have been allocated to the 'CSIT' class
f. Give a machine allotment etails of the stud_no 5 with his personal and class details
g. Count for how many machines have been allocatedinLab_no1 for the day of the week as "Monday"
h. How many students class wise have allocated machines in the labs
i. Create a view which lists out the stud_no, stud_name, mach_no, lab_no, dayofweek
j. Create a view which lists the machine allotment details for "Thursday".

Week 7

6. Write a program to find the largest number from the given three numbers.
7. Simple programs using loop, while and for iterative control statements.
8. Write a program to check whether the given number is Armstrong or not
9. Write a program to generate all prime numbers below 100.

Week 8

10. Write a program to demonstrate the GOTO statement.
11. Write a program to demonstrate %type and %row type attributes

Week 9

12. Write a program to demonstrate predefined exceptions
13. Write a program to demonstrate user defined exceptions
14. Create a cursor, which displays all employee numbers and names from the EMP table.

Week 10

15. Create a cursor, which update the salaries of all employees who works in deptno 10.
16. Create a cursor, which displays names of employees having salary > 50000.

Create a procedure to find reverse of a given number

Week 11

17. Create a procedure to update the salaries of all employees whose salary is between 25000

Week 12

18. Create a procedure to demonstrate IN, OUT and INOUT parameters
19. Create a function to check whether a given string is palindrome or not.

Week 13

20. Create a function to find the sum of salaries of all employees working in depart number 10.
21. Create a trigger before/after update on the employee table for each row/statement.

Week 14

22. Create a trigger before/after delete on the employee table for each row/statement.
23. Create a trigger before/after insert on the employee table for each row/statement.

Week 15

Review

Text Book

1. Ivan Bayross, SQL, PL/SQL, The programming Language of Oracle, 3rd Revised Edition, BPB Publications, 2008.

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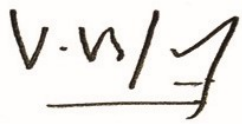

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Environmental Studies						MCA 1st year 1st semester		
Code	Category	Hours / Week			Credits	Marks		
MC109	Mandatory Course	L	T	P	C	Internal	End Exam	Total
		2	0	0	0	-	-	-

Course Objectives

Course Objectives of Environmental Studies are to:

1. Introduce the knowledge about Environment
2. Introduce students to the concepts of pollution, Biodiversity
3. Develop awareness about global Environmental problems
4. Learn to protect environment and awareness on legal issues
5. Learn about importance of sustainable development and role of IT in environment

Course Outcomes

1. Understand fundamental physical and biological principles that govern natural processes.
2. Understand fundamental concepts from the social sciences and humanities underlying environmentalthought and governance.
3. Integrate and apply perspectives from across the natural sciences, social sciences, and the humanitiesin the context of complex environmental problems.
4. Communicate integrated perspectives on complex environmental problems in the form of written andoral argument to both professional and lay audiences.
5. Design and conduct independent research that contributes to environmental thought and/or problemsolving.

UNIT I

Multidisciplinary nature of Environmental Studies: Definition, Scope, and Importance – Need for Public Awareness.

Ecosystems: Concept of an ecosystem – Classification, structure, and function of different ecosystems - Producers, consumers and decomposers. - Energy flow in the ecosystem - Ecological succession - Food chains, food webs and ecological pyramids.

Biodiversity and its conservation: Introduction - Definition: genetic, species and ecosystem diversity. - Bio-geographical classification of India - Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values. India as a mega-diversity nation - Hot-spots of biodiversity - Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. ICUN categories of biodiversity and RED DATA book - Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT II

Natural Resources: Renewable and non-renewable – Natural resources and associated.
problems: Forest resources – Use and over – exploitation, deforestation, Timber extraction, mining, dams and other effects on forest and tribal people: Water resources – Use and over utilization of surface and groundwater – Floods, drought, conflicts over water, dams – benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources. - Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity. - Energy resources: Growing energy needs, renewable and nonrenewable energy sources, use of alternate energy sources. Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources: Equitable use of resources for sustainable lifestyles.

UNIT III

Environmental Pollution: Definition, Cause, effects, and control measures of different kinds of pollution (Air, Water, Soil, Marine, Noise, Thermal, Nuclear, e –Waste)
Carbon Capture & Sequestration – different storage sources, major disadvantages, environmental effects Social Issues and the Environment: From Unsustainable to Sustainable development - Urban problems related to energy -Water conservation, rainwater harvesting, and watershed management. - Climate change, global warming, ozone layer depletion, nuclear accidents, and holocaust.

UNIT IV

Waste management technology: Solid waste Management: Causes, effects, and control measures of urban and industrial wastes. - Role of an individual in prevention of pollution, Disaster management: floods, earthquake, cyclone, and landslides.
Wastewater and sewage treatment technology: primary, secondary, and tertiary treatments. Bioremediation, Phyto-remediation, ZLD (zero liquid discharge), membrane technology.
Application of GIS and GPS systems in environmental science.
Environmental policy, Rules, and regulations. EIA (Environmental Impact Assessment) & EMP (ENVIRONMENTAL Management Plan) – Environment Protection Act. - Air (Prevention and Control of Pollution) Act. -Water (Prevention and control of Pollution) Act - Wildlife Protection Act – Forest Conservation Act - Public awareness. Global environmental problems and global efforts.

UNIT V

Towards sustainable future: concept of sustainable development, threats of sustainability, population, and its explosion, over exploitation of resources, strategies for achieving sustainable development.

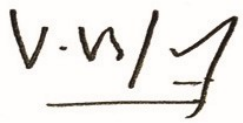
Environmental education, Conservation of resources. Urban sprawl, sustainable cities and sustainable communities, human health. Role of IT in environment, environmental ethics, concept of green building, Basic principles of green engineering, clean development mechanism (CDM), Low carbon life cycle, Polluters-pay principle.

Text Books

1. Erach Bharucha, Textbook of Environmental Studies for Undergraduate Courses University PressPrivate Limited, Reprinted in 2005.
2. R. Rajagopalan, Environmental Studies: From Crisis to Cure, Oxford University Press, Second Edition,2005.

Reference Books

1. Environmental Science: Towards a Sustainable Future by Richard T. Wright. PHL Learning Private Ltd,New Delhi, 2008
2. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela. PHI Learning Pvt.Ltd. Fourth Edition, 2008



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Syllabus of MCA 2nd Semester

Data Structures						MCA 1st year 2nd semester		
Code	Category	Hours / Week			Credits			
MC201	Program Core	L	T	P	C	Internal	End Exam	Total
		4	0	0	4	-	-	100

Course Objectives

Course Objectives of Data Structures are to:

1. Appraise the fundamental concepts of data structures and their representations
2. Describe the applications of non-linear data structures
3. Summarize the concepts of Advanced Trees
4. Discuss the implementation of various Graph representations and traversals
5. Outline the basic concepts of Hashing and Collision resolution Techniques

Course Outcomes

At the end of this Data Structures course, students will be able to:

1. Summarize Static and Dynamic data structures in implementing Stack applications
2. Implement Tree traversal algorithms in solving real time applications
3. Analyze the concepts of Advanced Trees to generate search efficiently
4. Interpret the importance of Graphs in solving real time applications
5. Apply the concepts of hashing

UNIT I

Introduction: What is data structure, Types of data structures, Static and Dynamic representation of data structure and comparison. Stacks-Definition, Operations, Implementation of stacks using arrays, Applications of stacks – Representation and evaluation of expressions using Infix, Prefix and Postfix, Algorithms for conversions and evaluations of expressions from infix to prefix and postfix using stack, Towers of Hanoi, Parenthesis checker.

Queues- Definition, Operations, Implementation of queues using arrays, Applications of queues

UNIT II

Linked Lists: Introduction to Linked List, Operations on Single Linked List (search, Insertion &Deletion)

Trees: Basic terminology, Types of trees: Binary Tree: terminology, Complete and Full Binary Tree, Extended Binary Trees, Threaded Binary Trees-Inorder Threading. Representation of Trees using Arrays and Linked lists (advantages and disadvantages). Tree Traversal and Representation of Algebraic expressions; Algorithms for Tree Traversals.

Heaps: Introduction, Types of Heaps – Min binary heap, Max binary heap.

UNIT III

Advanced concepts on Trees: Representation and Creation of Binary Search Trees (BST), Algorithm for inserting, deleting and searching in BST. Representation and advantages of AVL Trees, Algorithms on

AVL Trees-Insertion, Rotation and Deletion. Definition and advantages of B-trees, B Tree of Order M, operations- Insertion and Searching, Introduction to Red-Black Trees and Splay Trees.

UNIT IV

Graphs: Basic terminology, Representation of Graphs: sequential representation (Adjacency, Path Matrix)Linked representation.
Graph Traversals-Breadth First Search, Depth First Search with algorithms. Definition and properties of Spanning Tree, Minimum Spanning Tree, Minimum Spanning Tree Algorithms, Dijkstra Algorithms.

UNIT V

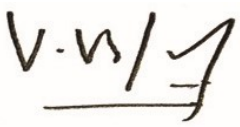
Hashing: General Idea, Hash Functions, Collision Resolution- Separate Chaining, Open Addressing-Linear probing, Quadratic Probing, Double Hashing, Rehashing, Extendible Hashing, Implementation of Dictionaries.

Text Book

1. Richard F.Gillberg & Behrouz A. Forouzan, Data Structures, A Pseudo code Approach with C, SecondEdition, Cengage Learning, India Edition, 2005

Reference Books

1. Seymour Lipschutz, Schaum's Outlines, Data Structures, Special Second Edition, Tata McGraw-Hill,2014.
2. Aaron M. Tanenbaum, Yedidyah Langsam and Moshe J. Augenstein, Data Structures Using C andC++, PHI Learning Private Limited, Delhi India, 2001.
3. Horowitz and Sahani, Fundamentals of Data Structures, Galgotia Publications Pvt Ltd. Delhi India,2015.
4. A.K. Sharma, Data Structure Using C, Pearson Education India, 2011



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Operating Systems						MCA 1st year 2nd semester		
Code	Category	Hours / Week			Credits			
MC202	Program Core	L	T	P	C	Internal	End Exam	Total
		3	0	0	3	-	-	100

Course Objectives

Course Objectives of Operating System are to:

1. Introduce basic concepts of operating system and process management
2. Discuss various CPU scheduling algorithms and problems of process synchronization
3. Demonstrate different methods for handling deadlock
4. Describe about memory management Techniques
5. Explore the File system, system security and protection mechanisms

Course Outcomes

At the end of the Operating System course, students will be able to:

1. Summarize operating system and process management concepts
2. Apply process scheduling and synchronization related issues
3. Outline Deadlock Prevention, Avoidance, Detection and recovery mechanisms
4. Analyze effectively memory management concepts
5. Illustrate various protection and security measures

UNIT I

Operating Systems Overview and Process Management: Introduction-What operating systems do, uni-programmed and multi-programmed, Operating System operations, Operating system services, System calls, Types of System calls, Operating System structure.
Process Management: Process concepts, Operations on processes, Inter process communication. Threads: overview, Multithreading models

UNIT II

Process Scheduling and Synchronization: Process Scheduling – Basic concepts, Scheduling criteria, Scheduling algorithms, Thread scheduling.
Process Synchronization: Background, The critical section problem, Peterson's solution, Synchronization hardware, Semaphore, Classical problems of synchronization, Monitors.

UNIT III

Deadlocks: System model, Deadlock characterization, Methods for handling deadlocks, Deadlock prevention, Detection and avoidance, Recovery from deadlock.

UNIT IV

Memory Management: Swapping, Contiguous memory allocation, Paging, Segmentation.
Virtual memory management - Demand paging, copy-on-write, page-replacement, Thrashing.

UNIT V

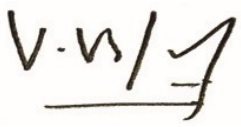
File System, System Protection and Security: Storage management – File concept, Access methods, Directory and disk structure, File-system mounting. System protection- Goals of protection, principles of protection, Domain of protection, Access matrix.
System Security – Security problem, Program threats, System and Network threats.

