POSTGRADUATE DEGREE PROGRAM

Master of Computer Application

University of Technology

Vatika Road, Jaipur Rajasthan 303903

UNIVERSITY OF TECHNOLOGY, JAIPUR
MCA

Program Outcomes (POs)

PO 1 :	Fundamental Knowledge: Apply knowledge of computing fundamentals, mathematics, and domain-specific principles to solve complex problems.
PO 2 :	Problem Analysis: Analyze and define computing requirements for the solution of a given problem..
PO 3 :	Design and Development: Design, develop, and implement software applications using appropriate programming languages and methodologies.
PO 4 :	Database Management: Utilize database management systems for data storage, retrieval, and manipulation.
PO5 :	Web Development: Create and maintain dynamic web applications using contemporary web technologies
PO 6:	Networking Concepts: Understand and apply basic networking concepts and protocols in practical scenarios.
PO 7:	Software Testing: Conduct testing and debugging of software applications to ensure functionality and quality.
PO 8:	Ethical Practices: Recognize and apply ethical practices in computing, including security, privacy, and intellectual property considerations.
PO 9:	Communication Skills: Communicate effectively in written and verbal forms with diverse audiences.
PO 10:	Team Collaboration: Work collaboratively in teams, demonstrating leadership and interpersonal skills.
PO 11:	Emerging Technologies: Stay updated on current trends and emerging technologies in the field of computer applications.
PO 12:	Project Management: Understand project management principles and apply them in software development projects.

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Program Specific Outcomes (PSOs)

PSO 1	Application Development: Design and implement robust software applications using various programming languages and development tools.
PSO 2	Data Analysis: Analyze and interpret data using database management systems, and apply relevant techniques for data handling.
PSO 3	Web Technologies: Develop responsive and interactive web applications using front-end and back-end technologies.
PSO 4	Mobile Application Development: Create mobile applications using modern frameworks and tools suitable for different platforms.
PSO 5	Cybersecurity Practices: Understand and implement fundamental cybersecurity practices to protect information systems from threats.

Program Education Outcomes (PEOs)

PEO 1 :	Technical Competence: Graduates will possess a strong foundation in computer science concepts and practical skills, enabling them to develop and maintain software applications effectively.
PEO 2 :	Problem-Solving and Innovation: Graduates will exhibit critical thinking and creativity in analyzing and solving complex problems using technological solutions.
PEO 3 :	Communication and Teamwork: Graduates will demonstrate effective communication skills and the ability to work collaboratively in diverse teams within professional environments..
PEO 4 :	Ethical Awareness: Graduates will understand the ethical implications of technology use and practice responsible behavior in their professional endeavors.
PEO 5:	Lifelong Learning: Graduates will be committed to continuous learning and professional development to adapt to changing technologies and industry trends

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MCA . 1st Semester Scheme

Sr. No.	Subject Name	Subject Code	Subject Type	Credit Point	Tot. Max Marks	Int. Min Marks	Int. Max Marks	Ext. Min Marks	Ext. Max Marks
1	Mathematical Foundations in Computer Science	MCA 101	Theoretical	3	100	12	30	28	70
2	Object Oriented Programming with C++	MCA 102	Theoretical	3	100	12	30	28	70
3	Operating System	MCA 103	Theoretical	3	100	12	30	28	70
4	Computer Architecture	MCA 104	Theoretical	3	100	12	30	28	70
5	Database Systems	MCA 105	Theoretical	3		12	30	28	70
6	Web Technologies	MCA 106	Theoretical	3	100	12	30	28	70
1	Object Oriented ProgrammingLab	MCA 151	Practical	3	100	12	30	28	70
2	SQL-PL/SQL Lab	MCA 152	Practical	3	100	12	30	28	70
3	Web Technologies Lab	MCA 153	Practical	3	100	12	30	28	70
	SODECA			2	100				
				23	**1000**	**108**	**270**	**252**	**630**

MCA Year 1 Semester I-BRIDGE COURSE
Theory

Sr. No.	Subject Name	Subject Code	Subject Type	Credit Point	Tot. Max Marks	Int. Min Marks	Int. Max Marks	Ext. Min Marks	Ext. Max Marks
1	Fundamentals of Computer Science	MCA BOO1	Theoretical	3	100	0	0	40	100

MCA Year 1 Semester I-BRIDGE COURSE
Practical

Sr. No.	Subject Name	Subject Code	Subject Type	Credit Point	Tot. Max Marks	Int. Min Marks	Int. Max Marks	Ext. Min Marks	Ext. Max Marks
1	C Programming Lab	MCA BOO2	Practical	2	100	0	0	40	100

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MCA 1st Semester
Course Code: MCA 101
Course Tittle: Mathematical Foundation in Computer Science

Course Objective:

1	Use mathematically correct terminology and notation.
2	Construct correct direct and indirect proofs.
3	. Use division into cases in a proof.
4	Use counterexamples.
5	Apply logical reasoning to solve a variety of problems..

Couse Outcomes

CO 1 For a given logic sentence express it in terms of predicates, quantifiers, and logical connectives

CO 2 For a given a problem, derive the solution using deductive logic and prove the solution based on logical inference.

CO 3 For a given a mathematical problem, classify its algebraic structure.

CO 4 Evaluate Boolean functions and simplify expressions using the properties of Boolean algebra

CO 5 Develop the given problem as graph networks and solve with techniques of graph theory..

COs and POs Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	-	-	-	-	-	-	-	-	-
CO2	3	2	2	-	-	-	-	-	-	-	-	-
CO3	3	3	2	-	-	-	-	-	-	-	-	1
CO4	3	2	3	1	2	-	-	-	-	-	-	2
CO5	2	2	3	1	2	-	-	-	-	-	-	2

UNIVERSITY OF TECHNOLOGY, JAIPUR
MCA

MCA 1st Semester
Course Code: MCA 101

Course Tittle: Mathematical Foundation in Computer Science

Syllabus

Credit: 3 **Max. Marks: 100**
40-44 Hours **End Term Exam: 3 Hours**

SN	CONTENTS
1	**Matrices:** Introduction, Rank of Matrix, Solving System of Equations, Inverse of a Matrix, Set theory, Principle of inclusion and exclusion, partitions, Permutation and Combination, Relations, Properties of relations, Matrices of relations, Closureoperations on relations, Functions-injective, subjective and objective functions.
2	**Probability:** Probability Classical, relative frequency and axiomatic definitions of probability, addition rule and conditional probability, multiplication rule, total probability, Bayes' Theorem and independence problems. Introduction to Statistics- Population, Sample, Variable, Descriptive Statistics-Mean, Mode, Median, Measures of Spread-Range, Inter Quartile Range, Variance, Standard Deviation
3	**Spreadsheet Applications** - Introduction to spreadsheet software - Basic functions and formulas - Data manipulation: sorting, filtering, and conditional formatting - Advanced functions: VLOOKUP, pivot tables, charts
4	**Data Representation:** Data Representation - Floating point Arithmetic – Addition, Subtraction, Multiplication and Division operation. Pitfall of floating point representation, Errors in numerical computation Iterative Methods, Measurement of Accuracy by using Absolute Error and Relative Error
5	**Graphs & Trees:** Basic Concepts of Graphs, Sub graphs, Matrix Representation of Graphs: Adjacency Matrices, Incidence Matrices, Isomorphic Graphs, Paths and Circuits, Eulerian and Hamiltonian Graphs, Multigraphs, Planar Graphs, Euler'sFormula, Spanning Trees

Text/Reference Books

SN	Name of Books with Author
1	A.Tamilarasi&A.M.Natarajan, "Theory of Automata and Formal Languages", New Age International Pvt. Ltd Publishers, 2008.
2	David Makinson, "Sets, Logic and maths for Computing", Springer Indian Reprint, 2011.
3	Edgar Goodaire ,"Discrete Mathematics with Graph Theory" Pearson Education

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MCA 1st Semester
Course Code: MCA 102
Course Tittle:Object Oriented Programming with c++

Course Objective:

1	Learn the basics of object oriented programming
2	Study Java I/O mechanisms
3	Explore Java API.
4	Develop graphics based Java programs
5	Learn swing framework

Couse Outcomes

CO 1 Explain OOPs features and concepts.

CO 2 Write basic Java programs

CO 3 Write I/O programs in Jav

CO 4 Use various built-in Java classes and methods

CO 5 Create window based Java programs.

COs and POs Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	-	-	-	-	-	-	-	-	-
CO2	3	2	-	2	-	-	-	-	-	-	-	-
CO3	2	3	2	-	-	-	-	-	-	-	-	-
CO4	3	2	3	1	-	-	-	-	-	-	-	-
CO5	2	2	2	-	1	-	-	-	-	-	-	-

UNIVERSITY OF TECHNOLOGY, JAIPUR
MCA

MCA 1st Semester
Course Code: MCA 102
Course Tittle :Object Oriented Programming with c++

Syllabus

Credit: 3 **Max. Marks: 100**
40-44 Hours **End Term Exam: 3 Hours**

SN	CONTENTS
1	**OOP Paradigm:** Characteristics of OOP, Comparison between functional programming and OOP approach, characteristics of object oriented language - objects, classes, inheritance, reusability, user defined data types, polymorphism, overloading
2	**Introduction to C++:** Identifier and keywords, constants, C++ operators, type conversion, Variable declaration, statements, expressions, input and output, conditional expression loop statements, break control statements, Classes, member functions, objects, arrays of class objects, pointers and classes, nested classes, constructors, destructors Inline member functions, static class member, friend functions, and dynamic memoryallocation.
3	**Polymorphism and Inheritance**: Function overloading, operator overloading, polymorphism, early binding, polymorphism with pointers, virtual functions, late binding, pure virtual functions. Single inheritance, types of inheritance, types of base classes, types of derivations, multiple inheritances, container classes, member access control.
4	**Exceptions and Templates**: Exception Syntax, Multiple Exceptions, Function Templates, Function Templateswith multiple argument templates.
5	**File Handling in C++:** C++ Streams, Console Stream Classes, Formatted And Unformatted Console I/O Operations, manipulators, File Streams, Classes File Modes, File Pointers andManipulations File I/O

Text/Reference Books

SN	Name of Books
1	Kamthane," Object Oriented Programming with ANSI and Turbo C++", Pearson Education, 2006
2	Andrei Alexandrescu," Modern C++ Design: Generic Programming and Design Patterns Applied "
3	Robert Lafore," Object Oriented Programming in C++ ",4th Edition, 2002

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MCA 1st Semester
Course Code: MCA 103
Course Tittle: Operating System

Course Objective:

1	To understand the fundamental concepts and functions of operating systems.
2	To learn about process management, scheduling algorithms, and inter-process communication.
3	To explore memory management techniques, including paging and segmentation.
4	To examine file system organization and management.
5	To discuss security and protection mechanisms within operating systems.

Couse Outcomes

CO 1 Explain the fundamental concepts and architecture of operating systems.

CO 2 Analyze process management and scheduling algorithms.

CO 3 Evaluate memory management techniques and their implementations.

CO 4 Describe file system structures and management processes.

CO 5 Discuss security issues and protection mechanisms in operating systems.

