SHIVAJI UNIVERSITY KOLHAPUR

Syllabus for

FIRST YEAR,

MASTER OF COMPUTER APPLICATION (MCA)

Under Faculty of Science and Technology
(Engineering and Technology)

(w. e. f. Academic Year: 2022-23)

FIRST YEAR MASTER IN COMPUTER APPLICATION– CBCS PATTERN

SEMESTER – I

Sr. No		TEACHING SCHEME									EXAMINATION SCHEME								
		THEORY			TUTORIAL			PRACTICAL			THEORY					PRACTICAL		TERM WORK	
		Credit	No. of Lectures	Hours	Credit	No. of Hours	Hours	Credit	No. of Hours	Hours	Mode	Marks	Total Marks	Min		MAX	MIN	MAX	MIN
1	PCC-MCA-C01	3	3	3	1	1	1	-	-	-	CIE	30	100	12		-	-	25	10
											ESE	70		28					
2	PCC-MCA-C02	3	3	3	1	1	1	-	-	-	CIE	30	100	12		-	-	25	10
											ESE	70		28					
3	PCC-MCA-C03	3	3	3	-	-	-	2	4	4	CIE	-	-	-		50	20	50	20
											ESE	-							
4	PCC-MCA-C04	4	4	4	-	-	-	1	2	2	CIE	30	100	12		50	20	50	20
											ESE	70		28					
5	BSC-MCA-B01	3	3	3	1	1	1	-	-	-	CIE	30	100	12		-	-	25	10
											ESE	70		28					
6	MNG-MCA-M01	1	1	1	-	-	-	1	2	2	-	-	-	-		25	10	50	20
	TOTAL	17	17	17	3	3	3	4	8	8			400			125		225	

SEMESTER – II

Sr. No		TEACHING SCHEME									EXAMINATION SCHEME								
		THEORY			TUTORIAL			PRACTICAL			THEORY					PRACTICAL		TERM WORK	
		Credit	No. of Lectures	Hours	Credit	No. of Hours	Hours	Credit	No. of Hours	Hours	Mode	Marks	Total Marks	Min		MAX	MIN	MAX	MIN
1	PCC-MCA-C05	3	3	3	1	1	1	-	-	-	CIE	30	100	12				25	10
											ESE	70		28					
2	PCC-MCA-C06	3	3	3	-	-	-	2	4	4	CIE	30	-	-		50	20	50	20
											ESE	70							
3	PCC-MCA-C07	3	3	3	1	1	1	-	-	-	CIE	30	100	12				50	10
											ESE	70		28					
4	PCC-MCA-C08	3	3	3	-	-	-	2	4	4	CIE	30	100	12		50	20	50	20
											ESE	70		28					
5	BSC-MCA-C09	3	3	3	-	-	-	1	2	2	CIE	30	100	12		-	-	25	10
											ESE	70		28					
6	MNG-MCA-M02	1	1	1	-	-	-	1	2	2	-	-	-	-		25	10	25	10
	TOTAL	16	16	16	2	2	2	6	12	12			400			125		225	
	TOTAL	33	33	33	5	5	5	10	20	20			800			250		450	

• Candidate contact hours per week : 30 Hours (Minimum)	• Total Marks for MCA Sem I & II : **800 + 250 + 450 = 1500**
• Theory and Practical Lectures : 60 Minutes Each	• Total Credits for MCA Sem I & II : **48 (SEM-I: 24 + SEM–II: 24)**
• In theory examination there will be a passing based on separate head of passing for examination of CIE and ESE.	
• There shall be separate passing for theory and practical (term work) courses.	
• ****** Indicates that the theory examination is of 03 hours duration.	

Note:

1. **PCC-MCA:** Professional Core Course (Master in Computer Applications).
2. **BSC-MCA:** Basic Science Course (Master in Computer Applications).
3. **MNG-MCA:** Management Course (Master in Computer Applications).