Text Book

1. Abraham Silberchatz, Peter B. Galvin, Greg Gagne, Operating System Concepts, 9th Edition, JohnWiley, 2016

Reference Books

1. D. M. Dharmdhere, Operating Systems – A Concept based Approach, 2nd Edition, TMH, 2007.
2. Andrew S Tanenbaum, Modern Operating Systems, Third Edition, PHI, 2008.
3. Behrouz A. Forouzan, Richard F. Gilberg, Unix and Shell programming, Cengage Learning, 2009.



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Java Programming						MCA 1st year 2nd semester		
Code	Category	Hours / Week			Credits	Marks		
MC203	Program Core	L	T	P	C	Internal	End Exam	Total
		3	0	0	3			100

Course Objectives

Course Objectives of Object-Oriented Programming are to:

1. Impart knowledge of core language features of Java
2. Appraise the concepts of Inheritance and Packages
3. Elaborate the use of Exceptions and collection frameworks in Java
4. Familiarize Event Handling and Applets
5. Emphasize GUI based application development

Course Outcomes

At the end of this Object-Oriented Programming course, students will be able to:

1. Appraise the basic concepts of java
2. Implement inheritance and polymorphism
3. Identify usage of collection framework and build multi-threaded applications
4. Design Applets by using Event Handling features
5. Implement Graphical User Interface applications using Swings

UNIT I

Java Basics: History of Java, Java buzzwords, data types, variables, scope and lifetime of variables, arrays, operators, expressions, control statements, simple java program, concepts of classes, objects, constructors, methods, access control, this keyword, static keyword, Garbage collection, Overloading methods and constructors, parameter passing.

UNIT II

Inheritance: Introduction, forms of inheritance- specialization, specification, construction, extension, limitation, combination, Member access rules, super uses, using final with inheritance.

Polymorphism: Method overriding, Abstract classes, Object class

Packages and Interfaces: Defining, Creating and Accessing a Package, importing packages, differences between classes and interfaces, File, Byte Streams, Character Streams

Exception Handling - Concepts of exception handling, exception hierarchy, usage of try, catch, throw,throws and finally, built in exceptions, creating own exception subclasses.
Package java.util- The Collection Interfaces, The Collection classes: LinkedList Class, HashSet Class. TreeSet Class, String Tokenizer, Date, Random, Scanner.
Multi-Threading: Differences between multithreading and multitasking, thread life cycle, creating threads, thread priorities, synchronizing threads, inter thread communication.

UNIT IV

Event Handling: Events, Event sources, Event classes, Event Listeners, Delegation event model, handlingmouse and keyboard events, Adapter classes.
Applets – Concepts of Applets, differences between applets and applications, life cycle of an applet, create applets, passing parameters to applets.

UNIT V

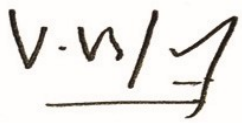
GUI Programming with Swing – Introduction, limitations of AWT, MVC architecture, components, containers. Understanding Layout Managers, Flow Layout, Border Layout, Grid Layout, Card Layout, Gridbaglayout.
Creating a Swing Applet, Painting in Swing, A Paint example, Exploring Swing Controls- JLabel and ImageIcon, JTextField, The Swing Buttons,JButton, JToggleButton, JCheckBox, JRadioButton, JTabbedPane, JScrollPane, JList, JComboBox, Swing Menus, Dialogs.

Text Book

1. Herbert Schildt, Java - The Complete Reference, Seventh edition, Tata McGraw Hill, 2006.

Reference Books

1. Bruce Eckel, Thinking in Java, Fourth Edition, Prentice Hall, 2006.
2. Y. Daniel Liang, Introduction to Java programming, Tenth Edition, Pearson education, 2014.
3.



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Software Engineering						MCA 1st year 2nd semester		
Code	Category	Hours / Week			Credits			
MC204	Program Core	L	T	P	C	Internal	End Exam	Total
		3	0	0	3	-	-	100

Course Objectives

Course Objectives are to:

1. Identify an appropriate Process Model.
2. Deliberate Software Requirements-functional and nonfunctional.
3. Design various system models for a given scenario.
4. Elaborate about different testing techniques.
5. Describe role of risk management in Software Engineering.

Course Outcomes

At the end of this course, students will be able to:

1. Analyze process models.
2. Emphasize Software Requirements -functional and nonfunctional.
3. Appreciate the system models.
4. Compare and contrast various testing techniques.
5. Identify various risk strategies

UNIT I

Introduction to Software Engineering: The evolving role of software, Changing Nature of Software, Software myths. A Generic view of process: Software engineering- A layered technology, a process framework, The Capability Maturity Model Integration (CMMI).
Process models: The waterfall model, Incremental process models, Evolutionary process model. [TB:1, CH:1,2,3]

UNIT II

Agile process Model: Agile principles, Extreme programming, Dynamic System Development Methods, Feature Driven Development, Scrum framework, Sprint, Scrum master, Roles of Scrum Master, Implementing Scrum - A case study. [TB:1, CH:4]

Software Requirements: Functional and non-functional requirements, the software requirements document. Requirements engineering process: Feasibility studies, Requirements elicitation and analysis, Requirements validation, Requirements management. [TB:2, CH:6,7]

System Models: Context Models, Behavioral models, Data models, Object models, structured methods. [TB:2, CH:8]
Design Engineering: Design process and Design quality, Design concepts, the design model. Modeling component level design: design class-based components, conducting component level design. Performing User interface design: Golden rules. [TB:1, CH:9,11]

UNIT IV

Testing Strategies: A strategic approach to software testing, test strategies for conventional software, Black-Box and White-Box testing, Validation testing, System testing.

Product metrics: Software Quality, Metrics for Analysis Model- function based metrics, Metrics for Design Model-object oriented metrics, class-oriented metrics, component design metrics, Metrics for source code, Metrics for maintenance. [TB:1, CH:13,14,15]

UNIT V

Risk Management: Reactive vs. Proactive Risk strategies, software risks, Risk identification, Risk projection, Risk refinement, RMMM, RMMM Plan.

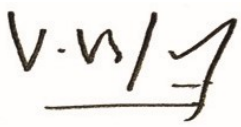
Quality Management: Quality concepts, Metrics for Software Quality, Software Reviews, Formal Technical Reviews, Software Reliability, The ISO 9000 quality standards. [TB:1, CH:25, 26]

Text Books

1. Roger S. Pressman, Software Engineering - A practitioner's Approach, 6th edition. McGraw HillInternational Edition, 2005.
2. Somerville, Software Engineering, 7th Edition, Pearson Education, 2009.

Reference Books

1. K.K. Agarwal & Yogesh Singh, Software Engineering, New Age International Publishers,3rd edition,2008
2. Pankaj Jalote, An Integrated Approach to Software Engineering, Narosa Publishing House, 3rd edition,2005.
3. James F. Peters, Witold Pedrycz, Software Engineering - an Engineering approach, JohnWiely, 2007.
4. Waman S Jawadekar, Software Engineering Principles and Practice, The McGraw-Hill Companies,2013.
5. https://nptel.ac.in/courses/106/105/106105182/



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Data Communications and Networking						MCA 1st year 2nd semester		
Code	Category	Hours / Week			Credits	Marks		
MC205	Program Core	L	T	P	C	Internal	End Exam	Total
		3	0	0	3	-	-	100

Course Objectives

Course Objectives of Computer Networks are to:

1. Elaborate the fundamental concepts of computer networks and network models
2. Interpret the error and flow control mechanisms in the data link layer
3. Explore the knowledge of various routing algorithms
4. Describe the transport layer functionalities
5. Illustrate different application layer functionalities

Course Outcomes

At the end of this Computer Networks course, students will be able to:

1. Illustrate the functionalities of various network models and Data Link Layer
2. Analyze error and flow control mechanisms in the data link layer
3. Examine various Routing Protocols
4. Compare various congestion control mechanisms to improve the QoS of networking
5. Identify the suitable Application layer protocols for specific applications

UNIT I

Introduction: Physical Structures, Network Models-Layered Tasks, OSI model, TCP/IP protocol Suite, Addressing.
Data Link Layer: Introduction, Hamming Distance, Cyclic Redundancy Check, Checksum.

UNIT II

Data Link Control: Framing, Flow and Error Control, Noiseless Channels, Noisy Channels, HDLC.
Multiple Access: Random Access, Controlled Access, Channelization.

UNIT III

Network Layer: IPV4 and IPV6 address space, Classful and classless Addressing, IPV4 and IPV6 datagram format, Transition from IPv4 to IPv6, Delivery, Forwarding and Routing, Routing protocols: Distance Vector Routing, Link State Routing, Path Vector Routing.

Transport Layer: Process-to-Process delivery, Transmission control protocol, User datagram protocol,Data traffic, Congestion Control, Quality of Service, Techniques to improve QoS.

UNIT V

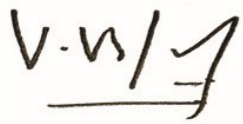
Application Layer: Domain Name Space, Distribution of Name Space, DNS in the Internet, Resolution, DNS Messages, Electronic mail, File Transfer Protocol.

Text Book

1. Behrouz A Forouzan," Data Communications and Networking", 4th Edition, McGraw-Hill, 2007.

Reference Books

1. Andrew S. Tanenbaum, Computer Networks, Third Edition, Prentice Hall, 2012.
2. William Stallings, Data and Computer Communications, Eight Editions. Pearson Publishers, 2008.
   http://highered.mheducation.com/sites/0072967757/student_view0/index.html



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Data Structures Lab						MCA 1st year 2nd semester		
Code	Category	Hours / Week			Credits			
MC206	Program Core	L	T	P	C	Internal	End Exam	Total
		0	0	4	2	-	-	100

Course Outcomes

At the end of this Data Structures Lab course, students will be able to:

1. Develop the programs on stacks and its applications
2. Demonstrate the operations on Trees
3. Code the implementation of various advanced trees
4. Design and implementation of programs on BST and Graph Traversals
5. Develop the programs on Hashing and Dictionaries

Week 1

1. Program to implement Stack Operations using arrays and Linked Lists
2. Program to implement Queue Operations using arrays and Linked Lists

Week 2

1. Program to convert infix to postfix notation
2. Program to evaluate postfix notations

Week 3

1. Program to implement towers of Hanoi
2. Program to implement parenthesis checker

Week 4

1.Program to implement Single linked list

Week 5

1.Program to illustrate tree traversals

a) In order b) Preorder c) Post order

Week 6

1. Program to illustrate insertion, deletion and searching in Binary Search Tree

Week 7

1.Program to implement Heaps

a) Min Heap b) Max Heap

Week 8

1. Program to illustrate Insertion on AVL Trees
2. Program to illustrate deletion and Rotation on AVL Trees

Week 9

1.Program to illustrate Graph traversals

a) Breadth First Search

b) Depth First Search

Week 10 1.Program to implement

a) Prim's algorithm b) Kruskal's algorithm

Week 11 1.Program to Implement Dijkstra algorithm

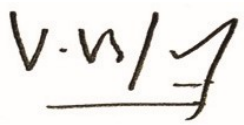
Week 12

1.Program to implement Hashing and collision resolution techniques

Week 13 1.Program to implement Dictionaries

Week 14 Internal Assessment

Note: The above experiments are for indicative purposes only. However, the concerned faculty member can add a few more experiments in addition to the existing. In such cases the concerned faculty member should get the syllabus approved by the BoS.



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Java Programming Lab						MC 1st year 2nd semester		
Code	Category	Hours / Week			Credits	Marks		
MC207	Program Core	L	T	P	C	Internal	End Exam	Total
		0	0	4	2			100

Course Outcomes

At the end of this Java Programming Lab course, students will be able to:

1. Implement simple Java Programs
2. Develop the programs using interfaces and packages
3. Demonstrate the use of threads and Exception handling
4. Design Applet programs
5. Develop GUI applications using Swings

List of Experiments

Week 1

1. Write a Java Program to define a class, define instance methods for setting and retrieving values ofinstance variables and instantiate its object
2. Demonstrate the use of static keyword and this keyword.