COs and POs Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	-	-	-	-	-	-	-	-	-
CO2	3	3	2		-	-	-	-	-	-	-	-
CO3	3	2	2	1	-	-	-	-	-	-	-	-
CO4	2	2	2	3	-	-	-	-	-	-	-	-
CO5	2	2	3	1	2	-	-	-	-	-	-	-

UNIVERSITY OF TECHNOLOGY, JAIPUR
MCA

MCA 1st Semester

Course Code: MCA 103

Course Tittle: Operating System

Syllabus

Credit: 3 **Max. Marks: 100**

40-44 Hours **End Term Exam: 3 Hours**

SN	CONTENTS
1	**Introduction to Operating Systems** - Definition and types of operating systems - Operating system architecture
2	**Process Management** - Process concept and states - Process scheduling algorithms - Inter-process communication (IPC)
3	**Memory Management** - Memory allocation techniques - Paging and segmentation - Virtual memory
4	**File Systems** - File concepts and operations - Directory structures - File system management and implementation
5	**Concurrency and Deadlocks** - Synchronization mechanisms - Deadlock prevention and avoidance
6.	**Security and Protection** - Security issues in operating systems - Protection mechanisms and authentication methods
7	**Case Studies of Operating Systems** - Overview of popular operating systems (Windows, Linux, macOS) - Comparative analysis of features and functionalities

Text/Reference Books	
SN	**Name of Books**
1	Operatng System ,Firewall Publication
2	Fundamental of Operating system RBH
3	Operating system Satish Jain BPP Publication

UNIVERSITY OF TECHNOLOGY, JAIPUR
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MCA 1st Semester
Course Code: MCA 104
Course Tittle: Computer Architecture

Course Objective:

1	Learn the basics of data representation
2	Study register transfer micro operations
3	Explore CPU.
4	Comprehend computer arithmetic algorithms
5	Learn I/O organization.

Couse Outcomes

CO 1 Apply data representation methods.

CO 2 Write logic diagrams for microoperations

CO 3 Write general register organization diagrams

CO 4 Analyze computer arithmetic algorithms.

CO 5 Explain I/O organization

COs and POs Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	1	1	1	1	1	1	1	1	1
CO2	3	3	2	1	1	1	1	1	1	1	1	1
CO3	3	2	2	1	1	1	1	1	1	1	1	1
CO4	2	2	3	1	1	1	1	1	1	1	1	1
CO5	2	2	2	2	1	1	1	1	1	1	1	1

UNIVERSITY OF TECHNOLOGY, JAIPUR
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MCA 1st Semester
Course Code: MCA 104
Course Tittle: Computer Architecture

Syllabus

Credit: 3 **Max. Marks: 100**
40-44 Hours **End Term Exam: 3 Hours**

SN	CONTENTS
1	**Basic Building Blocks**: Gates, Boolean Functions and Expressions Designing Gate Networks, K-map simplification, Useful Combinational Parts, Programmable Combinational Parts, Timing and Control, Latches, Flip-flops, Registers and Counters, Sequential Circuits. **Arithmetic/Logic Unit**: Numbers Representation, Arithmetic Operations, Floating-Point Arithmetic
2	**Register Transfer Language and Micro-operations**: Concept of bus, data movement among registers, a language to represent conditional data transfer, data movement from/ to memory. Design of Arithmetic & Logic Unit and Control Unit Control design hardwired control, micro programmed arithmetic and logical operations along with register transfer, timing in register
3	**Instruction and Addressing**: A simple computer organization and instruction set, instruction formats, addressing modes, instruction cycle, instruction execution in terms of microinstructions, interrupt cycle, concepts of interrupt and simple 1/O organization, Synchronous & Asynchronous data transfer, Data Transfer Mode: Program Controlled, Interrupt driven, DMA (Direct Memory Access). Implementation of processor using the building blocks.
4	**Memory System Design**: Memory Origination, Memory Hierarchy, Main Memory (RAM/ROM chips), Auxiliary memory, Associative memory, Cache Memory, Virtual Memory. Assembly Language Programs, AssemblerDirectives, Pseudo Instructions, Macroinstructions, Linking and Loading.
5	**Vector and Array Processing**: Shared-Memory, Multiprocessing, Distributed **Microprocessor Concepts**: Pin Diagram of 8085, Architecture of 8085, Addressing Mode of 8085, functional block diagram of 8085 assembly language, instruction set of 8085.

Text/Reference Books	
SN	**Name of Books**
1	William Stallings, Computer Organization and Architecture – Designing for Performance,8thEdition, Pearson Education, 2010.
2	John P. Hayes, Computer Architecture and Organization, 3rdEdition, Tata McGraw Hill, 2012.
3	John L. Hennessey and David A. Patterson, Computer Architecture – A Quantitative Approach, Morgan Kaufmann / Elsevier Publishers, 5th Edition, 2012.

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MCA 1st Semester
Course Code: MCA 105
Course Tittle: Database System

Course Objective:

1	Knowledge of database design.
2	A general understanding of database, design and dependency
3	Understanding of different types of databases
4	Knowledge of databases on the internet
5	Application on enhanced database

Couse Outcomes

CO 1 Understand the basic concepts of database management systems

CO 2 Apply SQL to find solutions to a broad range of queries

CO 3 Apply normalization techniques to improve database design.

CO 4 Analyze a given database application scenario to use ER model for conceptual design of the database

COs and POs Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	-	-	-	-	-	-	-	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	-
CO3	3	2	2	-	-	-	-	-	-	-	-	-
CO4	2	2	3	1	-	-	-	-	-	-	-	-
CO5	2	2	2	-	1	-	-	-	-	-	-	-

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MCA 1st Semester
Course Code: MCA 105
Course Tittle: Database System

Syllabus

Credit: 3 **Max. Marks: 100**
40-44 Hours **End Term Exam: 3 Hours**

SN	CONTENTS
1	**Introduction** Overview of DBMS, Database System v/s File System, Architecture of DBMS, Data models, Entity Relationship Diagram, Types of Keys, Integrity Rules, Data Dictionary, Normalization (1NF, 2 NF, 3NF, BCNF, 4NF, 5NF), inclusion dependencies, loss less join decompositions, Codd's Rules
2	**Transaction Management** Transactions: Concepts, ACID Properties, States Of Transaction, Serializaibility, Conflict & View Serializable Schedule, Checkpoints, Deadlock Handling
3	**Database Querying& Concurrency Control** Relational Algebra, Set Operations, Relational Calculus, Steps In Query Processing, Algorithms For Selection, Sorting And Join Operations, Understanding Cost Issues InQueries, Query Optimization, Transformation Of Relational Expressions, Query Evaluation Plans Concurrency Control: Locks Based Protocols, Time Stamp Based Protocols, Validation Based Protocol, Multiple Granularity, Multi-version Schemes
4	**Recovery System & Security** Failure Classifications, Recovery & Atomicity, Log Base Recovery, Recovery with Concurrent Transactions, Shadow Paging, Failure with Loss of Non-Volatile Storage, Recovery From Catastrophic Failure, Introduction to Security & Authorization, Introduction to emerging Databases-OODBMS, ORDBMS, Distributed database, Multimedia database ,Special database-limitations of conventional databases, advantages of emerging databases
5	**SQL and PL/SQL** Introduction to SQL: Characteristics of SQL, Advantages of SQL, SQL data types and literals, Types of SQL commands, SQL operators, Tables, views and indexes, Constraints, Group By and Having Clause, Order By Clause, Queries and sub queries, Functions, PL/SQL basics, blocks, architecture, variables, constants, attributes, character set, PL/SQL control structure, data types, conditional and

Text/Reference Books

SN	Name of Books
1	Raghurama Krishnan, Johannes Gehrke, Data base Management Systems, 3 rd Ed., TMH.
2	C.J.Date, Introduction to Database Systems, 8 th Ed. , Pearson
3	Abraham Silberschatz, Henry F Korth, S. Sudarshan, Data base System Concepts, 5 th Ed., McGraw Hill.

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MCA 1st Semester
Course Code: MCA 106
Course Tittle: Web Technology

Course Objective:

1	To understand the foundational concepts of web technologies and their applications.
2	To learn the structure and semantics of HTML and CSS for web design.
3	To develop client-side scripting skills using JavaScript.
4	To explore server-side programming concepts and technologies
5	To apply best practices in web development, including usability and accessibility.

Couse Outcomes

CO 1 Understand the basic concepts of web technologies and their components

CO 2 Create and design web pages using HTML and CSS.

CO 3 Develop interactive web pages using JavaScript and DOM manipulation.

CO 4 Implement server-side programming concepts using a suitable technology (e.g., PHP).

CO 5 Apply web development best practices, including usability, accessibility, and SEO

COs and POs Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	-	-	-	-	-	-	-	-	-
CO2	3	2	2	-	-	-	-	-	-	-	-	-
CO3	3	3	2	-	-	-	-	-	-	-	-	-
CO4	2	2	3	1	-	-	-	-	-	-	-	-
CO5	2	2	2	2	1	-	-	-	-	-	-	-

UNIVERSITY OF TECHNOLOGY, JAIPUR
MCA

MCA 1st Semester
Course Code: MCA 106
Course Tittle: Web Technology

Syllabus

Credit: 3 **Max. Marks: 100**
40-44 Hours **End Term Exam: 3 Hours**

SN	CONTENTS
1	**Introduction to HTML** The internet: history of the World Wide Web, hardware and software trend, object technology – java script object, scripting for the web-browser portability. Introduction of HTML: introduction, markup language, editing HTML : common tags, headers, text styles, linking, images, formatting text, horizontal rules and more line breaks, unordered lists, nested and ordered lists, basic HTML tables : intermediate HTML tables and formatting : basic HTML forms, more complex HTML forms, HTML5: Input Types & Attributes, internal linking, creating and using image maps
2	**Java Script** Introduction to scripting: introduction- memory concepts- arithmetic- decision making. Java script control structures, Java script functions: introduction – program Units in java script - function definitions, duration of identifiers, scope rules, recursion, java script global functions. Java script arrays: introduction, array-declaring and allocating arrays, references and reference parameters – passing arrays to functions, multiple subscripted arrays. Java script objects: introduction, math, string, date, Boolean and number objects.
3	**Dynamic HTML** CSS: introduction – inline styles, creating style sheets with the style element, conflicting styles, linking external style sheets, positioning elements, backgrounds, element dimensions, text flow and the CSS box model, user style sheets, Filter and Transitions, HTML DOM, Browser BOM Event model : introduction, event ON CLICK, event ON LOAD – error handling with ON ERROR, tracking the mouse with event, more DHTML events.
4	**Introduction to PHP &Web Server Architecture** Overview of PHP Capabilities, PHP HTML embedding tags & syntax, Simple script examples, PHP & HTTP Environment variables. PHP Language Core- Variables, Constants, Data Types, PHP: Operators, Flow Control & Loops, Arrays, String, Functions Include & require statements, Simple File & Directory Access Operations,
5	Error handling, Processing HTML form using GET, POST, REQUEST, SESSION, COOKIE variables, Sending E-mail, Database Operations with PHP, Connecting to My-SQL (or any other database), Selecting a db, building & Sending Query, retrieving, updating. Note: XAMMP is used for PHP

Text/Reference Books

SN	Name of Books
1	Hofstetter, Fred, "Internet Technology at work", Osborne, 2004
2	Steven Holzner, "PHP: The Complete Reference", McGrawHill, 2008
3	Elizabeth Naramore, Jason Gerner, Jeremy Stolz, and Timothy Boronczyk Beginning PHP, Apache, MySqlweb development.Wrox Publication, 2009
4	Ivan Bayross, Sharanam Shah, Shroff ,"PHP 5.1 for Professionals", Publishers and Distributers Pvt. Ltd., 2007

UNIVERSITY OF TECHNOLOGY, JAIPUR
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MCA 1st Semester
Course Code: MCA 151
Course Tittle :Object Oriented Programming Lab

Syllabus

Credit: 1 **Max. Marks: 100**
40-44 Hours **End Term Exam: 3 Hours**

Lab Experiments
1. Basic Commands of Linux. 2. Basic Shell Programming. 3. Accessing help options, File names and Wild Card, Types of Files, Directory Hierarchy, Operations. 4. Introduction of vi and gedit Editor, File Permissions and Simple Filter Commands 5. Control Statements: -Programs on if-else ladder, iterative statements, Functions and recursions, predefined functions. 6. Pointer and Dynamic Memory: -Programs on Arrays, sorting (Bubble, selection, insertion) Searching (linear, Binary), 2D Array (Matrix operations), Pointers, Structures, union, enum, Dynamic Memory allocation Programs on File Handling, Programs on Command Line Arguments. 7. Objects, Functions and Constructor: - Programs on classes and objects constructors, functions, inline functions, Friend function. 8. Polymorphism: -Programs on Function Overloading, overriding, Operator overloading, programs on different type of inheritances, virtual function.

UNIVERSITY OF TECHNOLOGY, JAIPUR
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MCA 1st Semester
Course Code: MCA 152
Course Tittle : SQL-PL/SQL Lab

Syllabus

Credit: 1 **Max. Marks: 100**
40-44 Hours **End Term Exam: 3 Hours**

Lab Experiments
1. SQL data types, Operators, Literals, Constraints 2. Assignment on Queries: Select / From / Where/ Group By/Having Clause/ Order By Clause/ SQLOperators/ Joins/ Built-in Functions 3. PL/SQL Block Structure 4. Conditional Statements 5. Iterations: Simple Loops, For Loop, While Loop, Nested Loops 6. Exception Handling 7. Database Programming with Record Variables 8. Database Programming with Cursors, Cursor-For Loop 9. Procedures & Functions 10.Triggers Packages

UNIVERSITY OF TECHNOLOGY, JAIPUR
MCA

MCA 1st Semester
Course Code: MCA 153
Course Tittle : Web Technologies Lab

Syllabus

Credit: 1 **Max. Marks: 100**
40-44 Hours **End Term Exam: 3 Hours**

Lab Experiments

HTML:

- Basics Elements & Attributes, HTML Formatting tags, Links,
- Images, Tables, Forms Elements
- HTML5 Audio and Video, HTML5 Input Types & Attributes
- CSS Syntax, CSS Attribute Selectors
- CSS properties: Fonts, Background, Colors, Links, Lists,
- CSS Box Model, Display, Opacity, Float, Clear
- CSS Layout, CSS Navigation Bar,

CSS Rounded Corners, CSS Border Images, CSS Animations

JavaScript:

- Displaying Output, Declaring Variables, Operators, Arithmetic, Data Types, Assignment
- JavaScript Functions, Booleans, Comparisons, Conditional ,
- JavaScript Switch, Loops, Break, Type,
- JavaScript Objects, Scope,
- Strings and String Methods
- Numbers and Number Methods, Math, JavaScript Dates: Formats and Methods
- JavaScript Events, JavaScript, JavaScript Forms (API and Validation), Objects, JavaScript Functions, JavaScript DOM, JavaScript Validation, Browser BOM

PHP:

- Installing XAMMP
- Variables, Data Types, Constants, Operators, Programming Loops,
- PHP Functions,
- Arrays
- Strings Functions
- PHP Form Handling, Require & Include
  PHP with MySQL

UNIVERSITY OF TECHNOLOGY, JAIPUR
MCA

MCA 1st Semester BRIDGE COURSE
Course Code: MCA-B001
Course Tittle : Fundamentals of Computer Science

Course Objective:

1	Familiarize students with various office automation tools and their applications in the workplace
2	Equip students with skills to use IT tools for improving productivity and efficiency in office tasks
3	To introduce basic concepts of Computer
5	Develop skills to create engaging and effective presentations using presentation software..

Couse Outcomes

CO 1 For a given logic sentence express it in terms of predicates, quantifiers, and logical connectives

CO 2 Create and format professional documents, reports, and presentations.

CO 3 Analyze and manipulate data effectively using spreadsheet functions and formulas

CO 4 Utilize collaborative tools to work effectively in team projects.

CO 5 Understand the role of IT tools in enhancing office productivity and workflow management

COs and POs Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	-	-	-	-	-	-	-	-	-
CO2	3	2	2	-	-	-	-	-	-	-	-	-
CO3	3	3	2	-	-	-	-	-	-	-	-	1
CO4	3	2	3	1	2	-	-	-	-	-	-	2
CO5	2	2	3	1	2	-	-	-	-	-	-	2

UNIVERSITY OF TECHNOLOGY, JAIPUR
MCA

MCA 1st Semester BRIDGE COURSE
Course Code: MCA-B001
Course Tittle : Fundamentals of Computer Science

Syllabus

Credit: 3 **Max. Marks: 100**
40-44 Hours **End Term Exam: 3 Hours**

SN	CONTENTS
1	**Introduction to Computers:** Characteristics of computers, Evolution of computers, generation of computers, classification of computers, applications of computers. **Input and Output Devices:** Keyboard, pointing devices, speech recognition, digital camera, scanners, optical scanners. Classification of output devices, Hard copy output devices- printers, plotters, computer output microfilm (COM), Classification of output devices, Soft copy output devices- monitors, audio output, projectors, and terminals **Computer System:** Central processing unit (CPU), Memory, instruction format, instruction set.
2	**Primary and Secondary Memory:** Memory hierarchy, Random access memory(RAM), types of RAM, Read only memory (ROM), types of ROM. Classification ofsecondary storage devices, magnetic tape, magnetic disk, optical disk. **Number Systems:** Introduction to number system, Binary, Octal, Hexadecimal, conversion between number bases, Alphanumeric- EBCDIC and ASCII, Sets Theory, Types of Sets, Multi Sets, Operations on Sets
3	**Computer Program:** Introduction, developing a program, algorithm, flowchart, pseudo code. **Computer Languages:** Introduction, classification of programming languages, generations of programming languages, features of a good programming language. **Computer Software:** Software definition, relationship between software and hardware, software categories, system software, application software, utility software.
4	**Operating System**: Introduction of operating system, types of operating system, functions of an operating system, modern operating systems. Data Communication and Computer Network: Introduction, data communication, transmission media, multiplexing, switching, computer network,network topologies, communication protocols, network devices. Internet Basics: Introduction, evolution of Internet, basic Internet terms, getting connected to Internet, Internet applications, electronic mail and other Internet Services, searching the web (search engines), languages of Internet, viruses. Use of Anti-Virus software.
5	**Office Management Tools** **MS-Word:** Creating Saving documents, Entering, Editing, Page formatting, Finding and replacing text, Spell checking and Grammar checking, Indexing, Columns, Tables and feature there in, Inserting (Objects, picture, files etc.), Using Graphics, using Mail Merge, using Word Art, customizing MS Word. **MS Excel:** Spreadsheet terminology, organization of the worksheet area, editing cells using commands and functions, formatting worksheet, creating & editing

	charts, naming range and using statistical, mathematical and financial functions, multiple worksheets and Macros, working with objects, Worksheet printing options. **MS Power Point:** Anatomy of a power Point Presentation, Creating and Viewing a presentation, Managing Slide Shows, Using hyperlinks, advanced navigation with action setting and action buttons, organizing formats with Master Slides, adding graphics, multimedia and special effects, creating presentation for the web. **MS Access:** Planning a database (tables, queries, forms, reports), Creating and editing database, customizing tables, linking tables, designing and using forms, modifying database structure, maintaining database, Sorting and Indexing database, Querying a database and generating Reports, modifying a Report.

Text/Reference Books

SN	Name of Books with Author
1	Computer Fundamentals and Programming in C, Reema Thareja, OXFORD University Press
2	Introduction to Computer,Peter Norton's, Tata McGraw Hill Publication
3	Office 2019:In Easy Steps,Michal Price ,BPB Publication.

UNIVERSITY OF TECHNOLOGY, JAIPUR
MCA

MCA 1st Semester BRIDGE COURSE
Course Code: MCA-B002
Course Tittle : C programming Lab

Syllabus

Credit: 1 **Max. Marks: 100**
40-44 Hours **End Term Exam: 3 Hours**

Lab Experiments
1. Basic C Programming: -Data types, Tokens, Keywords, Operators 2. Control Statements:-Programs on if, if-else, ladder,Switch, iterative statements-for, while, do-while. 3. Functions: - Programs on Functions. 4. Arrays:-Programs on Arrays. 5. Pointer:- Programs on Pointer. 6. Structures and Union. Dynamic Memory allocation Programs on File Handling.

UNIVERSITY OF TECHNOLOGY, JAIPUR
MCA

UNIVERSITY OF TECHNOLOGY ,JAIPUR
Scheme & Syllabus
MCA Second Semester
Teaching & Examination Scheme
ACADEMIC SESSION 2023-2024

Sr. No.	Subject Name	Subject Code	Subject Type	I.A.	E.T .	T.M.	T.H.	C.P.
1	Java Technologies	MCA 201	Theoretical	30	70	100	3	3
2	Computer Networks	MCA 202	Theoretical	30	70	100	3	3
3	Data Structures	MCA 203	Theoretical	30	70	100	3	3
4	Software Engineering & UML	MCA 204	Theoretical	30	70	100	3	3
5	Python Programming	MCA 205	Theoretical	30	70	100	3	3
6	Business Informatics	MCA 206	Theoretical	30	70	100	3	3
7	Data Structures Lab	MCA 251	Practical	30	70	100	2	1
8	Java Technologies Lab	MCA 252	Practical	30	70	100	2	1
9	Python Programming Lab	MCA 253	Practical	30	70	100	2	1
10	SODECA	MCA 254	Practical	100	0	100	0	1
				370	**630**	**1000**	**24**	**22**

I.A -INTERNAL ASSESSMENT , E.T.- End Term , T.M -Total Marks , T.H- Theory Hours C.P -Credit Point

UNIVERSITY OF TECHNOLOGY, JAIPUR
MCA

MCA-Ist Year (Second Semester)
Course Tittle: Java Technologies
Course Code:- 201

Course Objective:

1	Understand fundamentals of programming such as variables, conditional and iterative execution, methods, etc.
2	Understand fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc.
3	Be aware of the important topics and principles of software development
4	Be able to use the Java SDK environment to create, debug and run simple Java programs

Couse Outcomes

CO 1 Able to solve real world problems using OOP techniques.

CO 2 Able to understand the use of abstract classes.

CO 3 Able to solve problems using java collection framework and I/o classes.

CO 4 Able to develop multithreaded applications with synchronization

CO 5 Able to develop applets for web applications..