Week 2

1. Write a program to illustrate types of constructors and constructor overloading
2. Write a Java program to demonstrate the use of String class and its methods.

Week 3

1. Write a program to illustrate parameter passing Techniques
2. Write a java program to illustrate Recursion and nested class

Week 4

1. Write a program to demonstrate the use of inheritance.
2. Write a java program to demonstrate the concept of polymorphism.

Week 5

1. Write a program to illustrate Files.
2. Demonstrate the use of I/O Streams.

Week 6

1. Write a program to illustrate the use of packages.
2. Write a program to illustrate Interfaces.

Week 7

1. Write a program to illustrate try, catch, throw, throws and finally keywords
2. Write a program to implement the concept of User defined Exceptions.

Week 8

1. Write a program to illustrate Multithreading.
2. Write a program to illustrate thread priorities.

Week 9

1. Write a program to illustrate Thread Synchronization.
2. Write a program to illustrate Inter Thread Communication.

Week 10

1. Write a program to illustrate collection classes and interfaces.
2. Write a program to illustrate String Tokenizer, Date, Random and Scanner classes.
3. Write a program to illustrate Event Handling (keyboard, Mouse events).

Week 11

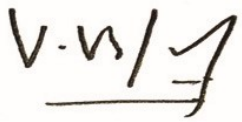
1. Develop an applet in Java that displays a simple message.
2. Develop an applet in Java that receives an integer in one text field, and computes its factorial Valueand returns it in another text field, when the button named “Compute” is clicked.

Week 12

1. Write a program to develop a calculator application using Swings.

Week 13

Review.



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Gender Sensitization						MCA 1st year 2nd semester		
Code	Category	Hours / Week			Credits			
MC208	Mandatory	L	T	P	C	Internal	End Exam	Total
		2	0	0	0	-	-	-

Course Objectives

1. Develop student's sensibility with regard to issues of gender in contemporary India
2. Provide a critical perspective on the socialization of men and women
3. Introduce students to information about some key biological aspects of genders
4. Expose the students to debates on the politics and economics of work
5. Help students reflect critically on gender violence

Course Outcomes

1. Develop a better understanding of important issues related to gender in contemporary India
2. Identify the basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film
3. Analyze a finer grasp of how gender discrimination works in our society and how to counter it
4. Acquire insight into the gendered division of labour and its relation to politics and economics
5. Men and women students and professionals will be better equipped to work and live together asequals

UNIT I - Understanding Gender

Gender: Why should we study it? (Towards a world of equals: Unit-1)
Socialization: Making Women, Making Men (Towards a world of equals: Unit-2)
Introduction, Preparing for womanhood. Growing up male. First lesson in caste. Different Masculinities.Just Relationships: Being Together as Equals (Towards a world of equals: Unit-12)
Mary Kom and Onler. Love and acid just do not mix. Love Letters. Mothers and Fathers. Further reading:Rosa Parks-The Brae Heart.

UNIT II - Gender and Biology

Declining Sex Ration. Demographic Consequences.
Gender Spectrum: Beyond The Binary (Towards a world of equals: Unit-10)Two or many? Struggles with Discrimination.
Additional Reading: Our Bodies, Our Health (Towards a world of equals: Unit-13)

UNIT III - Gender and Labour

"May Mother doesn't work". "Share the Load".
Women's work: its politics and economics (Towards a world of equals: Unit-7)
Fact and Fiction. Unrecognized and unaccounted work. Further Reading: Wages and Conditions of Work.

UNIT IV - Issues of Violence

Sexual Harassment, not Eve-teasing-coping with everyday Harassment-Further Reading: "Chupulu".
Domestic Violence: Speaking out (Towards a world of equals: Unit-8)
Is Home a Safe Place? – When Women Unite [Film]. Rebuilding Lives. Further Reading: New Forums for Justice.
Thinking about sexual Violence (Towards a world of equals: Unit-11)
Blaming the Victim- "I Fought for my life.." – Further reading: The Caste Face of Violence.

UNIT V - Gender Studies

Point of View. Gender and the Structure of Knowledge. Further Reading: unacknowledged Women artists of Telangana. Whose History? Questions for Historians and others (Towards a world of equals: Unit-9)
Reclaiming a past. Writing other Histories. Further Reading: Missing Pages from Modern Telangana History.

Text Books

1. Suneetha, Uma Bhrugubanda, Duggirala Vasantha, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, Gogu Shyamala, Deep Sreenivas and Susie Tharu, "Towards a world of Equals; A Bilingual Textbookon Gender"
2. Sen, Amartya. "More than one million Women are Missing". New York review of books 37.20 (20 December 1990). Print. 'We Were Making History….' Life Stories of Women in the Telangana People's Struggle. New Delhi: Kali for Women 1989.

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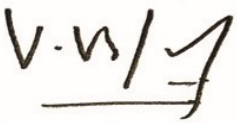
1. Tripti Lahari. "By the numbers: Where Indian Women Work." Women's studies journal (14 November2012) Available online at: http://blogs.wsj.com/indiarealtime/2012/11/14/by the numbers where Indian women work.
2. K. Satyanarayana & Susie Tharu (ed.) Steel are sprouting: New Dalit Writing From South India,Dossier 2: Telugu And Kannada http://herpercollins.co.in/Bookdetail.asp? Book _code = 3732.
3. Monon, Nivedita, Seeing like a Feminist, New Delhi: Zubaan-Penguin Bokks, 2012.



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Program Structure and Syllabus of

MCA II Year

Machine Learning						MCA 2nd year 1st semester		
Code	Category	Hours / Week			Credits			
MC301	Program Core	L	T	P	C	Internal	End Exam	Total
		4	0	0	4	-	-	100

Course Objectives

To implement, train, and validate their own neural network.

To learn deep recurrent and memory networks.

To demonstrate a toolbox of techniques that can be immediately applied to real world problems.

Course Outcomes

Analyze the strengths and weaknesses of many popular machine learning approaches.

Appreciate the underlying mathematical relationships within and across machine learning algorithms.

Characterize the paradigms of supervised, semi-supervised and unsupervised learning.

Ability to recognize and implement various ways of selecting suitable model parameters for different machine learning techniques.

Understand how to perform evaluation of machine learning algorithms and model selection.

Design and Implement various machine learning algorithms in a range of real-world applications.

UNIT I **Machine Learning Foundations**

Three types of Machine Learning, Supervised Learning, Reinforcement Learning, Unsupervised Learning, Machine Learning Systems, Preprocessing, Training and Choosing Predictive Models, Model Evaluation and Validation of unseen data instances

UNIT II

Different Training Models :

Gradient Descent, Polynomial Regression, Regularized Linear Models, Support Vector Machine, Soft Margin and Non-Linear SVM classification, Similarity Features, Quadratic Programming

UNIT III

The Perceptron, MLP and Backpropagation, Train a DNN, Construction and Execution phase, How to use the Neural Network, Fine-tuning the Hyperparameters, The Number of Hidden, Layers, Activation Functions, Visual Cortex Architecture, Convolutional Layers, Filters, Common CNN architectures, LexNet- AlexNet,GoogleNet and ResNet

UNIT IV

Recurrent Neural Networks :

Recurrent Neurons, Training RNNs, The Complexity of Training over multiple steps, The LSTM cell using Peephole Connections, GRU cells, Natural Language Processing Applications

UNIT V

Autoencoders and Reinforcement Learning:

Efficient Data Representations, Stacked Autoencoders, Visualize the Reconstructions, Using Stacked Autoencoders for unsupervised pre-training, Variational Autoencoders- Learning How to Optimize Rewards, Policy Search, Neural Network Policies, Action Evaluation: Credit Assignment problem, Using Policy Gradients.

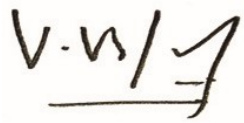
Text Books

1.EthemAlpaydi, Introduction to Machine Learning, Second Edition, The MIT Press, 2015

2. ShaiShalev- Shwartz and Shai Ben David, Understanding Machine Learning: From Theory to Algorithms, First Edition, Cambridge University Press, 2014.

References

1. Russell and Norvig, Artificial Intelligence, Third Edition, Prentice Hall, 2015
2. Sudharsan Ravichandran, Reinforcement Learning with Python: Master reinforcement and deep reinforcement learning using OpenAI Gym and TensorFlow, Packt Publishers, 2018.
3. BharathRamsundar and Reza BosaghZadeh, TensorFlow for Deep Learning, O"Reilly Publications, 2018.



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Python Programming					MCA 2nd year 1st Semester			
Code	**Category**	**Hours / Week**			**Credits**			
MC302	Program Core	L	T	P	C	**Internal**	**End Exam**	**Total**
		3	0	0	3	-	-	100

Course Objectives

1. Understand the basics and function of Python Programming Language.
2. Understand the string operation and sequences used in Python Programming Languages.
3. Understand the modules and packages in Python Programming Language.
4. Understand File operations in Python Programming Language

Course Outcomes

At the end of course , students will be able to:

1. Apply control structures, functions and packages in Problem Solving. (L3)
2. Analyze various String handling functions and data structures(L4)
3. Model the object-oriented problems with classes and objects (L4)
4. Solve the problems by using Inheritance and polymorphism (L3)
5. Illustrate programs on Exception Handling and various packages(L3)

UNIT I

Problem Solving: Definition and Steps, Problem Analysis Chart, Developing an Algorithm, Flowchart and Pseudo-code. Introduction to python - Interactive and Script Mode - Indentation - Comments - Variables - Reserved Words - Data Types - Operators and their precedence - Expressions - Built-in Functions - Importing from Packages.

UNIT II

Control Structures

Decision Making and Branching: if, if-else, nested if, multi-way if-elif statements - Looping: while loop, for loop - else clauses in loops, nested loops - break, continue and pass statements.

Functions and Modules:

Declaration and Definition Function Calling, More on Defining Functions, Recursive Functions, Modules, Packages in Python, Doc Strings.

UNIT III

Collection Lists: Create, Access, Slicing, Negative indices, List methods, List comprehensions - Tuples: Create, Indexing and slicing, Operations on tuples - Dictionary: Create, add, and replace values, Operations on dictionaries - Sets: Creation and operations.

Strings and Regular Expressions:

String Operations, Built-in String Methods and Functions, Comparing Strings, function in Regular Expression.

UNIT IV

Functions and Files

Functions - Parameters and Arguments: Positional arguments, Keyword arguments, Parameters

with default values - Local and Global scope of variables - Functions with Arbitrary arguments - Recursive Functions - Lambda Function. Files: Create, Open, Read, Write, Append and Close - tell and seek methods.

UNIT V

Python NumPy: NumPy ND array, Data Types, Functions of NumPy Array, NumPy Array Indexing, Mathematical Functions on Arrays in NumPy

Python Pandas: Pandas Features, Dataset in Pandas, Data Frames, Manipulating the Datasets, Describing a Dataset, group by Function, Filtering, Missing Values in Pandas, Concatenating Data Frames. Import data from csv file.

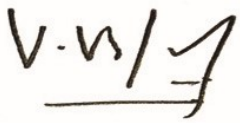
Introduction to Matplotlib :, Plot, Scatterplot, Introduction to Tkinter ,Date and Time Packages

Text Book

1. Ashok Namdev Kamthane, Amit Ashok Kamthane, programming and problem solving with python, 2nd edition, McGrahill, 2020.
2. ReemaThareja,Python Programming using Problem Solving Approach, First Edition,Oxford Higher Eduction,2017
3. James Payne, Beginning Python using Python 2.6 and Python 3,1st Edition

Reference Books

1. Charles Dierach, Introduction to Computer Science using Python,2013
2. https://www.programiz.com/python-programming
3. https://www.javatpoint.com/python-tutorial
4. https://www.geeksforgeeks.org/python-programming-language



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Big Data Analytics						MCA 2nd year 1st semester		
Code	Category	Hours / Week			Credits	Marks		
MC303	Professional Elective-III	L	T	P	C	Internal	End Exam	Total
		4	0	0	4	-	-	100

Course Objectives

Course Objectives of Big Data Analytics are to:

1. Discuss the overview of big data analytics concepts and growth rate
2. Introduce the tools required to manage and analyze big data like Hadoop, NoSQL Data Management.
3. Summarize the fundamental concepts of Hadoop Distributed file systems
4. Describe the techniques involved with Map Reduce Applications.
5. Analyze various recommender systems for applications

Course Outcomes

At the end of this Big Data Analytics course, students will be able to:

1. Appraise the concept and application of Big Data
2. Apply scalable algorithms on NO SQL for big data analytics.
3. Elaborate the notion of Hadoop Distributed File System and applications
4. Apply MapReduce for the given problem
5. Implement recommender systems for different application

UNIT I

Introduction To Big Data: Characteristics of Big Data, Traits of Big data, Challenges of ConventionalSystems, Sources of Big Data, Applications of big data, Features and benefits of big data, Analysis vs Reporting, CAP theorem, Modern Data Analytic Tools. Introduction to Hadoop Programming languages: Pig, Hive. NOSQL Databases: Cassandra, Mongo, HBase.