COs and POs Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	1	2	-	-	-	-	-	-	-	-
CO2	2	3	2	2	-	-	-	-	-	-	-	-
CO3	3	3	2	1	-	-	-	-	-	-	-	-
CO4	3	2	2	2	-	-	-	-	-	-	-	-
CO5	2	3	3	3		-	-	-	-	-	-	-

UNIVERSITY OF TECHNOLOGY, JAIPUR
MCA

MCA Ist Year (Second Semester)
Course Code: MCA 201
Course Tittle: Java Programming
Syllabus

Credit: 2 **Max. Marks: 100**
40-44 Hours **End Term Exam: 3 Hours**

SN	CONTENTS
1	Introduction to Java,OOP in Java, Characteristics of Java, Fundamental Programming Structures in Java, Abstract Class, Interfaces, Defining Methods, Inheritance, Overloading, Overriding, Packages, Exception Handling, Threads, Thread Life-Cycle
2	Need of J2EE, J2EE Architecture, J2EE APIs, J2EE Containers. Web Application Basics, Architecture and Challenges of Web Application, Servlet Life Cycle, Developing and Deploying Servlets, Exploring Deployment Descriptor (web.xml), Handling Request and Response, Initializing a Servlet. Servlet Chaining, Session Tracking and Management
3	The JDBC Connectivity Model, Types of JDBC Drivers., Basic steps to JDBC, setting up a connection to database, Creating and executing SQL statements, Result Set and Result Set Metadata Object, Accessing Database.
4	Java Server Pages Basic JSP Architecture, Life Cycle of JSP, JSP Tags & Expressions, JSP ImplicitObjects, JSP Directives, Tag Libraries ,Using JDBC with JSP , Accessing a Database, Adding a Form, Updating the Database.
5	Introduction to Spring Overview of Spring Framework- Inversion of Control / Dependency Injection Concepts, Aspect Oriented Programming - concept ,Spring MVC Architecture , Bean Factory and Application Context, Attaching and Populating beans, Injecting data through setters and constructors , Listening on events, Publishing events, Spring MVC Layering, Dispatcher Servlet, Writing a Controller, DAO, Models, Services, Spring Configuration File, Error handling Strategy.

Text/Reference Books

SN	Name of Books
1	"Java: The Complete Reference", , McGraw-Hill
2	Marty Hall and Larry Brown, "Core Servlets and Java Server Pages", 2nd Edition, 2003.
3.	MertCaliskan, KenanSevindik, Rod Johnson, Jurgen Holler, "Beginning Spring",

UNIVERSITY OF TECHNOLOGY, JAIPUR
MCA

MCA-Ist Year (Second Semester)
Course Tittle: Computer Network
Course Code:- MCA 202

Course Objective:

1	To understand the basic concepts of data communication, layered model, protocols and interworking between computer networks and switching components in telecommunication systems.
2	Discuss the nature, uses and implications of internet technology.
3	To. understand the functioning of Frame Relay, ATM.
4	An overview of security issues related to data communication in networks

Couse Outcomes

CO 1 Understand the basics of data communication, networking, internet and their importance.

CO 2 Analyse the services and features of various protocol layers in data networks.

CO 3 Differentiate wired and wireless computer networks

CO 4 Analyze TCP/IP and their protocols.

CO 5 Recognize the different internet devices and their functions.

COs and POs Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	1	2	-	-	-	-	-	-	-	-
CO2	2	3	2	2	-	-	-	-	-	-	-	-
CO3	3	3	2	1	-	-	-	-	-	-	-	-
CO4	3	2	2	2	-	-	-	-	-	-	-	-
CO5	2	3	3	3		-	-	-	-	-	-	-

UNIVERSITY OF TECHNOLOGY, JAIPUR
MCA

MCA Ist Year (Second Semester)
Course Code: MCA 202
Course Tittle: Computer Network
Syllabus

Credit: 2 **Max. Marks: 100**
40-44 Hours **End Term Exam: 3 Hours**

SN	CONTENTS
1	Networking Fundamentals- Introduction, Data & Information, Data Communication-Characteristics of Data Communication, Components of Data Communication, Data Representation, Data Flow- Simplex, Half Duplex, Full Duplex, Computer Network- Categories of anetwork, Protocol- Elements of a Protocol, Networking Standards, Reference Models- OSI Model, TCP/IP Model, Comparison of OSI and TCP/IP Model 8 HOURS
2	The Physical Layer- Transmission Media- Guided & Unguided, PSTN: Structure of theTelephoneSystem, Data & Signals Data types, Signal types- Analog & Digital, Modulation Techniques, Modem, Cable Modem, Protocols: DSL, ISDN. The Data Link Layer Design IssuesFraming, Error Control-Error Detection and Correction, Flow Control, Protocols: FDDI, CDDI, Frame Relay, ATM, 802.11, PPP, HDLC 8 HOURS
3	The Medium Access Sub-Layer- Multiple Access Protocols: ALOHA, CSMA, Ethernet: Switched Ethernet, FastEthernet, Gigabit Ethernet, DLL Switching: Internetworking, Repeaters, Hubs, Bridges, Switches, Routers, Gateways, Virtual LANs. 8 HOURS
4	The Network LayerDesign Issues, Routing Algorithms: Link State Routing, Distance Vector Routing,Flooding, Routing Protocols: RIP, IGRP, EIGRP, OSPF, Internetworking: Tunneling, Fragmentation, IPV4, IPV6 Basics, BGP. The Transport LayerProtocols: UDP, TCP, Headers 8 HOURS
5	The Application Layer DNS- The DNS Name Space, Name Servers-Mail: SMTP, POP3, HTTP, FTP,Telnet, Network Management: SNMP.Network SecurityCryptography: Encryption, Decryption, Private/Public Key, Digital Signatures SSL, Firewalls, PGP, S/MIME. 10 HOURS

Text/Reference Books

SN	Name of Books
1	Andrew S.Tanenbaum, “Computer Networks”, Prentice Hall, 5th Edition, January, 2013.
2	“Data Comm. &Computer Network Global Ed (English)” , McGraw Hill Education
3.	“Computer Networks “, Prentice Hall, 5thEdition (Paperback)

UNIVERSITY OF TECHNOLOGY, JAIPUR
MCA

MCA-Ist Year (Second Semester)
Course Tittle: Data Structure
Course Code:- MCA 203

Course Objective:

1	To make students understand the idea of Data's structure and its internal functionalities
2	It will make learners understand the Big-O Notation
3	To give the understanding to learners the concept of Array
4	To present the types of array and its memory representation and its applications.

Couse Outcomes

CO 1 To be able to practically implement the data structures like stack, queue, array etc.

CO 2 To understand and implement different searching and sorting.

CO 3 Understand the need for Data Structures when building Applications.

CO 4 Able to walk through insert and delete for different data techniques.

CO 5 Improve programming skills.

COs and POs Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	1	2	-	-	-	-	-	-	-	-
CO2	2	3	2	2	-	-	-	-	-	-	-	-
CO3	3	3	2	1	-	-	-	-	-	-	-	-
CO4	3	2	2	2	-	-	-	-	-	-	-	-
CO5	2	3	3	3		-	-	-	-	-	-	-

UNIVERSITY OF TECHNOLOGY, JAIPUR
MCA

MCA Ist Year (Second Semester)
Course Code: MCA 203
Course Tittle: Data Structures
Syllabus

Credit: 2 **Max. Marks: 100**
40-44 Hours **End Term Exam: 3 Hours**

SN	CONTENTS
1	Introduction Basic data structures such as arrays, linked list, stack, trees and queues and Their applications, linked and sequential representation Basic Terminology, Elementary Data Organization, Data Structure operations. Preliminaries of algorithm, Algorithm analysis and Complexity.Stack Implementation of stack, operations on stack. Applications of stack: Conversion of infix- 8 Hours
2	Queues Implementation of queues, Operations on Queue, Types of Queues - Circular queue, D-queue and Priority Queue. Linked List Representation and Implementation of Singly Linked Lists, Two-way Header List, Traversing and Searching of Linked List, insertion and deletion to/from Linked Lists,insertion and deletion Algorithms, Doubly linked list, Header lists, circular lists, sorted lists. 8 HOURS
3	Trees Basic terminology and definitions. Array and Linked Representation of Binary trees, Traversing Binary trees. Binary Search Trees: Binary Search Tree (BST), Traversal, Insertion and Deletion in BST, and Introduction to balanced BST (AVL Trees) 8 HOURS
4	Trees Basic terminology and definitions. Array and Linked Representation of Binary trees, Traversing Binary trees. Binary Search Trees: Binary Search Tree (BST), Traversal, Insertion and Deletion in BST, and Introduction to balanced BST (AVL Trees) 8 HOURS
5	Trees Basic terminology and definitions. Array and Linked Representation of Binary trees, Traversing Binary trees. Binary Search Trees: Binary Search Tree (BST), Traversal, Insertion and Deletion in BST, and Introduction to balanced BST (AVL Trees) 8 HOURS

Text/Reference Books

SN	Name of Books
1	Tannenbaum, “Data Structure Using C”,
2	AnanyLevitin, “Introduction to the Design and Analysis of Algorithms”,
3.	Ronald L. Rivest and Clifford Stein, “Introduction to Algorithms”,

UNIVERSITY OF TECHNOLOGY, JAIPUR
MCA

MCA-Ist Year (Second Semester)
Course Tittle: Software Engineering & UML
Course Code:- MCA 204

Course Objective:

1	Understanding System Design: To introduce students to the principles and methodologies of system design.
2	Requirements Analysis: To equip students with skills to gather and analyze requirements for effective system design.
3	Architectural Design: To teach the fundamentals of software architecture and its role in system design.
4	Design Patterns: To familiarize students with common design patterns and their applications in solving design problems
5	Hands-on Project Development: To provide practical experience through projects that apply system design concepts.

Couse Outcomes

CO 1 Explain fundamental concepts and methodologies in system design.

CO 2 Conduct thorough requirements analysis to inform design decisions.

CO 3 Develop software architectures that meet specified requirements.

CO 4 Apply design patterns to create reusable and efficient system designs.

CO 5 Complete a project demonstrating the application of system design concepts

COs and POs Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	1	2	-	-	-	-	-	-	-	-
CO2	2	3	2	2	-	-	-	-	-	-	-	-
CO3	3	3	2	1	-	-	-	-	-	-	-	-
CO4	3	2	2	2	-	-	-	-	-	-	-	-
CO5	2	3	3	3		-	-	-	-	-	-	-

UNIVERSITY OF TECHNOLOGY, JAIPUR
MCA

MCA Ist Year (Second Semester)
Course Code: MCA 204
Course Tittle: Software Engineering &UML
Syllabus

Credit: 2 **Max. Marks: 100**
40-44 Hours **End Term Exam: 3 Hours**

SN	CONTENTS
1	Software Engineering Fundamentals Software Engineering – A layered Technology, The importance of software, software myths, software engineering paradigms, Software Process Models: Linear Sequential Model, Prototyping Model, RAD Model Evolutionary Software Process Models: Incremental Model, Spiral Model Component Assembly Model, Formal Methods, Fourth-Generation Techniques. 8 HOURS
2	Analysis Concepts and Principles : Analysis Concepts and Principles the Elements of the Analysis Model Data Modifying, Functional Modeling and Information Flow and Behavior Modeling, Mechanics of Structured Analysis, Data Dictionary. Requirement analysis, tasks, analyst, software prototyping, specification principles, representation and the software requirements specification. 8 HOURS
3	Software Project Planning Software Project Planning, Size Estimation, Cost Estimation, Models, Static, single variable models, Static, Multivariable Models, COCOMO, The Putnam Resource Allocation Model, Risk Identification and Projection: RMMM, Project scheduling and Tracking. Software Design Process, Design Principles, and Design Concepts: Effective Modular Design, Design Heuristics, Design Documentation, Design Methods: Data Design, Architectural Design, Interface Design, Human Computer Interface Design, Procedural Design. Case Study for Design of any Application Project 8 HOURS
4	Software Testing S/W Testing Fundamentals, White Box Testing, Black Box Testing, software testing strategies, verification and Validation, System Testing, Unit testing, Integration testing and Debugging. Software Maintenance Maintainability – maintenance Tasks, Characteristics of a good quality software. Case Study for Testing Techniques 8 HOURS
5	Unified Modeling Language (UML) Unified Modeling Language, Basic structures and modeling classes, common modeling techniques, relationships, common mechanism, class diagrams. Advanced structured modeling, advanced classes and relationships, interfaces, types and roles, instances and object diagram. Basic idea of behavioral modeling. State diagrams, Interaction diagrams, Use case diagrams Object- oriented concepts and principles. Identifying the elements of an object model. Object oriented projects metrics and estimation. 8 HOURS