UNIT II

NOSQL Data Management: Introduction to NoSQL, aggregate data models, aggregates, key-value and document data Models, relationships, graph databases, schema less databases, materialized views, distribution models, sharding, master-slave replication, peer-peer replication, sharing and replication

UNIT III

Introduction To Hadoop: History of Hadoop, Data Storage and Analysis, Hadoop –Setup, Hadoop operation modes, Configurations of Hadoop.

Hadoop Ecosystem, Hadoop Distributed File System, HDFS Architecture, concepts of Blocks in HDFS Architecture, Name Nodes and Data Nodes, using command Line Interface with HDFS, HDFS Commands, Features of HDFS.

UNIT IV

MapReduce Applications: MapReduce workflows, unit tests with MR Unit, test data and local tests, anatomy of MapReduce job run, classic Map-reduce, YARN, failures in classic MapReduce and YARN, job scheduling, shuffle and sort, task execution, MapReduce types, input formats, output formats

UNIT V

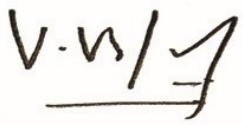
Social Media Analytics and Text Mining: Introducing social media; Key elements of social media; Sentiment Analysis, Performing Social Media Analytics.

Text Book

1. BIG DATA- Black Book, Dream Tech Press, 2019.

Reference Books

1. Seema Acharya, S. Chellappan," Big Data and Analytics", Wiley,2014
2. Tom White "Hadoop: The Definitive Guide" 4th Edition, O'reilly Media, 2015.
3. Michael Minelli, Michele Chambers, Ambiga Dhiraj, Jim Stogdill, "Big Data Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses", 1st Edition, Wiley Publications,2013
4. Chris Eaton, Dirk De Roos, Tom Deutsch, George Lapis, Paul Zikopoulos, "Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data", McGraw Hill Publishing, 2012
5. Pete Warden, "Big Data Glossary", O'Reilly, 2011.



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Cloud Computing						MCA 2nd year 1st semester		
Code	Category	Hours / Week			Credits	Marks		
MC304	Professional Elective-II	L	T	P	C	Internal	End Exam	Total
		2	0	0	2	-	-	100

Course Objectives

Course Objectives are to:

1. Impart the concepts of virtualization and its benefits
2. Discuss various Virtualization Technologies
3. Demonstrate the use of storage virtualization
4. Analyze various cloud architectures
5. Acquire the knowledge of disaster recovery and security in the cloud

Course Outcomes

At the end of this course, students will be able to:

1. Appreciate Virtualization Concepts
2. Analyze various Virtualization Technologies
3. Compare cloud storage mechanisms
4. Draw cloud architecture
5. Apply security mechanisms for cloud computing

UNIT I

Introduction to Virtualization: Objectives of virtualization, history of virtualization, benefits of virtualized technology, the virtual service desk, what can be virtualized, related forms of computing, cloud computing, software as a service – SaaS, grid computing, utility computing, virtualization processes. [TB:1, CH:1]

UNIT II

Virtualization Technologies: Storage virtualization, Virtualization density, Para-virtualization, OS virtualization, Virtualization software, Data Storage virtualization, Intel virtualization technology, Thinstall virtualization suite, Net framework virtualization, Windows virtualization on Fedora, Storage virtualization technologies, Virtualization level, Security monitoring and virtualization, Oracle virtualization. [TB:1, CH:3]

UNIT III

Virtualization and Storage Management: The heart of cloud computing-virtualization, defining virtualization, why virtualize, what can be virtualized, where does virtualization happen, how does virtualization happen, on the road to storage virtualization, improving availability using virtualization, improving performance through virtualization, improving capacity through virtualization, business value for virtualization. [TB:1, CH:6]

UNIT IV

Overview of Cloud Computing: Essentials, Need and History of Cloud Computing, Benefits and Limitations. Cloud Computing Architecture: Introduction, Grid Architecture, Advantages and Challenges. Cloud Computing Architecture – on the basis, Similarities and Differences between Grid and Cloud Computing, Characteristics of Cloud Computing, Cloud Service Models. [TB:2, CH: 1,3, 4.1]

UNIT V

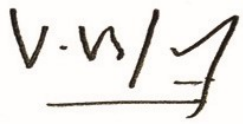
Models of Cloud Computing: Cloud Computing Deployment Models, Cloud Data Center Core Elements, Replication Technologies, Backup, and Disaster Recovery.
Security issues of Cloud Computing – Introduction, Security Concerns, Information Security Objectives,Design Principles, and Security Services. [TB:2, CH:4.4,5,10]

Text Books

1. Ivanka Menken, Gerard Blokdijk, Cloud Computing Virtualization Specialist Complete Certification Kit - Study Guide Book, 2009
2. Shailendra Singh, Cloud Computing, Oxford University Press, 2018

Reference Books

1. Anthony T. Velte, TobeJ.Velte, Robert Elsenpeter, Cloud Computing: A Practical Approach, PublicationPearson Education, 2009
2. Tom Clark, Storage Virtualization: Technologies for Simplifying Data Storage and Management, Addison-Wesley, 2005
3. Curtis Brian, J.S. Chee, Cloud Computing Technologies and Strategies of the Ubiquitous Datacenter, 2010
4. George Reese, Cloud Application Architectures Building Applications and Infrastructure in the Cloud, O'Reilly Media Press, 2009.



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Design and Analysis of Algorithms						MCA 2nd year 1st semester		
Code	Category	Hours / Week			Credits	Marks		
MC305	Professional Elective-I	L	T	P	C	Internal	End Exam	Total
		2	0	0	2	-	-	100

Course Objectives

Course Objectives of Design and Analysis of Algorithms are to:

1. Analyze the asymptotic performance of algorithms
2. Apply the Paradigms and approaches to appreciate the impact of algorithm design in practice
3. Synthesize efficient algorithms in common engineering design situations
4. Analyze complex engineering problems using backtracking
5. Utilize data structures and algorithmic design techniques in solving new problems

Course Outcomes

At the end of this Design and Analysis of Algorithms course, students will be able to:

1. Formulate the knowledge of algorithm analysis and its notations that are applied on the problemssolved by divide and conquer paradigm.
2. Design the major graph algorithms for model engineering problems and knowledge of the greedyparadigm
3. Apply the dynamic-programming paradigm and recite algorithms that employ this paradigm
4. Illustrate the concept of backtracking, branch and bound paradigm for real time problems
5. Analyze the complexity of problems and differentiate that in terms of P and NP problems withexamples

UNIT I

Introduction: Algorithm, Pseudo code for expressing algorithms, Performance Analysis-Space complexity, Time complexity, Asymptotic Notation- Big oh notation, Omega notation, Theta notation and Little oh notation, Disjoint Sets- disjoint set operations, union and find operations. [TB:1, CH:1] [TB:2, CH:3]

Divide and conquer: General method, applications-Binary search, Quick sort, Merge sort. [TB:1, CH:3]

UNIT II

Graphs: breadth first search, depth first search, spanning trees, connected and bi connected components.[TB:1, CH:2]

Greedy method: General method, applications-Job sequencing with deadlines, 0/1 knapsack problem, Minimum cost spanning trees, Single source shortest path problem. [TB:1, CH:4]

UNIT III

Dynamic Programming: General method, Multistage graph, applications-Matrix chain multiplication, Optimal binary search trees, 0/1 knapsack problem, All pairs shortest path problem,

Travelling salesperson problem. [TB:1, CH:5]

UNIT IV

Backtracking: General method, applications-n-queen problem, sum of subsets problem, graph coloring, Hamiltonian cycles. [TB:1, CH:7]
Branch and Bound: General method, applications - Travelling salesperson problem,0/1 knapsack problem- LC Branch and Bound solution, FIFO Branch and Bound solution. [TB:1, CH:8]

UNIT V

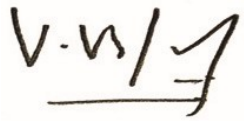
Lower Bound Theory: Comparison trees, NP-Hard and NP-Complete problems: Basic concepts, non-deterministic algorithms, NP - Hard and NP Complete classes, Clique Decision Problem (CDP), Node cover decision problem. [TB-1, CH-10,11]

Text Books

1. Ellis Horowitz, Satraj Sahni and Rajasekharam, Fundamentals of Computer Algorithms, Galgotiapublications Pvt. Ltd, Second Edition, 2007.
2. Thomas H. Cormen, Charles E. Leiserson,Ronald L. Rivert and Clifford Stein, Introduction toAlgorithms, Third Edition ,PHI Learning Private Limited, Eastern Economy Edition, 2008.

Reference Books

1. Aho, Ullman and Hopcroft, Design and Analysis of algorithms, Pearson education, Reprint 2002
2. R.C.T.Lee, S.S.Tseng, R.C.Chang and T.Tsai, Introduction to Design and Analysis of Algorithms: Astrategic approach, McGraw Hill, 2005.
3. Allen Weiss, Data structures and Algorithm Analysis in C++, Third Edition, Pearson Education.



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Cryptography and Network Security						MCA 2nd year 1st semester		
Code	Category	Hours / Week			Credits			
MC306	Professional Elective-I	L	T	P	C	Internal	End Exam	Total
		2	0	0	2	-	-	100

Course Objectives

Course Objectives of Cryptography and Network Security are to:

1. Describe the basic concepts of classical encryption techniques, finite fields and number theory
2. Discuss the working principles and utilities of various cryptographic algorithms including secret keycryptography, hashes and message digests, and public key algorithms
3. Design issues and working principles of various authentication protocols, PKI standards
4. Explore various secure communication standards including Kerberos, IPsec, and SSL/TLS and email
5. Describe the concepts of cryptographic utilities and authentication mechanisms to design secureapplications

Course Outcomes

At the end of this Cryptography and Network Security course, students will be able to:

1. Identify information security goals, classical encryption techniques and acquire fundamentalknowledge on the concepts of finite fields and number theory
2. Compare and apply different encryption and decryption techniques to solve problems related toconfidentiality and authentication
3. Apply the knowledge of cryptographic checksums and evaluate the performance of different messagedigest algorithms
4. Apply different digital signature algorithms to achieve authentication and create secure applications
5. Analyze different attacks on networks and evaluate the performance of firewalls and securityprotocols like SSL, IPSec, and PGP

UNIT I

Classical Encryption Techniques: Security Attacks, Services & Mechanisms, Symmetric Cipher Model. Cyber Threats, Phishing Attack, Web Based Attacks, SQL Injection Attacks, Buffer Overflow& FormatString Vulnerabilities, TCP session hijacking, UDP Session Hijacking. Block Ciphers: Traditional Block Cipher Structure, Block Cipher Design Principles.

UNIT II

Symmetric Key Cryptography: Data Encryption Standard (DES), Advanced Encryption Standard (AES), Blowfish, IDEA, Block Cipher Modes of Operations. Number Theory: Prime and Relatively Prime Numbers, Modular Arithmetic, Fermat's and Euler's Theorems, The Chinese Remainder Theorem, Discrete Logarithms.

UNIT III

Public Key Cryptography: Principles, Public Key Cryptography Algorithms, RSA Algorithm, Diffie

Hellman Key Exchange, Elliptic Curve Cryptography. Cryptographic Hash Functions: Application of Cryptographic Hash Functions, Requirements & Security, Secure Hash Algorithm, Message Authentication Functions, Requirements & Security, HMAC & CMAC. Digital Signatures: NIST Digital Signature Algorithm, Key Management and Distribution.

UNIT IV

User Authentication: Remote User Authentication Principles, Kerberos. Electronic Mail Security: Pretty Good Privacy (PGP) And S/MIME. IP Security: IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management.

UNIT V

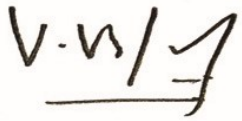
Transport Level Security: Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Shell (SSH). Firewalls: Characteristics, Types of Firewalls, Placement of Firewalls, Firewall Configuration, Trusted Systems.

Text Books

1. Cryptography and Network Security-William Stallings, Pearson Education, 7th Edition.
2. Cryptography, Network Security and Cyber Laws –Bernard Menezes, Cengage Learning, 2010 edition.

Reference Books

1. Cryptography and Network Security-Behrouz A Forouzan, Debdeep Mukhopadhyay, Mc-GrawHill, 3rdEdition, 2015.
2. Network Security Illustrated, Jason Albanese and Wes Sonnenreich, MGH Publishers, 2003.



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Introduction to Artificial Intelligence						MCA 2nd year 1st semester		
Code	Category	Hours / Week			Credits			
MC307	Professional Elective-II	L	T	P	C	Internal	End Exam	Total
		2	0	0	2	-	-	100

Course Objectives

Course Objectives of Artificial Intelligence are to:

1. Summarize overview of artificial concepts
2. Discuss uniform search and informed search
3. Demonstrate how to solve the zero sum gain problem
4. Describe the logic in artificial intelligence and knowledge representation
5. Elaborate notion of different production and expert systems in AI

Course Outcomes

At the end of the Artificial Intelligence course, students will be able to:

1. Describe the concepts and applications of artificial intelligence
2. Compare uniform search and informed search algorithms
3. Solve problems using Zero Sum Game algorithms
4. Represent logic for given problems using facts and rules
5. Summarize functionalities of production and expert systems

UNIT I

Overview of Artificial Intelligence: Introduction. The Turing Test, Strong AI Versus Weak AI, Identifying Problems Suitable for AI, Applications and Methods, Early History of AI, Recent History of AI to thePresent, AI in the New Millennium

UNIT II

Uninformed Search: Introduction: Search in Intelligent Systems, State-Space Graphs, Generate-and-Test Paradigm, Blind Search Algorithms, Implementing and Comparing Blind Search Algorithms
Informed Search: Introduction, Heuristics, Informed Search Algorithms – Finding Any Solution, The Best- First Search, The Beam Search, Additional Metrics for Search Algorithms, Informed Search – Finding an Optimal Solution.

UNIT III

Search Using Games: Introduction, Game Trees and Minimax Evaluation, Minimax with Alpha-Beta Pruning, Variations and Improvements to Minimax, Games of Chance and the Expect minimax Algorithm

Logic in Artificial Intelligence: Introduction, Logic and Representation, Propositional Logic, Predicate Logic – Introduction, Several Other Logics, Uncertainty and Probability
Knowledge Representation: Introduction, Graphical Sketches and the Human Window, Graphs and the Bridges of Königsberg Problem, Search Trees, Representational Choices, Production Systems, Object Orientation, Frames, Semantic Networks

UNIT V

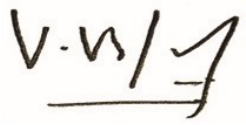
Production Systems: Introduction, Background, Production Systems and Inference Methods, Production Systems and Cellular Automata, Stochastic Processes and Markov Chains, Basic Features and Examplesof Expert Systems

Text Book

1. Stephen Lucci, Danny Kopec, Artificial Intelligence in the 21st Century-A Living Introduction,Mercury Learning and Information, Second Edition, 2016

Reference Books

1. Russell, Norvig: Artificial Intelligence, A Modern Approach, Pearson Education, Second Edition, 2004
2. Rich, Knight, Nair: Artificial Intelligence, Tata McGraw Hill, Third Edition, 2009.
3. Saroj Kaushik. Artificial Intelligence. Cengage Learning, 2011



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R Programming						MCA 2nd year 1st semester		
Code	Category	Hours / Week			Credits	Marks		
MC308	Professional Elective-II	L	T	P	C	Internal	End Exam	Total
		2	0	0	2	-	-	100

Course Objectives:

1. To understand the fundamentals of R programming.
2. To comprehend the various functions and structures of R.
3. To design systems based on graphics and analytics using R.

Course Outcome:

1. Understand the basics of R programming in terms of vectors, matrices and lists
2. Understand the working of data frames, functions and tables using R.
3. Apply various programming structures in solving statistical problems.
4. Design Systems by interfacing R with other programming languages.
5. Design and implement models to perform analytics on the given dataset.
6. Apply the R programming from a statistical perspective over the real world problems.

Module:1 Vectors in R

Introduction to R – R Data Structures – Help functions in R – Vectors – Scalars – Declarations– recycling – Common Vector operations – Using all and any – Vectorised operations – NA and NULL values – Filtering – Vectorised if-then else – Vector Equality – Vector Element names

Module:2 Matrices Arrays and Lists

Creating matrices – Matrix operations – Applying Functions to Matrix Rows and Columns – Adding and deleting rows and columns – Vector/Matrix Distinction – Avoiding Dimension Reduction – Higher Dimensional arrays – lists – Creating lists – General list operations – Accessing list components and values – applying functions to lists – recursive lists

Module:3 Data Frames and Tables

Creating Data Frames – Matrix-like operations in frames – Merging Data Frames – Applyingfunctions to Data frames – Factors and Tables – factors and levels – Common functions used with factors – Working with tables - Other factors and table related functions

Module:4 Data Frames and Tables

Control statements – Arithmetic and Boolean operators and values – Default values for arguments - Returning Boolean values – functions are objects – Environment and Scope issues – Writing Upstairs - Recursion – Replacement functions – Tools for composing function code –Math and Simulations in R

Module:5

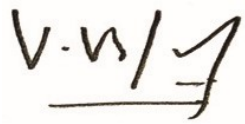
String Manipulation and Graphics

String Manipulation – Graphics – Creating Graphs – Customizing Graphs – Saving graphs tofiles – Creating three-dimensional plots.Interfacing R to other languages – Parallel R – Basic Statistics – Linear Model – Generalized Linear models, Non-linear models – Time

Series and Auto-correlation – Clustering

Text Book(s)

1. Norman Matloff , “The Art of R Programming: A Tour of Statistical Software Design”,No Starch Press, 2011.
2. Wickham, H. & Grolemund, G. , “R for Data Science”. O’Reilly, New York, 2018.



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Internet of Things						MCA 2nd year 1st semester		
Code	Category	Hours / Week			Credits			
MC309	Professional Elective-I	L	T	P	C	Internal	End Exam	Total
		2	0	0	2	-	-	100

Course Objectives

Exploring the characteristics of Internet of things and its design.
Defining the communication model with cloud environment.
Extrapolating the design thinking skills to new IoT based prototypes for real life applications.

Course Outcomes

Design the logical and physical structure of Internet of Things.
Develop the communication system and protocol in implementing Internet of Things.
Define the virtualization for Internet of things.
Configuration of IOT devices.
Design functional model specification for Internet of Things based on domain specification.
Develop an Internet of Things application based on domain specification and real time applications.
Perform interactive product development using IoT technologies.

UNIT I

Definition and Characteristics, Physical Design of IoT, Logical Design of IoT, IoT EnablingTechnologies.

UNIT II

Introduction to M2M, Difference between IoT and M2M, SDN and NFV for IoT.

UNIT III

IEEE 802.15.4, BACNet Protocol, Modbus, KNX, Zigbee Architecture, 6LoWPAN, RPL

UNIT IV

IoT Platforms Design Methodology, Python packages of Interest for IoT, IoT Physical Devicesand Endpoints

UNIT V

IoT Physical Servers and Cloud Offerings, IoTTools:Chef,Puppet- Home Automation, Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry, Health and Lifestyle, Virtual Reality Internet Advertising, Intelligent Transportation Systems, Health Information System: Genomics Driven Wellness Tracking and Management System(Go-WELL)

Text Books

Arshdeep Bahga, Vijay Madisetti, Internet of Things: A Hands-on Approach, 2015, 1stEdition, Universities Press.

Reference Books

Olivier Hersent, David Boswarthick, Omar Elloumi, The Internet of Things - Key applications and Protocols, 2012, Wiley Publication.
Honbo Zhou, The Internet of Things in the Cloud: A Middleware Perspective, 2012, CRC Press.
Dieter Uckelmann; Mark Harrison; Florian Michahelles Architecting the Internet of Things, 2011, Springer.

Web Technology						MCA 2nd year 1st semester		
Code	Category	Hours / Week			Credits			
MC310	Mandatory	L	T	P	C	Internal	End Exam	Total
		2	0	0	2	-	-	100

Course Objectives

1.To develop understanding of the web architecture and web languages.

2.To familiarize with web development tools and techniques.

3. To illustrate web development environment and methodologies.

Course Outcomes

weaknesses of many popular machine learning approaches. Appreciate the underlying mathematical relationships within and across machine learning algorithms. Characterize the paradigms of supervised, semi-supervised and unsupervised learning.

Ability to recognize and implement various ways of selecting suitable model parameters for different machine learning techniques.

Understand how to perform evaluation of machine learning algorithms and model selection.

Design and Implement various machine learning algorithms in a range of real-world applications.

UNIT I

Web Essentials :Evolution of web - Web architecture - HTML5: Text tags, Graphics, Form elements, Semantic tags - CSS3: Selectors, Backgrounds and borders, Text effects, Cascading and inheritance of style properties, Box Model, Positioning - Introduction to responsive design-Bootstrap: Containers, Grids, Typography, Flex, and Forms.

UNIT II

Client-side Scripting :JavaScript basics –Arrays- Functions - JavaScript object – HTML DOM - DOM methods –Events- Form Validation-Regular expressions- JQuery.

UNIT III

Web Application and Angular JS

Web applications- Web application frameworks: MVC framework-Angular JS: Introduction,Data binding, Directives, Modules, Scopes, Controllers, Expressions, Filters, Events, Form- Single Page Application-Multiple Views and Routing – Service.

UNIT IV

Client/Server Communication

HTTP- Request/Response Model- HTTP Methods- REST APIs-AJAX –AJAX calls – XMLhttp object- Data formats-JSON -AJAX with JQuery- Node.js - NPM – Call backs - Events- Express framework: Request-Response, Routing-

Template engines – Cookies - Sessions - File uploading - Sending email.

UNIT V

MongoDB database: Basics - Manipulating andaccessing MongoDB Documents – Client/Server/Database interaction. Component-based front-

end library: ReactJS – Environment setup – React HTML render – JSX – React Components

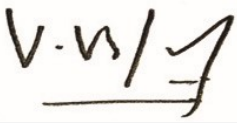
Text Books

1. Brad Dayley, Brendan Dayley, Caleb Dayley, "Node.js, Mongo DB and Angular JS Web Development", 2017, 2nd Edition, Addison Wesley - Oreilly, USA.

2.Vasan Subramanian, "Pro MERN Stack: Full stack web app development", 2019, 2nd Edition, APress, Oreilly.

References

1. Jessica Minnick, Responsive, "Web Design with HTML 5 & CSS, Cengage Learning", 2020, 9th Edition.
2. Ethan Brown, "Web Development with Node and Express", 2019, 2nd Edition, O'Reilly Media Inc.
3. Frank Zammetti, "Modern Full-Stack Development: Type Script, React, Node. JS", 2020, 1st Edition, Apress.