Text/Reference Books

SN	Name of Books
1	Roger S Pressman, Bruce R Maxim, “Software Engineering: A Practitioner’s Approach”,
2	Ian Sommerville,” Software engineering”, Addison
3.	Ali Behforooz, Hudson, “Software Engineering Fundamentals”,

UNIVERSITY OF TECHNOLOGY, JAIPUR
MCA

MCA-Ist Year (Second Semester)
Course Tittle: Python Programming
Course Code:- MCA 205

Course Objective:

1	.Learn Syntax and Semantics and create Functions in Python.
2	.Handle Strings and Files in Python.
3	Understand Lists, Dictionaries and Regular expressions in Python.
4	Implement Object Oriented Programming concepts in Python.
5	Build Web Services and introduction to Network and Database Programming in Python.

Couse Outcomes

CO 1 Examine Python syntax and semantics and be fluent in the use of Python flow control and functions

CO 2 Demonstrate proficiency in handling Strings and File Systems

CO 3 Create, run and manipulate Python Programs using core data structures like Lists, Dictionaries and use Regular Expressions.

CO 4 Interpret the concepts of Object-Oriented Programming as used in Python.

CO 5 Implement exemplary applications related to Network Programming, Web Services and Databases in Python.

COs and POs Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	1	2	-	-	-	-	-	-	-	-
CO2	3	3	2	2	-	-	-	-	-	-	-	-
CO3	2	2	2	1	-	-	-	-	-	-	-	-
CO4	3	2	2	2	-	-	-	-	-	-	-	-
CO5	2	3	3	3		-	-	-	-	-	-	-

UNIVERSITY OF TECHNOLOGY, JAIPUR
MCA

MCA Ist Year (Second Semester)
Course Code: MCA 205
Course Tittle: Python Programming
Syllabus

Credit: 2 **Max. Marks: 100**
40-44 Hours **End Term Exam: 3 Hours**

SN	CONTENTS
1	Python Basics, Objects- Python Objects, Standard Types, Other Built-in Types, Internal Types, Standard Type Operators, Standard Type Built-in Functions, Categorizing the Standard Types, Unsupported Types Numbers - Introduction to Numbers, Integers, Floating Point Real Numbers, Complex Numbers, Operators, Built-in Functions, Related Modules Sequences - Strings, Lists, and Tuples, Mapping and Set Types
2	FILES: File Objects, File Built-in Function [open()], File Built-in Methods, File Built-in Attributes, Standard Files, Command-line Arguments, File System, File Execution, Persistent Storage Modules, Related Modules Exceptions: Exceptions in Python, Detecting and Handling Exceptions, Context Management,*Exceptions as Strings, Raising Exceptions, Assertions, Standard Exceptions, *Creating Exceptions, Why Exceptions (Now)?, Why Exceptions at All?, Exceptions and the sys Module, Related Modules: Modules and Files, Namespaces, Importing Modules, Importing Module Attributes, Module Built-in Functions, Packages, Other Features of Modules
3	Regular Expressions: Introduction, Special Symbols and Characters, Res and Python Multithreaded Programming: Introduction, Threads and Processes, Python, Threads, and the Global Interpreter Lock, Thread Module, Threading Module, Related Modules
4	GUI Programming: Introduction, Tkinter and Python Programming, Brief Tour of Other GUIs, Related Modules and Other GUIs WEB Programming: Introduction, Wed Surfing with Python, Creating Simple Web Clients, Advanced Web Clients, CGI-Helping Servers Process Client Data, Building CGI Application Advanced CGI, Web (HTTP) Servers
5	(DB-API), Object Relational Managers (ORMs), Related Modules

Text/Reference Books

SN	Name of Books
1	Think Python, Allen Downey, Green Tea Press
2	. Introduction to Python, Kenneth A. Lambert,
3.	Python Programming: A Modern Approach, VamsiKurama

UNIVERSITY OF TECHNOLOGY, JAIPUR
MCA

MCA Ist Year (Second Semester)
Course Code: MCA 206
Course Tittle: Business Informatics
Syllabus

Credit: 2 **Max. Marks: 100**
40-44 Hours **End Term Exam: 3 Hours**

SN	CONTENTS
1	Business Environment and Dependence on IT Introduction to Business Informatics, Organizational Structure and Design, Dependence on Technology, Integrating Technology with Business Environment, IT and Corporate Strategy, Sustaining a Competitive Edge through application of IT in Management Functions. 8 Hours
2	E-Commerce Definition, Objectives, Components, Advantages and disadvantages, Scope, ECommerce Models, E-Commerce Opportunities for Industries, Growth of ECommerce, e-Commerce Applications- E-Marketing, E-Customer Relationship Management, E-Supply Chain Management, E-Governance, E-Buying, E-Selling, E-Banking, E-Retailing. 8 Hours
3	E-Payments and Security issues in E-Commerce Introductions, Special features, Types of E-Payment Systems (EFT, E-Cash, ECheque, Credit/Debit Card, Smart Card, Digital Tokens and Electronic Purses/ Wallets), Security risk of E-Commerce, Types of threats, Security Tools, Cyber Laws, Business Ethics 8 Hours
4	ERP Introduction, Needs and Evolution of ERP Systems, ERP Domain, ERP Benefits, ERP and Related Technologies, Relevance to Data Warehousing and Data Mining, ERP Drivers, Evaluation Criterion for ERP product, ERP Life Cycle: Adoption decision, Acquisition, Implementation, Use & Maintenance, Evolution and Retirement Phases, ERP Units, ERP Success & Failure Factors 8 Hours
5	Information Systems Introduction, Categories of System: Open, Closed, Physical, Abstract, Dynamic, Static etc., Types of Information Systems: TPS, MIS, DSS, OLAP, OLTP, Expert System, Internet Based Systems, Learning Management Systems, Business Process 8 Hours

Text/Reference Books

SN	Name of Books
1	Dr. K Abirami Devi & Dr. M Alagammai, “E-Commerce Essentials”
2	Kenneth C. Laudon, Karol Traver, “E-Commerce 2014”
3.	Electronic Commerce and Risk by Daniel

UNIVERSITY OF TECHNOLOGY, JAIPUR
MCA

MCA IInd Semester
Course Code: MCA 251
Course Tittle :Data Structure Lab

Syllabus

Credit: 1 **Max. Marks: 100**
40-44 Hours **End Term Exam: 3 Hours**

Lab Experiments
1. Array implementation of Stack and Queue
2. Linked list implementation of List, Stack Queue
3. Array implementation of QUEUE
4. Applications of List, Stack and Queue ADTs
5. Implementation of Binary Trees and operations of Binary Trees
6. Implementation of Binary Search Trees
7. Implementation of AVL Trees
8. Implementation of Heaps using Priority Queues.
9. Graph representation and Traversal algorithms
10. Applications of Graphs
11. Implementation of searching and sorting algorithms

UNIVERSITY OF TECHNOLOGY, JAIPUR
MCA

MCA IInd Semester
Course Code: MCA 252
Course Tittle :Java Technology Lab
Syllabus

Credit: 1 **Max. Marks: 100**
40-44 Hours **End Term Exam: 3 Hours**

Lab Experiments
1. Simple java applications for understanding references to an instant of a class
2. Handling strings in JAVA
3. Package creation
4. Developing user defined packages in java
5. Use of Interfaces
6. Threads, Multithreading
7. Exception Handling
8. Dynamic HTML using Servlet
9. Use of get() and Post() methods
10. Cookies in Servlet
11. Session tracking and Management
12. JDBC
13. JSP Actions elements
14. Directives elements in JSP
15. JSP Tags
16. Implement JDBC with JSP
17. Implement JDBC with Servlet
18. Applications using Spring Web MVC

UNIVERSITY OF TECHNOLOGY, JAIPUR
MCA

MCA IInd Semester
Course Code: MCA 253
Course Tittle: Python Programming Lab
Syllabus

Credit: 1 **Max. Marks: 100**
40-44 Hours **End Term Exam: 3 Hours**

Lab Experiments
1. Implement a sequential search 2. Create a calculator program 3. Explore String Functions 4. Implement Selection Sort 5. Implement Stack 6. Read and Write into a file 7. Demonstrate usage of basic regular expression 8. Demonstrate use of advanced regular expressions for data validation 9. Demonstrate use of List 10. Demonstrate use of Dictionaries 11. Create Comma separate files(CSV), Load CSV files into internal data structure 12. Write script to work like a SQL SELECT statement for internal data structure

UNIVERSITY OF TECHNOLOGY, JAIPUR
MCA

MCA . 3rd Semester Scheme

Sr. No.	Subject Name	Subject Code	Subject Type	Credit Point	Tot. Max Marks	Int. Min Marks	Int. Max Marks	Ext. Min Marks	Ext. Max Marks
1	Cloud Computing	MCA 301	Theoretical	3	100	12	30	28	70
2	Analysis and Design of Algorithm	MCA 302	Theoretical	3	100	12	30	28	70
3	Artificial Intelligence	MCA 303	Theoretical	3	100	12	30	28	70
4	Information Security	MCA 304	Theoretical	3	100	12	30	28	70
5	Mobile Application Development	MCA 305	Theoretical	3		12	30	28	70
6	Big Data	MCA 306	Theoretical	3	100	12	30	28	70
1	ADA Lab	MCA 351	Practical	3	100	12	30	28	70
2	Mobile Application Development Lab	MCA 352	Practical	3	100	12	30	28	70
3	Summer Industrial Training Presentation	MCA 353	Practical	3	100	12	30	28	70
	SODECA	MCA 354		2	100				
				23	**1000**	**108**	**270**	**252**	**630**

UNIVERSITY OF TECHNOLOGY, JAIPUR
MCA

MCA 3rd Semester
Course Code: MCA 301
Course Tittle: Cloud Computing

Course Objective:

1	Identify the technical foundations of cloud systems architectures.
2	Analyze the problems and solutions to cloud application problems.
3	Apply principles of best practice in cloud application design and management.
4	Identify and define technical challenges for cloud applications and assess the importance.

Couse Outcomes

CO 1 Understand the fundamental principles of distributed computing.

CO 2 Understand how the distributed computing environments known as Grids can be built from lower level services.

CO 3 Understand the importance of virtualization in distributed computing and how this has enabled the development of Cloud Computing.

CO 4 Analyze the performance of Cloud Computing.

CO 5 Understand the concept of Cloud Security.

COs and POs Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	-	-	-	-	-	-	-	-	-
CO2	3	2	2	-	-	-	-	-	-	-	-	-
CO3	3	3	2	-	-	-	-	-	-	-	-	1
CO4	3	2	3	1	2	-	-	-	-	-	-	2
CO5	2	2	3	1	2	-	-	-	-	-	-	2

UNIVERSITY OF TECHNOLOGY, JAIPUR
MCA

MCA 3rd Semester
Course Code: MCA 301
Course Tittle: Cloud Computing

Syllabus

Credit: 3 **Max. Marks: 100**
40-44 Hours **End Term Exam: 3 Hours**

SN	CONTENTS
1	**Introduction to Cloud**: Cloud Computing at a Glance, Vision of Cloud Computing, Defining a Cloud, Cloud Computing Reference Model. Characteristics and Benefits, Challenges Ahead, Historical Developments, Risks and Approaches of Migration into Cloud ,Types of Clouds, Services models, Cloud Reference Model.
2	**Cloud Architecture**: cloud architecture, features and benefits of Servive Models: Software as a Service (SaaS),Platform as a Service (PaaS), Infrastructure as a Service (IaaS), Service providers, challenges and risks in cloud adoption. Cloud deployment model: Public clouds – Private clouds – Community clouds - Hybrid clouds - Advantages of Cloud computing
3	**Virtualization**: Introduction, Characteristics of Virtualized Environment, Taxonomy of Virtualization Techniques, Virtualization and Cloud computing, Pros and Cons of Virtualization, Technology Examples- VMware and Microsoft Hyper-V. Virtualization of CPU, Memory, I/O Devices, Virtual Cluster ,datacenterand Resources Management
4	**Securing the Cloud**: Cloud Information security fundamentals, Cloud security services, Design principles, Policy Implementation, Cloud Computing Security Challenges, Cloud Computing Security Architecture. Legal issues in cloud Computing. **Data Security in Cloud**: Risk Mitigation , Understanding and Identification of Threats in Cloud, SLA-Service Level Agreements, Trust Management
5	**Defining the Clouds for Enterprise**: Storage as a service, Database as a service, Process as a service, Information as a service, Integration as a service and Testing as a service. **Disaster Management in Cloud:** Disasters in the Cloud, Disaster Recovery Planning.

Text/Reference Books	
SN	**Name of Books**
1	San Murugesan, Irena Bojanova, “Encyclopedia of Cloud Computing”, Wiley , 2016
2	Kai Hawang , GeofreyC.Fox, Jack J. Dongarra, “Distributed and Cloud Computing: From ParallelProcessing to the Internet of Things”, Morgan Kaufmann, 2013
3	Krutz , Vines, “Cloud Security “ , Wiley Pub, 2014

UNIVERSITY OF TECHNOLOGY, JAIPUR
MCA

MCA 3rd Semester
Course Code: MCA 302
Course Tittle: Analysis and Design of Algorithm

Course Objective:

1	Analyze the asymptotic performance of algorithms
2	Write rigorous correctness proofs for algorithms
3	Demonstrate a familiarity with major algorithms and data structures
4	Apply important algorithmic design paradigms and methods of analysis.

Couse Outcomes

CO 1 Argue the correctness of algorithms using inductive proofs and invariants

CO 2 Analyze worst-case running times of algorithms using asymptotic analysis.

CO 3 Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize divide-and-conquer algorithms. Derive and solve recurrences describing the performance of divide-and-conquer algorithms

CO 4 Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize dynamic-programming algorithms, and analyze them.

COs and POs Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	-	-	-	-	-	-	-	-	-
CO2	3	2	2	-	-	-	-	-	-	-	-	-
CO3	3	3	2	-	-	-	-	-	-	-	-	1
CO4	3	2	3	1	2	-	-	-	-	-	-	2
CO5	2	2	3	1	2	-	-	-	-	-	-	2

UNIVERSITY OF TECHNOLOGY, JAIPUR
MCA

MCA 3rd Semester
Course Code: MCA 302
Course Tittle: Analysis and Design of Algorithm

Syllabus

Credit: 3 **Max. Marks: 100**
40-44 Hours **End Term Exam: 3 Hours**

SN	CONTENTS
1	**Introduction** - Algorithm definition and specification – Design of Algorithms, and Analysis of Algorithms, Asymptotic Notations, Growth of function: Asymptotic notations Performance Analysis Space complexity, Time complexity, Divide and conquer- General method, applications – Binary search, Merge sort, Quick sort
2	**The Greedy method** General method – knapsack problem – minimum cost spanning tree (Prims and Kruskal algorithm) – single source shortest path-DijkastraAlgorithm .
3	**Dynamic Programming** – general method – multistage graphs – all pair shortest path – 0/1 Knapsack – traveling salesman problem – flow shop scheduling.
4	**Backtracking:**General method – 8-Queens problem – sum of subsets – graph coloring – Hamiltonian cycles– knapsack problem. Branch and bound:- The Method – 0/1 Knapsack problem – traveling sales person.
5	**Parallel models** Basic concepts, performance Measures, Parallel Algorithms: Parallel complexity, Analysis ofParallel Addition, Parallel Multiplication and division, parallel Evaluation of GeneralArithmetic Expressions, First-Order Linear recurrence. **NP-hard and NP-complete problems:** Basic Concepts, non-deterministic algorithms, Np-hard graph problems and scheduling problems.

Text/Reference Books	
SN	**Name of Books**
1	AnanyLevitin, "Introduction to the Design and Analysis of Algorithms", Third Edition, PearsonEducation, 2012
2	Donald E. Knuth, "The Art of Computer Programming", Volumes 1& 3 Pearson Education,2009.
3	Steven S. Skiena, "The Algorithm Design Manual", Second Edition, Springer, 2008.

UNIVERSITY OF TECHNOLOGY, JAIPUR
MCA

MCA 3rd Semester
Course Code: MCA 303
Course Tittle: Artificial Intelligence

Course Objective:

1	Study the concepts of Artificial Intelligence.
2	Learn the methods of solving problems using Artificial Intelligence.
3	Learn the knowledge representation techniques, reasoning techniques and planning
4	Apply important algorithmic design paradigms and methods of analysis

Couse Outcomes

CO 1 Identify problems where artificial intelligence techniques are applicable

CO 2 Apply selected basic AI techniques; judge applicability of more advanced techniques

CO 3 Participate in the design of systems that act intelligently and learn from experience.

COs and POs Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	-	-	-	-	-	-	-	-	-
CO2	3	2	2	-	-	-	-	-	-	-	-	-
CO3	3	3	2	-	-	-	-	-	-	-	-	1
CO4	3	2	3	1	2	-	-	-	-	-	-	2
CO5	2	2	3	1	2	-	-	-	-	-	-	2

UNIVERSITY OF TECHNOLOGY, JAIPUR
MCA

MCA 3rd Semester
Course Code: MCA 303
Course Tittle: Artificial Intelligence

Syllabus

Credit: 3 **Max. Marks: 100**
40-44 Hours **End Term Exam: 3**
Hours

SN	CONTENTS
1	**General Issues and overview of AI** Concept of AI, AI technique, Characteristics of AI applications Problem Solving, Search and Control Strategies General Problem solving, Production systems, and Control strategies, forward and backward chaining Exhaustive searches: Depth first and Breadth first search
2	**Heuristic Search Techniques** Hill climbing, Branch and Bound technique, Best first search and A* algorithm, AND/OR Graphs, Problem reduction and AO* algorithm, Constraint Satisfaction problems, Game Playing Min Max Search procedure.
3	**Knowledge Representation** First Order Predicate Calculus, Resolution Principle and Unification, Inference Mechanisms Horn's Clauses, Semantic Networks, Frame Systems, Scripts, Conceptual Dependency AI Programming Languages.
4	**Natural Language Processing:** Origins and challenges of NLP – Language Modeling: Grammar-based LM, Statistical LM – Regular Expressions, Finite-State Automata – English Morphology, Tokenization, Part-of-Speech Tagging, Issues in Part-of-Speech tagging. Semantics and pragmatics-Requirements for representation, Syntax-Driven Semantic analysis, Introduction to syntactic analysis.
5	**Expert Systems** Introduction to Expert Systems, Architecture of Expert Systems, Expert System Shells, Knowledge Acquisition, Case Studies of Expert System. **Learning**: Concept of learning, Types of learning.

Text/Reference Books

SN	Name of Books
1	Nils J. Nilsson, "Principles of Artificial Intelligence (Symbolic Computation / Artificial Intelligence)",reprint edition, 2014.
2	Stuart Russell, Peter Norvig, "Artificial Intelligence: A Modern Approach", Pearson Education, 3 rd.edition, 2010
3	Daniel Jurafsky, James H. Martin Speech and Language Processing: An Introduction to Natural LanguageProcessing, Computational Linguistics and Speech, Pearson Publication, 2014.

UNIVERSITY OF TECHNOLOGY, JAIPUR
MCA

MCA 3rd Semester
Course Code: MCA 304
Course Tittle: Information Security

Course Objective:

1	The goal of this course is for students to maintain an appropriate level of awareness, knowledge and skill on the disciplines of technology
2	The students will learn techniques used to detect, respond to, and prevent network intrusions
3	The course bear a strong adherence to computer based technological skills and capabilities, and thereby resulting in efficiency to handle a variety of issues related to Information and Cyber Security in any organization
4	Apply important algorithmic design paradigms and methods of analysis

Couse Outcomes

CO 1 Upon successful completion of this course, students will be able to: Analyze and evaluate the cyber security needs of an organization. Determine and analyze software vulnerabilities and security solutions to reduce the risk of exploitation.

CO 2 Diagnose and investigate cyber security events or crimes related to computer systems and digital evidence.

CO 3 Protect data and respond to threats that occur over the Internet and locally.

COs and POs Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	-	-	-	-	-	-	-	-	-
CO2	3	2	2	-	-	-	-	-	-	-	-	-
CO3	3	3	2	-	-	-	-	-	-	-	-	1
CO4	3	2	3	1	2	-	-	-	-	-	-	2
CO5	2	2	3	1	2	-	-	-	-	-	-	2

UNIVERSITY OF TECHNOLOGY, JAIPUR
MCA

MCA 3rd Semester
Course Code: MCA 304
Course Tittle: Information Security

Syllabus

Credit: 3 **Max. Marks: 100**
40-44 Hours **End Term Exam: 3 Hours**

SN	CONTENTS
1	Introduction to Information Security: Attacks, Vulnerability, Security Goals, Security Services and mechanisms. Conventional substitution and transposition ciphers, One-time Pad, Block cipher and Stream Cipher, Steganography. Classical Encryption Techniques
2	Symmetric and Asymmetric Cryptographic Techniques: DES, AES, RSA algorithms. Hash Functions Message Authentication & Hash Functions: Authentication Requirements, Authentication Functions, Message Authentication Codes, Hash Functions, Birthday Attacks, Security of Hash Function & MACS, MD5 Message Digest Algorithm, Secure Hash Algorithm (SHA), Digital Signatures: Digital Signatures, Authentication Protocol, Digital Signature Standard (DSS), Proof Of Digital Signature Algorithm
3	Program Security: No malicious Program errors – Buffer overflow, Incomplete mediation, Time-of-check to Time-of- use Errors, Viruses, Trapdoors, Salami attack, Man-in-the- middle attacks, Covert channels.
4	Security in Networks: Threats in networks, Network Security Controls – Architecture, Encryption, Content Integrity, Strong Authentication, Access Controls, Wireless Security, Honeypots, Traffic flow security, Firewalls – Design and Types of Firewalls, Personal Firewalls, IDS, Email Security – PGP, S/MIME
5	Administering Security: Security Planning, Risk Analysis, Organizational Security policies. Legal Privacy and Ethical Issues in Computer Security: Protecting Programs and data, Information and the law, Rights of Employees and Employers, Software failures, Computer Crime, Ethical issues in Computer Security, case studies of Ethics.