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Linux Programming						MCA 2nd year 1st semester		
Code	Category	Hours / Week			Credits			
MC311	Mandatory	L	T	P	C	Internal	End Exam	Total
		2	0	0	2	-	-	100

Course Objectives:

1. To teach principles of operating system including File handling utilities, Security by file permissions, Process utilities, Disk utilities, Networking Commands, Basic Linux commands, Scripts and filters.
2. To familiarize fundamentals of the Bourne again shell (bash), shell programming, pipes, input and output redirection Control structures, arithmetic in shell interrupt processing, functions, debugging shell scripts.
3. To impart fundamentals of file concepts kernel support for file, File structure related system calls (file API's).
4. To facilitate students in understanding Inter process communication.
5. To facilitate students in understanding semaphore and shared memory.
6. To facilitate students in understanding process.

Course Outcomes:

1. Ability to use various Linux commands that are used to manipulate system operations at admin level and a prerequisite to pursue job as a Network administrator.
2. Ability to write Shell Programming using Linux commands.
3. Ability to design and write application to manipulate internal kernel level Linux File System.
4. Ability to develop IPC-API's that can be used to control various processes for synchronization.
5. Ability to develop Network Programming that allows applications to make efficient use of resources available on different machines in a network.

UNIT – I

INTRODUCTION TO LINUX AND LINUX UTILITIES: A brief history of LINUX, architecture of LINUX, features of LINUX, introduction to vi editor. Linux commands- PATH, man, echo, printf, script, passwd, uname, who, date, stty, pwd, cd, mkdir, rmdir, ls, cp, mv, rm, cat, more, wc, lp, od, tar, gzip, file handling utilities, security by file permissions, process utilities, disk utilities, networking commands, unlink, du, df, mount, umount, find, unmask, ulimit, ps, w, finger, arp, ftp, telnet, rlogin.Text Processing utilities and backup utilities , tail, head , sort, nl, uniq, grep, egrep, fgrep, cut, paste, join, tee, pg, comm, cmp, diff, tr, awk, cpio

UNIT - II

Introduction to Shells: Linux Session, Standard Streams, Redirection, Pipes, Tee Command, Command Execution, Command-Line Editing, Quotes, Command Substitution, Job Control, Aliases, Variables, Predefined Variables, Options, Shell/Environment Customization. Filters: Filters and Pipes, Concatenating files, Display Beginning and End of files, Cut and Paste, Sorting, Translating Characters, Files with Duplicate Lines, Count Characters, Words or Lines, Comparing Files.

UNIT - III

Grep: Operation, grep Family, Searching for File Content. Sed :Scripts, Operation, Addresses,

commands, Applications, grep and sed. UNIX FILE STRUCTURE: Introduction to UNIX file system, inode (Index Node), file descriptors, system calls and device drivers. File Management :File Structures, System Calls for File Management – create, open, close, read, write, lseek, link, symlink, unlink, stat, fstat, lstat, chmod, chown, Directory API – opendir, readdir, closedir, mkdir, rmdir, umask.

UNIT - IV PROCESS AND SIGNALS:

Process, process identifiers, process structure: process table, viewing processes, system processes, process scheduling, starting new processes: waiting for a process, zombie processes, orphan process, fork, vfork, exit, wait, waitpid, exec, signals functions, unreliable signals, interrupted system calls, kill, raise, alarm, pause, abort, system, sleep functions, signal sets. File locking: creating lock files, locking regions, use of read and write with locking, competing locks, other lock commands, deadlocks.

UNIT - V INTER PROCESS COMMUNICATION:

Pipe, process pipes, the pipe call, parent and child processes, and named pipes: fifos, semaphores: semget, semop, semctl, message queues: msgget, msgsnd, msgrcv, msgctl, shared memory: shmget, shmat, shmdt, shmctl, ipc status commands.

TEXT BOOKS:

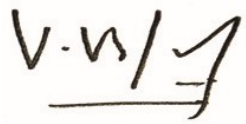
1. W. Richard. Stevens (2005), Advanced Programming in the UNIX Environment, 3rd edition, Pearson Education, New Delhi, India.

2. Unix and shell Programming Behrouz A. Forouzan, Richard F. Gilberg.Thomson

REFERENCES:

1. Linux System Programming, Robert Love, O'Reilly, SPD.

2. Advanced Programming in the UNIX environment, 2nd Edition, W.R.Stevens, Pearson Education. 3. UNIX Network Programming, W.R. Stevens, PHI. UNIX for Programmers and Users, 3rd Edition, Graham Glass, King Ables, Pearson Education



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Machine Learning Lab						MCA 2nd year 1st semester		
Code	Category	Hours / Week			Credits	Marks		
MC312	PC-Lab	L	T	P	C	Internal	End Exam	Total
		0	0	4	2	-	-	100

Course Objectives

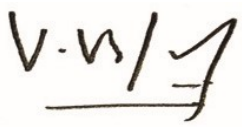
1. To teach the theoretical foundations of various learning algorithms.
2. To train the students better understand the context of supervised andunsupervised learning through real-life examples.
3. To understand the need for Reinforcement learning in real – time problems.
4. Apply all learning algorithms over appropriate real-time dataset.
5. Evaluate the algorithms based on corresponding metrics identified.

Course Outcome

1. At the end of this course, student will be able to:
2. Understand, visualize, analyze and preprocess the data from a real-time source.
3. Apply appropriate algorithm to the data.
4. Analyze the results of algorithm and convert to appropriate information required for the real – time application.
5. Evaluate the performance of various algorithms that could be applied to thedata and to suggest most relevant algorithm according to the environment.

Indicative Experiments

1.	Linear & Multiple Linear Regression
2.	Naïve Bayes classifier
3.	Decision trees – ID3 & CART
4.	Logistic regression
5.	Support Vector Machines – Linear & Non-linear
6.	Single & Multilayer Perceptron
7.	K-NN, K-Means & K-mode clustering
8.	Random – forest
9.	Adaboost, XGboost
10.	Principal component analysis
11.	Self – Organizing maps
12.	Q-Learning



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Python Programming Lab						MCA 2nd year 1st semester		
Code	Category	Hours / Week			Credits			
MC313	Program Core	L	T	P	C	Internal	End Exam	Total
		0	0	4	2	-	-	100

Course Outcomes

At the end of this Python Programming Lab course, students will be able to:

1. Develop programs on data types, operators and expressions
2. Apply the data structures in real time scenarios
3. Write programs on strings and functions
4. Implement programs on class and related concepts
5. Solve various exception handling programs and implement the packages

Week 1

Installation and Environment set up of Python & Programs on Data types

Week 2

Programs on Standard I/O, Operators and Expressions

Week 3

Programs on Functions

Week 4

Programs on lists and Tuples

Week 5

Programs on Dictionaries

Week 6

Programs on Strings and string operations

Week 7

Programs on Regular Expressions

Week 8

Programs on class & object, static and instance method implementation

Week 9

Programs on Inheritance and Polymorphism

Week 10

Programs on Stacks and Queues

Week 11

Programs on Exception Handling, Database Connectivity, Executing queries

Week 12

Demonstration of Numpy Package

Week 13

Demonstration of Pandas Package

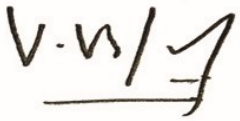
Week 14

Demonstration of Matplotlib Package and Tkinter Package

Week 15

Demonstration of Date and Time Packages

Note: The above experiments are for indicative purposes only. However, the concerned faculty member can add a few more experiments in addition to the existing. In such cases the concerned faculty member should get the syllabus approved by the BoS.



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Web Technologies Lab						MCA 2nd year 1st semester		
Code	Category	Hours / Week			Credits	Marks		
MC314	PE-II Lab	L	T	P	C	Internal	End Exam	Total
		0	0	4	2	-	-	100

Course Outcomes

At the end of this Web Technologies lab course, students will be able to:

1. Design static web pages and validate using java script.
2. Implement database concepts using Mongo DB
3. Create Database and Manipulate data using Mongo DB
4. Deploy web application interfaces
5. Build Dynamic web pages

Week 1

Practice Basic HTML Programs:

1. Basic Tags
2. Lists
3. Tables
4. Frames
5. Forms
6. Div and Span

Week 2

Design the following static web pages required for online book store application.

1. Registration page
2. Login page
3. User profile page
4. Shopping page
5. Catalog page

Apply internal and external CSS (Cascading Style Sheets) for Online book store application.

Week 3 – JavaScript

Implement Alert Box, Confirm Box, Prompt Box. & Control Structures, Conditional Statements using Javascript.

Week 4

Write JavaScript to validate the following fields of registration page [Book Store Application]: Username Field, Password Field, Phone Number Field, Email-id.

Week 5, 6 & 7: Node JS Introduction

Data Visualization

Events and Streams

Week 7, 8 & 9: Express JS Introduction, Setup, Routing

Template Engines, Express JS security

Week 10, 11: Mongo DB Introduction to Open Source database tools - Mongo DB/ No SQL.

CRUD Operations in Mongodb

Introduction to Mongoose and Core Operations of

MongoosWorking with hooks

Week 12, 13 & 14: Angular JS Typescript

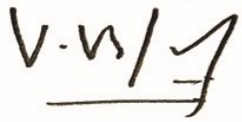
Power types

Functions, Classes and interfaces

Week 15 Recap

Week 16 Review.

Note: The above experiments are for indicative purposes only. However, the concerned faculty member can add a few more experiments in addition to the existing. In such cases the concerned faculty member should get the syllabus approved by the BoS.



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Linux Programming Lab						MCA 2nd year 1st semester		
Code	Category	Hours / Week			Credits			
MC315	PE-II Lab	L	T	P	C	Internal	End Exam	Total
		0	0	4	2	-	-	100

Prerequisites

Basic Computer fundamentals

Course Objectives

1. To gain an understanding of important aspects related to the Linux Commands.
2. To understand directory commands.
3. To provide a comprehensive introduction to SHELL programming.
4. To understand file handling utilities
5. To develop ability to use system calls.

Course Outcomes

1. Apply the basic commands in Linux Operating System.
2. Create directories and Shell Script programs.
3. Analyze a given problem and apply requisite facets of Shell programming.
4. Demonstrate UNIX commands for file handling mechanisms.
5. Develop a C Program for UNIX Commands.

Week 1

Practice Vi Commands

Week 2

Open the file created in session 1
Add some text
Change some text
Delete some text Save
the Changes

Week 3

a) Create mytable (name of the table) using cat command for the following data. use tabto separate fields.

1425 Ravi 15.65
4320 Ramu 26.27
6830 Sita 36.15
1450 Raju 21.86

b) Use the cat command to display the file, mytable.

c) Use the vi command to correct any errors in the file, mytable.

Week 4

a) Use the sort command to sort the file mytable according to the first field. Call the sortedfile mytable (same name)

b) Print the file mytable

c) Use the cut and paste commands to swap fields 2 and 3 of mytable. Call it my table(same name)

d) Print the new file, mytable

e) Logout of the system.

Week 5

a) Use the appropriate command to determine your login shell

b) Use the /etc/passwd file to verify the result of "step a".

c) Use the who command and redirect the result to a file called myfile1. Use the more command to see the contents of myfile1.

d) Use the date and who commands in sequence (in one line) such that the output of date will display on the screen and the output of who will be redirected to a file called myfile2.

Use the more command to check the contents of myfile2.

Week 6

a) Write a sed command that deletes the first character in each line in a file.

b) Write a sed command that deletes the character before the last character in each linein a file.

c) Write a sed command that swaps the first and second words in each line in a file.

Week 7

a) Pipe your /etc/passwd file to awk, and print out the home directory of each user.

b) Develop an interactive grep script that asks for a word and a file name and then tells how many lines contain that word.

Week 8

a)Write a shell script that takes a command –line argument and reports on whether it is directory, a file, or something else.

b) Write a shell script that accepts one or more file name as arguments and converts all ofthemo uppercase, provided they exist in the current directory.

c) Write a shell script that determines the period for which a specified user is working onthe System.

Week 9

a) Write a shell script to perform the following string operations:

i) To extract a sub-string from a given string.

ii) To find the length of a given string.

b) Write a shell script that accepts a file name starting and ending line numbers as arguments and displays all the lines between the given line numbers.

c) Write a shell script that deletes all lines containing a specified word in one or more filessupplied as arguments to it.