Text/Reference Books

SN	Name of Books
1	William Stallings, Network Security Essentials: Applications and Standards, Prentice Hall, 4th edition,2010
2	Michael T. Goodrich and Roberto Tamassia, Introduction to Computer Security, Addison Wesley, 2011.
3	Alfred J. Menezes, Paul C. van Oorschot and Scott A. Vanstone, Handbook of Applied Cryptography, CRCPress, 2011..

UNIVERSITY OF TECHNOLOGY, JAIPUR
MCA

MCA 3rd Semester
Course Code: MCA 305
Course Tittle: Mobile Application Development

Course Objective:

1	Understanding of an open source and Linux-based Operating System for mobile devices such as smart phones and tablet computers.
2	Knowledge and ability to implement application development for mobile devices
3	.Getting programming experience of Android application development on either of the following operating systems –
4	Apply important algorithmic design paradigms and methods of analysis

Couse Outcomes

CO 1 know the components and structure of mobile application development frameworks for Android based mobiles;

CO 2 design and implement the user interfaces of mobile applications;.

CO 3 implement fragments and location based services in Android application;

COs and POs Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	-	-	-	-	-	-	-	-	-
CO2	3	2	2	-	-	-	-	-	-	-	-	-
CO3	3	3	2	-	-	-	-	-	-	-	-	1
CO4	3	2	3	1	2	-	-	-	-	-	-	2
CO5	2	2	3	1	2	-	-	-	-	-	-	2

UNIVERSITY OF TECHNOLOGY, JAIPUR
MCA

MCA 3rd Semester
Course Code: MCA 305
Course Tittle: Mobile Application Development

Syllabus

Credit: 3 **Max. Marks: 100**
40-44 Hours **End Term Exam: 3 Hours**

SN	CONTENTS
1	**INTRODUCTION**. Introduction to mobile applications, Market and business drivers for mobile applications, Difficulties in Mobile Development, Mobile Myths, When to Create an App, Types of Mobile App. Design Constraints for mobile applications, both hardware and software related, Architecting mobile applications, user interfaces for mobile applications, touch events and gestures
2	**ADVANCED DESIGN** Designing applications with multimedia and web access capabilities. Integration with GPS and social media networking applications, accessing applications hosted in a cloud computing environment, Design patterns for mobile applications, Understanding Application users, Information Design, Achieving quality constraints
3	**TECHNOLOGY I ANDROID** Establishing the development environment Android architecture Android Application Structure, Emulator, Android virtual device, UI design, Fragments, Activity, Services, broadcast receiver, Intents/Filters, Content provider-SQLite Programming, SQLITE open, Helper, SQLite Database, Interaction with server side applications
4	**Advanced ANDROID** Using Google Maps, GPS and Wi-Fi Integration, Android Notification, Audio Manager, Bluetooth, Camera and Sensor Integration, Sending SMS, Phone Calls, Publishing Android Application.Introduction to KOTLIN
5	**TECHNOLOGY II IOS** Introduction to Objective C iOS features UI implementation Touch frameworks Data persistence using Core Data and SQLite, Action and Outlets, Delegates and Storyboard, Location aware applications using Core Location and Map Kit, Integrating calendar and address book with social media application Using Wifi iPhone marketplace.

Text/Reference Books

SN	Name of Books
1	Reto Meier, Ian Lake,"Professional Android, 4th Edition", Wiley, 2018.
2	Neil Smyth "Android studio 2.2 Development Essentials 7th Edition" Payload Media 2017.

3	Paul Deitel, Harvey Deitel, Abbey Deitel and Michel Morgano, "Android for Programmers an App-DrivenApproach", Pearson, 2012.

MCA 3rd Semester
Course Code: MCA 306
Course Tittle: Big Data

Course Objective:

1	The aim of this course is to provide depth knowledge about Big data Technologies and tools used for Big data.
2	The students will learn to implement and work on tools to handle large volume of data in parallel and distributed environments. Retrieval and analysis of unstructured data are done using NOSQL database
3	Examine application of very large clusters of COTS computing systems for solving large data problems
4	Gain experience with NoSQL systems and Hadoop through hands-on projects.

Couse Outcomes

CO 1 Perform data gathering of large data from a range of data sources

CO 2 Critically analyze existing Big Data datasets and implementations, taking practicality, and usefulness metrics into consideration.

CO 3 Understand the role of statistics in the analysis of large of datasets.

COs and POs Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	-	-	-	-	-	-	-	-	-
CO2	3	2	2	-	-	-	-	-	-	-	-	-
CO3	3	3	2	-	-	-	-	-	-	-	-	1
CO4	3	2	3	1	2	-	-	-	-	-	-	2
CO5	2	2	3	1	2	-	-	-	-	-	-	2

UNIVERSITY OF TECHNOLOGY, JAIPUR
MCA

MCA 3rd Semester
Course Code: MCA 306
Course Tittle: Big Data

Syllabus

Credit: 3 **Max. Marks: 100**
40-44 Hours **End Term Exam: 3 Hours**

SN	CONTENTS
1	**Understanding Big Data:** Introduction, Need, Importance of Big data, Classification of Digital Data, Four Vs, Drivers for Big data, Big data Terminology, Industry examples and Top Challenges Facing Big Data, Responsibilities of data scientists, Technology Challenges for Big data, Convergence of key trends, Big data Architecture. **Big data Applications:** Healthcare, Finance, Advertising, Marketing, Transportation, Education, Government, Cyber Security etc.
2	**Web Analytics:** Big data and Marketing, fraud and big data, risk and big data, credit risk management, big data and algorithmic trading, Open-source technologies, cloud and big data, Crowd Sourcing Analytics, inter and trans firewall analytics.
3	**Hadoop Ecosystem:** Introduction to Hadoop, Features of Hadoop, Hadoop Versions, Hadoop Architecture, Introduction to Data Management and Data Access tools: Data Management using Flume, Oozie, Zookeeper; Hive, Pig, Avro, SQOOP for data access. Introduction to Data Processing and Data Storage tools: MapReduce, YARN, HDFS, HBase.
4	**HDFS**: HDFS concepts, Name Node, Design working of Hadoop distributed file system (HDFS). **MapReduce:** Introduction, MapReduce workflows, Split, map, combine, scheduling, shuffle and sort YARN. Problems & examples in MapReduce
5	**NO SQL Data Management:** Problem with Relational Database Systems. Introduction to NOSQL, Advantages of NOSQL, SQL versus NOSQL. Aggregate data models, key-value and document data models, relationships, graph databases, schema less databases.

Text/Reference Books

SN	Name of Books
1	ArshdeepBahga, Vijay Madisetti, “Big Data Analytics: A Hands-On Approach”, VPT, 2018
2	EMC Education Services, “ Data Science and Big Data Analytics: Discovering, Analyzing, Visualizingand Presenting Data”, 2015
3	Anil Maheshwari, “ Big Data”, McGraw-Hill; Second edition, 2019

UNIVERSITY OF TECHNOLOGY, JAIPUR
MCA

MCA 3rd Semester
Course Code: MCA 351
Course Tittle : ADA Lab

Syllabus

Credit: 1 **Max. Marks: 100**
40-44 Hours **End Term Exam: 3 Hours**

Lab Experiments
1. Linear search & binary search, Sorting Techniques
2. Single source shortest path-Dijkastra Algorithm
3. Greedy method: -knapsack problem
4. Greedy method minimum cost spanning tree
5. Traveling salesman problem – flow shop scheduling.
6. Dynamic Programming – 0/1 Knapsack
7. Dynamic Programming – traveling salesman problem
8. Backtracking 8-Queens problem
9. Backtracking Sum of Subset
10. Backtracking – graph coloring – Hamiltonian cycles– knapsack problems

UNIVERSITY OF TECHNOLOGY, JAIPUR
MCA

MCA 3rd Semester
Course Code: MCA 352
Course Tittle : Mobile Application Development Lab

Syllabus

Credit: 1 **Max. Marks: 100**
40-44 Hours **End Term Exam: 3 Hours**

Lab Experiments
1. Develop an application that uses GUI components, Font and Colors.
2. Write an android program to implement activity life cycle using toast messages with proper positioning
3. Develop an application that uses Layout Managers and event listeners.
4. Write an application that draws basic graphical primitives on the screen.
5. Write an application that basic graphical primitives and animations.
6. Develop an application that makes use of databases.
7. Develop an application that makes use of Notification Manager.
8. Develop a native application that uses GPS location information.
9. Implement an application that creates an alert upon receiving a message
10. Write a mobile application that makes use of feed.
11. Develop a mobile application to send an email.
12 .Mini Project using Android Studio

UNIVERSITY OF TECHNOLOGY, JAIPUR
MCA

MCA 3rd Semester
Course Code: MCA 353
Course Tittle : Summer Industrial Training Presentation

Mandatory Summer Training: **45 Working Days Summer Training** during Semester Break, of 100 Marks. Evaluation will be done in Semester-III Examinations.

GENERAL INSTRUCTIONS FOR PREPRATION OF SUMMER INDUSTRIAL TRAINNING PRESENTATION/ REPORT

I. Cover Page
II. Title Page
III. Certificate
IV. Acknowledgement

1. Table of Contents
2. **Introduction**
3. **Project Specification**
   a. **Project need**
   b. **Project Overview**
4. **Specific Requirements**
   I. External Interface Requirements
   II. Hardware Interfaces
   III. Software Interfaces
   IV. Communications Protocols (Networking Protocols)
   V. Security / Maintainability / Performance
   VI. **5.Software Product Features**
      I. System Architecture
      II. Database Requirements
      III. ER Diagram
      IV. Data Flow Diagram
      V. Use Case Diagrams
      VI. User Interfaces (Input Forms / Processing Forms/ Search Forms/ Output Forms)
      VII. Report Formats
5. **Drawbacks and Limitations**
6. **Proposed Enhancements**
7. **Conclusion**
8. **Bibliography**
9. **Annexure:**

a. User Interface Screens (Optional)
b. Output Reports with Data (if any)

Sample Program Code

UNIVERSITY OF TECHNOLOGY, JAIPUR
MCA

MCA 4th Semester Schema

Sr. No.	Subject Name	Subject Code	Subject Type	Credit Point	Tot. Max Marks	Int. Min Marks	Int. Max Marks	Ext. Min Marks	Ext. Max Marks
1	Software Project Management	MCA 301	Theoretical	3	100	12	30	28	70
2	Machine Learning	MCA 302	Theoretical	3	100	12	30	28	70
3	Industrial Project	MCA 303	Theoretical	6	100	12	30	28	70
4	SODECA	MCA 354		1	100				
				23	**400**	**36**	**90**	**68**	**210**

UNIVERSITY OF TECHNOLOGY, JAIPUR
MCA

MCA 4 th Semester
Course Code: MCA 401
Course Tittle: Software Project Management

Course Objective:

1	This course is aimed at introducing the primary important concepts of project management related to managing software development projects.
2	They will also get familiar with the different activities involved in Software Project Management
3	Software project management activity, and to complete a specific project in time with the available budget. –

Couse Outcomes

CO 1 Identify the different project contexts and suggest an appropriate management strategy;

CO 2 Practice the role of professional ethics in successful software development.