Week 10

a) Write a shell script that computes the gross salary of a employee according to the following rules:

i) If basic salary is < 1500 then HRA =10% of the basic and DA =90% of the basic.

ii) If basic salary is >=1500 then HRA =Rs500 and DA=98% of the basicThe basic salary is entered interactively through the key board.

b) Write a shell script that accepts two integers as its arguments and compute the valueof first number raised to the power of the second number

Week 11

a) Write an interactive file-handling shell program. Let it offer the user the choice of copying, removing, renaming, or linking files. Once the user has made a choice, then program ask the user for the necessary information, such as the file name, new name and so on.

Week 12

a) Write shell script that takes a login name as command – line argument and reports when that person logs in

b) Write a shell script which receives two file names as arguments. It should check whether the two file contents are same or not. If they are same then second file shouldbe deleted.

Week 13

a) Write a shell script that displays a list of all the files in the current directory to which the user has read, write and execute permissions.

b) Develop an interactive script that ask for a word and a file name and then tells howmany times that word occurred in the file.

Week 14

Write a C program that takes one or more file or directory names as command line input and reports the following information on the file:file type

i) Number of links

ii) Read, write and execute permissions

iii) Time of last access

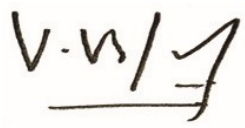
(Note: Use stat/fstat system calls)

Week 15

Review

Text Books

1. Unix concepts and applications, Fourth Edition, Sumitabha Das, TMH
2. Introduction to UNIX & SHELL programming, M.G. Venkatesh Murthy, PearsonEducation.



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Syllabus of MCA 4th Semester

Fundamentals of Cyber Security						MCA 2nd year 2nd semester		
Code	Category	Hours / Week			Credits	Marks		
MC401	Professional Elective-III	L	T	P	C	Internal	End Exam	Total
		4	0	0	4	-	-	100

Course Objectives

Course Objectives of Fundamentals of Cyber Security are to:

1. Summarize major types of cyber-attacks.
2. Discuss computer malware programs and their impact on the world.
3. Elaborate firewall and password management.
4. Describe major cyber-security prevention mechanisms.
5. Outline Cyber-Security aspects of wireless networks and routers.

Course Outcomes

At the end of this Fundamentals of Cyber Security course, students will be able to:

1. Analyze the cyber security needs of an organization.
2. Design operational and strategic cyber security strategies and policies.
3. Demonstrate various network security applications.
4. Analyze software vulnerabilities and security solutions to reduce the risk of exploitation.
5. Design and develop a security architecture for an organization.

UNIT I

Introduction to Cyber Security Basics, Importance of Cyber Security, Cyber- attacks, objectives of cyber- attacks, Types of Cyber-attacks, Denial of Service (DoS), Distributed Denial of Service (DDoS), Man-in- the-Middle (MITM) Attacks, Crypto jacking, SQL Injection, Spamming, Cyber-terrorism, Digital Property Misappropriation, zero-day exploitation, phishing, digital vandalism, cyber-stalking, cyber frauds and forgery.

UNIT II

Introduction to Cyber-attacks and their impact, Equifax Data Theft, VPNFilter Cyber- attack, WannaCry Ransom Attack, Peta Cyber-attack, US Election Manipulation, Power Grid Hacking, Shadow Network attack, GitHub DDoS Attack, Under Armor Account Hacking, Types of Computer Malware, Viruses, Trojan Horse, Rootkit, Spyware, Worms, Adware, Scare-ware, Browser Hijacker.

UNIT III

Introduction to Computer Security, Firewall Settings, Antivirus Software, Anti-Spyware Software, Anti-

Spam Software, Security Updates, Secure Browsing Settings, Scan Devices before Data Transfer, Social Engineering Attack Precautions. Password Management, Basics of Passwords, Threats to Passwords, Good and Bad about Passwords, Hacking Password, Effective Password Management, Creating and Managing Secure Passwords, Strong Password, Use of Biometrics, Two-Factor Authentication, Multi- Factor Authentication, Password Manager Tools.

UNIT IV

Prevention from Cyber-attacks, Algorithms and Techniques, Cyber-attack Detection, Cyber-attack Prediction, Cyber-attack Prevention , Firewalls, Activating Windows Firewall, Windows 10 firewall, Windows 7 firewall, Enabling Windows 7 firewall, Enabling Windows firewall service, Traffic Issues and rules , firewall settings, Intrusion Detection/Prevention Systems, Intrusion Detection System (IDS) , Intrusion Prevention System (IPS),,Authentication Using Hash, Message Digest , Secure Hash Algorithm ., Multi-Factor Authentication, Activating Two-Factor Authentication, Creating Application Specific Passwords , What If Your Phone with All Apps Enabled Is Lost?, Mac Computer Firewall Configuration, Virtual Private Network.

UNIT V

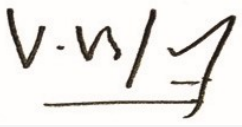
Introduction to Wireless Security, LAN Vulnerabilities, Reconnaissance Vulnerability, Resource Stealing and Invasion, Rogue Access Points (APs), STA and AP Plain Text Transaction, Denial of Service (DoS),Default AP Configuration, Rogue Insiders, Protocol Vulnerabilities, Ad Hoc Network Mode Security Problems ,Wireless WAN Vulnerabilities ,IoT Vulnerabilities, Wireless Network Security Measures, Modify Default Configuration, Wireless Router Location, Update Router Software, Stronger Encryption Algorithms, MAC Address Filtering ,Useful Tips on Safe Use of Wireless Network.

Text Book

1. Dr Kutub Thakur Dr Al-Sakib Khan Pathan, Cyber-security Fundamentals Real-World Perspective, firstedition published 2020 by CRC Press, © 2020 Taylor & Francis Group, LLC.

Reference Books

1. Rajkumar Singh Rathore, Aatif Jamshed, Mayank Bhusan, Fundamental of Cyber Security Principlesand Theory and Practices, BPB Publications, 01-Jun-2018.
2. J. Pieprzyk, T. Hardjono and J. Seberry, Fundamentals of computer security, Springer, 2003.



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Data Science						MCA 2nd year 2nd semester		
Code	Category	Hours / Week			Credits	Marks		
MC402	Program Core	L	T	P	C	Internal	End Exam	Total
		3	0	0	3	-	-	100

Course Objectives

Course Objectives are to:

1. Summarize the concepts of Data science
2. Outline various steps involved in Data science
3. Discuss data collection and manipulation methods in Data science
4. Describe how to handle categorical and time series data
5. Compare various methodologies in data visualization

Course Outcomes

1. Discuss data science concepts and Process
2. Handle large data in Single Computer
3. Manipulate large data using Python Programming language
4. Analyze large categorical and time series data
5. Create dashboards to display the data using visualization

UNIT I

Data science in a Big Data World: Benefits and uses of data science and big Data-Facets of data-The data science process-The big data ecosystem and data science. The data science process-Overview of the data science process-Steps: Defining research goals and creating-- Retrieving data. [TB:1, CH:1]

UNIT II

Handling Large Data on a Single Computer: The problem in handling large data-General techniques for handling large volumes of data-General programming tips for dealing with large data sets-Case Studies. [TB:1, CH:2,4]

UNIT III

Data Manipulation with Pandas: Introducing Pandas Objects- Data Indexing and Selection- Operating on Data in Pandas- Handling Missing Data- Hierarchical Indexing- Combining Datasets: Concat and Append-Combining Datasets: Merge and Join- Aggregation and Grouping. [TB:2, CH:3]

UNIT IV

Data Manipulation with Pandas: Pivot Tables- Vectorized String Operations- Working with Time Series-High-Performance Pandas: eval () and query (). [TB:2, CH:3]

UNIT V

Visualization with Matplotlib: Simple Line Plots- Simple Scatter Plots- Visualizing Errors- Density and

Contour Plots- Histograms, Binnings, and Density- Customizing Plot Legends- Customizing Colorbars- Multiple Subplots- Text and Annotation- Customizing Ticks- Customizing Matplotlib: Configurations and Stylesheets- Three-Dimensional Plotting in Matplotlib- Geographic Data with Basemap. [TB:2, CH:4]

Text Books

1. Davy Cielen, Arno d. B. Meysman, Mohamed Ali, Introduction to Data Science, Manning Publications,2016.
2. Jake Vanderplas, Python Data science Hand Book, O'Reilly, 2017.

Reference Books

1. Cathy O'neil, Rachel Schutt, Doing Data Science, straight talk from the frontline, O'Reilly, 2013
2. Jure Leskovek, Anand Rajaraman, Jeffry Ullman, Mining of Massive datasets, V2.1, CambridgeUniversity Press, 2014.
3. Joel Grus, Data Science from Scratch: First Principles with Python, first edition, O'Reilly, 2015.

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http://bigdata-madesimple.com/3-effective-methods-of-data-collection-for-market-research/
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https://www.allerin.com/blog/top-5-sources-of-big-data

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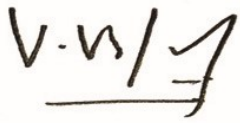

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Block Chain Technology						MCA 2nd year 2nd semester		
Code	Category	Hours / Week			Credits	Marks		
MC403	Professional Elective-III	L	T	P	C	Internal	End Exam	Total
		4	0	0	4	-	-	100

Course Objectives

Course Objectives of Block Chain Technology are to:

1. Identify different components and types of Blockchain
2. Apply Ethereum tool for application development
3. Interpret various components of DApps and multichain
4. Summarize the architecture of Hyperledger Fabric
5. Analyze the impact of Blockchain in business

Course Outcomes

At the end of this Block Chain Technology course, students will be able to:

1. Summarize types and applications of Blockchain
2. Design and deploy smart contract through Ethereum
3. Apply DApps through Truffle IDE
4. Apply Hyper Ledger Fabric model in different Networks
5. Categorize different Business Applications of Blockchain

UNIT I

What is Blockchain: Definition, history, Digital Money to Distributed Ledgers
Why Blockchain: Properties of Blockchain, Requirements for consensus protocols, Proof of Work (PoW), Proof of Stake (PoS), Zero Knowledge Proofs, Byzantine Models, hashing, Merkle Tree, Gas Limit, Transactions and Fee, Anonymity, Reward, Chain Policy, Life of Blockchain application, Soft & Hard Fork, Types of Blockchain.

UNIT II

Ethereum Solidity: Introduction, Datatype, operator, enum, arrays, loops, Mapping, Structure, State Modifiers, Exception Handling in Solidity, Inheritance, Events, Self-Destruction, ERC Tokens, Constructors, Libraries, Compile and Deploy the Smart Contract.

UNIT III

Truffle IDE: Creating user interface, textboxes, radio buttons, drop down list, developing a DApp, Publish the DApp Connecting to DApp, truffle migrate, truffle test.
Multichain: Chain code (go) and Multi Chain, Privacy and Permissions in Multi Chain, Mining in Multi Chain, Multiple configurable Blockchains using Multi Chain, Setting up a Private Blockchain, Blockchain Bytes

UNIT IV

Hyperledger (go Lang): Introduction, architecture, Consensus, API, frameworks, setting up Development Environment using Composer, Developing and Testing business networks, Hyperledger Fabric Model Various ways to create Hyperledger Fabric Blockchain Network

UNIT V

Blockchain transforming business, Blockchain in governance.

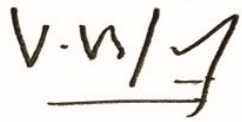
Case Studies: Supply chain management, real estate, healthcare, Government sectors, bitcoin.

Text Book

1. Josh Thompson, 'Blockchain: The Blockchain for Beginnings, Guide to Blockchain Technology and Blockchain Programming', Create Space Independent Publishing Platform, 2017

Reference Books

1. Chandramouli Subramanian,Asha A George,Abhilash K A and Meena Karthikeyan, BlockchainTechnology, Published by University Press
2. Philipp Hacker, Ioannis Lianos, Regulating Blockchain: Techno-Social and Legal Challenges, OUP Oxford. (ISBN-13: 978-0198842187), 2019
3. Mastering Bitcoin: Unlocking Digital Cryptocurrencies, by Andreas Antonopoulos Blockchain by Melanie Swa, O'Reilly
4. Hyperledger Fabric - https://www.hyperledger.org/projects/fabric
5. Zero to Blockchain - An IBM Redbooks course, by Bob Dill, David Smits - https://www.redbooks.ibm.com/Redbooks.nsf/RedbookAbstracts/crse0401.html.