CO 3 Identify and describe the key phases of project management

COs and POs Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	-	-	-	-	-	-	-	-	-
CO2	3	2	2	-	-	-	-	-	-	-	-	-
CO3	3	3	2	-	-	-	-	-	-	-	-	1

CO4	3	2	3	1	2	-	-	-	-	-	-	2
CO5	2	2	3	1	2	-	-	-	-	-	-	2

MCA 4th Semester
Course Code: MCA 401
Course Tittle: Software Project Management

Syllabus

Credit: 3 **Max. Marks: 100**
40-44 Hours **End Term Exam: 3 Hours**

SN	CONTENTS
1	**Project Management:** The management spectrum, the people, the product, the process, the project, critical practices Metrics for Process and Project: Metrics in the process and project Domains, software measurements, metrics for software quality, integrating metrics within software process, metrics for small organizations, establishing a software metrics program. Introduction of Project Management tool: Trello, Jira, Asana, Zoho, Wrike
2	**Estimation:** Project planning Process, software scope and feasibility, resources, software project estimation, empirical estimation models, estimation for object oriented projects, estimation forAgile development and web engineering projects, the make/buy decision
3	**Project Scheduling:** Basic concepts, project scheduling, defining a task set and task network, scheduling, earned value analysis. Risk Management: Reactive V/S proactive Risk Strategies, software risks, Risk identification, Risk projection, risk refinement, risk mitigation, monitoring and management, the RMMM plan Quality Planning: Quality Concepts, Procedural Approach to Quality Management, Quantitative Approaches to Quality Management, Quantitative Quality Management Planning, Setting the Quality Goal, Quality Process Planning, Defect Prevention Planning
4	**Quality Management:** Quality Concepts, Software Quality assurances, software reviews, formal technical reviews, Formal approaches to SQA, Statistical Software Quality assurances, Change Management: software Configuration Management, The SCM repository, SCM Process, Configuration Management for Web Engineering
5	**Project Execution And Closure:** Reviews. The Review Process, Planning, Overview and Preparation, Group Review Meeting, Rework and Follow-up, One-Person Review, Guidelines for Reviews in Projects, Project Closure: Project Closure Analysis, The Role of Closure Analysis, Performing Closure Analysis. **Project Monitoring and Control:** Project Tracking, Activities Tracking, Defect Tracking, Issues Tracking, Status Reports, Milestone Analysis, Actual Versus Estimated Analysis of Effort and Schedule, Monitoring Quality.

Text/Reference Books	
SN	**Name of Books**
1	Dr. P. Rizwan Ahmed, " Software Project Management", 1st Edition, Margham Publications, 2016
2	Walker Royce, "Software Project Management, A Unified Framework", 1st Edition, 2006.

3	Joel Henry, "Software Project Management", 1st Edition, Pearson Education, 2006

MCA 4th Semester
Course Code: MCA 402
Course Tittle: Machine Learning

Course Objective:

1	To understand the basic theory underlying machine learning
2	To be able to formulate machine learning problems corresponding to different applications.
3	To understand a range of machine learning algorithms along with their strengths and weaknesses.

Couse Outcomes

CO 1 Appreciate the importance of visualization in the data analytics solution

CO 2 Apply structured thinking to unstructured problems.

CO 3 Learn algorithmic topics of machine learning and mathematically deep enough to introduce the required theory

COs and POs Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	-	-	-	-	-	-	-	-	-
CO2	3	2	2	-	-	-	-	-	-	-	-	-
CO3	3	3	2	-	-	-	-	-	-	-	-	1
CO4	3	2	3	1	2	-	-	-	-	-	-	2
CO5	2	2	3	1	2	-	-	-	-	-	-	2

UNIVERSITY OF TECHNOLOGY, JAIPUR
MCA

MCA 4th Semester
Course Code: MCA 402
Course Tittle: Machine Learning

Syllabus

Credit: 3 **Max. Marks: 100**
40-44 Hours **End Term Exam: 3 Hours**

SN	CONTENTS
1	**Introduction** Machine Learning – Machine Learning Foundations, Overview, Applications, Types of Machine Learning – Basic Concepts in Machine Learning – Examples of Machine Learning, Perspectives/Issues in Machine Learning, AI vs. Machine Learning
2	**Supervised Learning** Introduction, Linear Models of Classification – Linear Regression – Logistic Regression – Bayesian Logistic Regression – Probabilistic Models Neural Network-Feed Forward Network Functions – Error Back Propagation – Regularization - Bayesian Neural Networks – Radial Basis Function Networks, Ensemble Methods – Random Forest – Bagging – Boosting
3	**Unsupervised Learning** Clustering – K-Means Clustering – EM (Expectation Maximization) – Mixtures of Gaussians EM algorithm in General – The Curse of Dimensionality – Dimensionality Reduction – Factor Analysis – Principal Component Analysis – Probabilistic PCA – Independent Component Analysis
4	**Probabilistic Graphical Models** Directed Graphical Models – Bayesian Networks – Exploiting Independence Properties –From Distributions to Graphs – Examples – Markov Random Fields – Inference InGraphical Models – Learning - Naïve Bayes Classifiers – Markov Models – Hidden Markov Models. Undirected graphical Models – Conditional Independence Properties
5	**Advanced Learning** Basic Sampling Method – Monte Carlo, Reinforcement Learning-Introduction-The Learning Task, and Elements of Reinforcement Learning. Computer Vision: Applications ofComputer Vision Using Machine Learning: Speech Processing, Natural Language Processing..

Text/Reference Books

SN	Name of Books
1	Stephen MarsLand, “Machine Learning-An Algorithmic Perspective”, CRC Press, 2009
2	Kevin P. Murphy, “Machine Learning: A Probabilistic Perspective”, MIT Press, 2012
3	M. Gopal, “Applied MACHINE LEARNING”, McGraw-Hill, 2018

UNIVERSITY OF TECHNOLOGY, JAIPUR
MCA

MCA 4th Semester
Course Code: MCA 403
Course Tittle: Industrial Project

Credit 1

The industrial project as part of the curriculum will be held in the institute as one of the laboratories. This may be in continuation to the project under taken by the student during industrial training and/or of industrial nature and/or have good industrial significance and/or may be done in collaboration with industry (as per suitability atthe institute level).

The evaluation will be done in the institute by one internal examiner and one external examiner (from outside the institute) appointed by University

Guidelines for Submission of Industrial Project

All the candidates of MCA are required to submit a **Final Project Report** based on the work done byhim/her during the project period.

THE GUIDE

The Guide for MCA would be a person having MCA with 3 years' experience in academic/Industry.

PROJECT TIME

The MCA Major Projects would be at list 12 Weeks and carries a total of 100 marks. The Project topicsshould be based on syllabus or as per the requirement of specific industry in sync with the course. Everystudent has to prepare and submit the project work in a group or separately (Max two students).

Plagiarism would not be accepted under any circumstances.

Project Report should compulsorily include the software development/ soft copy should also be submittedin CD along with Hard Bound Project report.

Project Evaluation Guidelines.

The project is evaluated on the basis of following aspects:

Presentation & Software execution:

40% of total marks.Project report

(documentation): 30% of total marks.

Viva-Voce: 30% of total marks.

SUMMARY/ABSTRACT

All students must submit a summary/abstract separately with the project report. Summary, preferably,should be of about 3-4 pages. The content should

be as brief as is sufficient enough to explain the objective and implementation of the project that the candidate is going to take up. The write up must adhere to the guidelines and should include the following :

- Name / Title of the Project and about the Problems
- Why is the particular topic chosen?
- Objective and scope of the Project
- Methodology (including a summary of the project)
- Hardware & Software to be used
- Testing Technologies used

TOPIC OF THE PROJECT- This should be explicitly mentioned at the beginning of the Synopsis. Thisbeing the overall impression on the future work, the topic should be able to corroborate the work.

OBJECTIVE AND SCOPE: This should give a clear picture of the project. Objective should be clearlyspecified. What the project ends up to and in what way this is going to help the end user has to be mentioned.

PROCESS DISCRIPTION: The process of the whole software system proposed, to be developed, should be mentioned in brief. This may be supported by DFDs / Flowcharts to explain the flow of the information

RESOURCES AND LIMITATIONS: The requirement of the resources for designing and developing the proposed system must be given. The resources might be in form of the hardware/software or the data from the industry. The limitation of the proposed system in respect of a larger and comprehensive systemmust be given.

CONCLUSION: The write-up must end with the concluding remarks-briefly describing innovation in theapproach for implementing the Project, main achievements and also any other important feature that makes the system stand out from the rest.

The following suggested guidelines must be followed in preparing the Final Project Report

The industrial project as part of the curriculum will be held in the institute as one of the laboratories. This may be in continuation to the project under taken by the student during industrial training and/or ofindustrial nature and/or have good industrial significance and/or may be done in collaboration with industry (as per suitability at the institute level). The evaluation will be done in the institute by one internal examiner and one external examiner (from outside the institute) appointed by University

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The Project study and development should be on the following lines:

FORMAT OF THE STUDENT PROJECT REPORT ON COMPLETION

1. Cover Page as per specified format
2. Declaration Certificate
3. Acknowledgement
4. Certificate of the Company /Institute
5. Main Report

6. Introduction

- Objectives
- Problem description
- About Organization

1. System Study

1.1 System with limitations
1.2 Significance of the Project
1.3 Beneficiaries of the System
1.4 Feasibility study

2.System Analysis

Requirement Specification

i. Functional Requirement.
ii. Non-Functional Requirement.
iii. User Requirement
iv. System Requirement

3.System Design

a) Data Flow Diagram
b) E-R Diagrams
c) Use Case Diagrams
d) Flow Charts
e) Database Tables
f) Input output Forms

4 **Devlopement**

a) Environment
b) Coding Style
c) Coding Techniques

5. Testing

a. Test Case

6. System Security

    a. Checks and Control
    b. Encryption, secure

2. Conclusion/Future Enhancement

3. Bibliography

The reports prepared by the students MUST NOT have only definitions of the above mentioned topics but should explicitly state these in the context of the project undertaken. They should submit the actual work done in details.

General instructions about preparation of report

Paper: A4

Font: Times New Roman, Bookman Old Style

Chapter Heading: 16pt, Sub heading: 14,

Sub-Sub Headings: 12Bold Running

Matter: 12 pt

Paragraph

Gap: 6Pt

Maximum

Line Gap: 1.5

Margins: Left 1.5, Right, Top and Bottom 1 inch

All diagrams/figures and tables should be appropriately numbered.

Submission of Project Report to the University:

The student will submit his/her project report in the prescribed format. The Project Report should include:

- Copy of the Summary/Abstract. To be mailed to college/Institute well in advance mentioning theabout future project which would be undertaken.
- Two Hard Bound Copies of the Project Report which is around 80 to 120 pages.
- Soft copy of project on CD/DVD/Pen Drive pasted inside of the back cover of the project report.

<u>Binding & Color code of the report/Thesis</u>

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MCA

For MCA – IV Semester
(Industrial Project work)
Hard Bound Report
Cover/Background of the Page of Project Report – **Sky Blue**
Letters in Black