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Deep Learning						MCA 2nd year 2nd semester		
Code	Category	Hours / Week			Credits	Marks		
MC404	Professional Elective-III	L	T	P	C	Internal	End Exam	Total
		4	0	0	4	-	-	100

Course Objectives

1. To introduce the fundamental theory and concepts of machine learning and artificial intelligence.
2. To provide a comprehensive foundation to artificial neural networks, neuro-modeling, and their applications to pattern recognition.
3. To explore the learning paradigmsof supervised and unsupervised shallow/deep neural networks.
4. To provide exposure to the recent advances in the field of and facilitate in depth discussions on chosen topic
5. To impart adequate knowledge on deep learning frameworks and their applications to solving engineering problems

Course Outcomes

1. Gain knowledge about basic concepts of machine learning algorithms and identify machinelearning techniques suitable for the given problem.
2. Understand the differences between shallow neural networks and deep neural networks forsupervised and unsupervised learning.
3. Develop and train neural networks for classification, regression and clustering.
4. Understand the foundations of neural networks, how to build neural networks and learn how to leadsuccessful machine learning projects.
5. Identify the deep feed forward, convolution and recurrent neural networks which are more appropriate for various types of learning tasks in various domains Implement deep learning algorithm and solve real world problems

Module:1 Foundations of Machine Learning-I

Supervised and unsupervised learning, parametric vs non-parametric models, parametric models for classification and regression- Linear Regression, Clustering-distance based- K-means, density based, association rule mining, validation techniques- cross validations, feature selection and dimensionality reduction, principal component analysis-Eigenvalues, Eigen vectors, Orthogonality-challenges motivating deep learning

Module:2 Neural Networks for Classification and Regression

ANN as a technique for regression and classification, structure of an artificial neuron, activation functions- linear activation, sigmoid and softmax. Feedforward neural networks- shallow model-single layer perceptron, multi-layer perceptron as complex decision classifier- learning XOR-Gradient based learning, Backpropagation algorithm, risk minimization, loss function, regularization, heuristicsfor faster training and avoiding local minima.

Module:3 Deep Feed Forward Neural Networks

Feed forward neural networks- deep model- output units and hidden units, training

deep models- hyper parameters and validation sets-cross validation, capacity, overfitting and under fitting, bias vs variance trade off, cross validation - vanishing gradient problem, new optimization methods (adagrad, adadelta, rmsprop, adam), regularization methods (dropout, batch normalization, dataset augmentation), early stopping.

Module:4 Convolutional Neural Networks

Convolution operation- kernel and feature map, sparse connectivity, equivariance through parameter sharing, pooling function for invariant representation, convolution and pooling as strong prior, convolution with stride, effect of zero padding, single-channel and multi-channel data types used in ConvNet, variants of basic convolution- locally connected, tiled ConvNet- spatial separable and depthwise separable convolutions, fully connected layers, ConvNet architecture-layer patterns, layer sizing parameters,case studies- - LeNet, AlexNet

Module:5 Recurrent Neural Networks

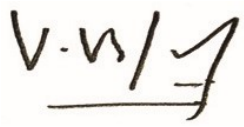
Sequence learning with neural nets, unrolling the recurrence, training RNN-Back projection through time (BPTT), vanishing gradient problem, Gated recurrent unit (GRU), Long short term memory (LSTM), Bidirectional LSTMs, bidirectional RNNs

Text Book(s)

1. Bengio, Yoshua, Ian J. Goodfellow, and Aaron Courville. "Deep learning" 2015, MlTPress
2. Josh Patterson and Adam Gibson, “Deep Learning- A Practitioner’s Approach”O’Reilly Media Inc., 2017, USA.

Reference Books

1. Bishop, C. ,M., Pattern Recognition and Machine Learning, Springer, 2011
2. Rich E and Knight K, “Artificial Intelligence”, 2011, 2nd ed., TMH, New Delhi,
3. Bengio, Yoshua. "Learning deep architectures for AI- Foundations and trends inMachine Learning, 2(1)- 2009
4. Tom M. Mitchell, “Machine Learning”, McGraw-Hill Education (India) Pvt Ltd, 2013.



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Professional Ethics						MCA 2nd year 2nd semester		
Code	Category	Hours / Week			Credits	Marks		
MC405	Open Elective-III (MOOCS)	L	T	P	C	Internal	End Exam	Total
		4	0	0	4	-	-	100

Course Outcomes

At the end of this course, students will be able to:

1. Understand the core values that shape the ethical behaviour of a professional.
2. Adopt a good character and follow an ethical life.
3. Explain the role and responsibility in technological development by keeping personal ethics and legalethics.
4. Solve moral and ethical problems through exploration and assessment by established experiments.
5. Apply the knowledge of human values and social values to contemporary ethical values and globalissues.

UNIT I

Human Values. Morals, values and Ethics – Integrity- Academic Integrity-Work Ethics- Service Learning- Civic Virtue- Respect for others- Living peacefully- Caring and Sharing- Honestly- courage-Cooperation commitment- Empathy-Self Confidence -Social Expectations.

UNIT II

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

UNIT III

Engineering as social Experimentation. Engineering as Experimentation – Engineers as responsible Experimenters- Codes of Ethics- Plagiarism- A balanced outlook on law - Challenges case study- Bhopalgas tragedy.

Responsibilities and Rights. Collegiality and loyalty – Managing conflict- Respect for authority- Collective bargaining- Confidentiality- Role of confidentiality in moral integrity-Conflicts of interest- Occupational crime- Professional rights- Employee right- IPR Discrimination.

UNIT V

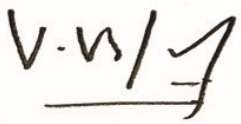
Global Ethical Issues. Text Book Reference Books Multinational Corporations- Environmental Ethics- Business Ethics- Computer Ethics -Role in Technological Development-Engineers as Managers- Consulting Engineers- Engineers as Expert witnesses and advisors-Moral leadership.

Text Book

1. M Govindarajan, S Natarajan and V S Senthil Kumar, Engineering Ethics, PHI Learning Private Ltd,New Delhi,2012.
2. R S Naagarazan, A text book on professional ethics and human values, New age international (P)limited, New Delhi,2006.

Reference Books

1. Mike W Martin and Roland Schinzinger, Ethics in Engineering,4th edition, Tata McGraw Hill PublishingCompany Pvt Ltd, New Delhi,2014.
2. Charles D Fleddermann, Engineering Ethics, Pearson Education/ Prentice Hall of India, NewJersey,2004.
3. Charles E Harris, Michael S Protchard and Michael J Rabins, Engineering Ethics- Concepts and cases,Wadsworth Thompson Learning, United states,2005.
4. http://www.slideword.org/slidestag.aspx/human-values-and-Professional-ethics.



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Accounting and Financial Management						MCA 2nd year 2nd semester		
Code	Category	Hours / Week			Credits	Marks		
MC406	Open Elective-III (MOOCS)	L	T	P	C	Internal	End Exam	Total
		4	0	0	4	-	-	100

Course Outcomes

At the end of this course, students will be able to:

1. Prepare simple Financial Statements of non-company forms of organizations
2. Interpret the financial information from the published Annual financial statements
3. Comment on and evaluate the financial performance with the help of Financial Ratios
4. Analyse the Relationship between Cost-Volume- Profit and carry out simple break-even analysis
5. Familiarize with the preparation of simple budgets and prepare simple budgetary control reports.

UNIT I

Financial Accounting information systems: Concepts of Accounting equation, Owner's equity. Transactions affecting the Owner's equity. Accounting concepts and conventions.

UNIT II

Accounting Cycle- Preparation of Journal, Ledger, Posting, Balancing of Accounts, Trial Balance, and Preparation of Final Accounts (simple numerical problems).

UNIT III

Analysis and Interpretation of Financial Statements: Preparation of common-size statements, Vertical and Horizontal analysis. Financial Ratio Analysis: Computation of simple ratios covering Liquidity, profitability, Leverage and Ratios.

UNIT IV

Cost Accounting Information systems: Basic Cost concepts: Total costs, Unit costs, Fixed Costs, Variable costs, Differential costs. Break-even analysis and short-run decision making Make or Buy, Add or drop a product decision.

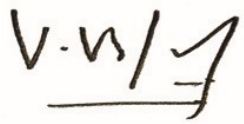
Budgets and Budgetary controls: Preparation of Sales, Production, Production cost, Material and Labour budgets. Preparation of fixed and variable budgets. Preparation of Budgetary reports.

Text Book

1. Narayana Swamy, Financial Accounting- A managerial Perspective, 7 Edition, Prentice- Hall Of India,New Delhi, 2017

References

1. Charles Horngren et al, Cost Accounting- A Managerial Emphasis, 16 edition, Pearson, 2017
2. Robert M Anthony David Hawkins, Kenneth, Accounting for Management, 13 e, McGrawHill, 2017.



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Entrepreneurship Development						MCA 2nd year 2nd semester		
Code	Category	Hours / Week			Credits	Marks		
MC407	Open Elective-III	L	T	P	C	Internal	End Exam	Total
		3	0	0	3	-	-	100

Course Objectives

The objective of this course is to familiarize the student with entrepreneurship, the issues involved in it, the potential of entrepreneurship and intrapreneurship, the legal environment and statutory issues and explore various funding opportunities.

Course Outcomes

At the end of this Entrepreneurship Development course, students will be able to:

1. Interpret the concepts of Entrepreneurship and Intrapreneurship.
2. Apply the opportunity identification techniques
3. Differentiate needs of different segments
4. Develop business model and MVP
5. Recognize organizational forms, IPR concerns and funding opportunities for startups.

UNIT I

Introduction to Entrepreneurship: Entrepreneurship and Intrapreneurship, Business Incubators, Rural entrepreneurship, Social Entrepreneurship, women entrepreneurs, Role of entrepreneurs in economic development, Types of entrepreneurs. Entrepreneurial mind set and stress, Causes of failure.

UNIT II

Opportunity identification: Myths and realities of entrepreneurship, Opportunity identification, Problem worth solving, idea generation techniques, Design thinking.

UNIT III

Customer analysis: Market segmentation, consumer persona, Product market fit, Unique Value proposition.

UNIT IV

Business model and MVP: Business model canvas, MVP, Risks and assumptions, Importance of financial planning.

UNIT V

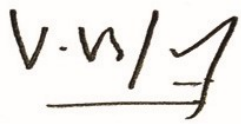
Organizational forms Funding Opportunities: Organizational forms - Partnership, Sole proprietorship, Corporation. Intellectual Property Rights - Copyrights, Trademarks, Patents. Law Vs. Ethics, Informal capital- Friends and Family, Angels, Venture Capitalists, Idea/ Patent, Growth strategies.

Text Books

1. Vasant Desai, YayatiNayak, Entrerpreneurship, Himalaya Publishing House, 2018.
2. D.F.Kuratko and T.V.Rao Entrepreneurship, Cengage Learning, 2012.

Reference Books

1. Dhruv Nath, Sushanto Mitra, Funding Your Startup: And Other Nightmares, 2020.
2. Rajeev Roy, Entrepreneurship, Oxford University Press, 2/e, 2012.
3. V Srinivasa Rao, Lean Digital Thinking: Digitalizing Businesses in a New World Order, BloomsburyIndia, 2021.
4. S.K.Mohanty, Fundamentals of Entrepreneurship, PHI, 1/e, 2005.
5. MOOCS by Wadhwani Foundation.



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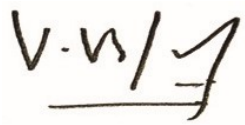
MC409 missing

Major Project						MCA 2nd year 2nd semester		
Code	Category	Hours / Week			Credits			
MC409	Project	L	T	P	C			
		0	0	24	12			



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