Semester -I

Sl. No	Code No.	Subject	Semester	Credits
1.	PCC- MCA-C01	Computer Organization	1	4
2.	PCC-MCA-C02	Operating System	1	4
3.	PCC- MCA-C03	Python Programming	1	5
4.	PCC- MCA-C04	Database Management System	1	5
5.	BSC-MCA-B01	Mathematical Foundations	1	4
6.	MNG-MCA-M01	Communication Skills	1	2

Semester - II

Sl. No	Code No.	Subject	Semester	Credits
1.	PCC- MCA-C05	Design and Analysis of Algorithms	2	4
2.	PCC- MCA-C06	Web Technology	2	5
3.	PCC- MCA-C07	Software Engineering	2	4
4.	PCC- MCA-C08	Java Programming	2	5
5.	PCC-MCA-C09	Data Communication and Network	2	4
6.	MNG-MCA-M02	Business Communication	2	2

***For Theory CIE 30 Marks,
Two tests of 30 marks at college should be conducted and best of two marks should be communicated to university.

***Guidelines to paper setter:
In theory ESE examination of 70 marks following points should be considered,
1. First question of 10 marks should be allotted to Objective type questions.
2. In Remaining 60 marks, four questions of 15 marks should be considered

SHIVAJI UNIVERSITY, KOLHAPUR

Master of Computer Application (MCA)

Under Faculty of Science and Technology (Engineering and Technology)
Part I Semester I
MCA-C01: Computer Organization

Course Details:

Course Details Class	First Year M.C.A. Sem-I
Course Code and Course Title	PCC- MCA-C01: Computer Organization
Prerequisites	Computer Fundamentals
Teaching scheme: Lectures + Tutorial	3 Hrs. + 1 Hr.
Credits	3 + 1
Evaluation Scheme ESE + CIE for Theory	70 (ESE) + 30 (CIE)

Teaching scheme	Examination scheme
Lectures: 3 Hrs. /Week	Theory: 100 Marks, 70 (ESE) +30 (CIE)
Tutorial: 1 Hr./Week	TW: 25 Marks

Course Outcomes:
1. To understand the structure and components of computer.
2. To familiarize a student with number systems and logic gates.
3. To understand the combinational and sequential circuits.
4. To familiarize a student with control unit.
5. To understand the memory subsystems.

UNIT 1 **(12 HOURS)**

Function and structure of a computer, Functional components of a computer, Interconnection of components, Performance of a computer, Introduction to Computer Organization, CPU Organization Memory subsystem Organization, and Interfacing, I/O Subsystem Organization and Interfacing, a relative Simple Computer, Software, hardware interaction, layers in computer architecture, Central processing and machine language.

UNIT 2 **(12 HOURS)**

Data Representation: Introduction to Digital Computer, Number Systems- Binary, Octal and Hexadecimal, Inter-conversion between number systems, Coding Schemes.
Boolean Algebra: Binary Logic, Logic Gates, Boolean Algebra, Postulates of Boolean Algebra, Boolean Function.

UNIT 3   **(12 HOURS)**
Combinational Circuits: Introduction, Design Procedure, Half Adder, Full Adder, Decoder, Encoder, Multiplexer, Demultiplexer.
Sequential Circuits: Introduction Flip Flops,Clocked SR Flip flop, D flip flop, T flip flop, JK and JK master-slave flip flop, Registers, Shift Registers.

UNIT 4   **(12 HOURS)**
Control Unit: Data path and control path design, microprogramming v/s hardwired control, RISC v/s CISC
Memory Subsystems: Storage technologies, memory array organization, memory hierarchy, interleaving, cache memory, Auxiliary memory, Associative Memory and virtual memory.

Text Books:
1. Computer Architecture & Organization J. P. Hayes MGH 3rd Edition.
2. C. Hamacher, Z. Vranesic and S. Zaky, "Computer Organization", McGrawHill, 2002.

References:
1. W. Stallings, "Computer Organization and Architecture - Designing for Performance", Prentice Hall of India, 2002.
2. Computer System Architecture, M. Morris Mano, Third Edition, Pearson Education, 2007
3. D. A. Patterson and J. L. Hennessy, "Computer Organization and Design - The Hardware/Software Interface", Morgan Kaufmann,1998.
4. Digital Computer Electronics Malvino TMH 3rd Edition.

Master of Computer Application (MCA)

Under Faculty of Science and Technology (Engineering and Technology)

Part I Semester I

MCA-C02: Operating System

Course Details:

Course Details Class	First Year M.C.A. Sem-I
Course Code and Course Title	PCC- MCA-C02: Operating System
Prerequisites	Basics of Computer Hardware and software
Teaching scheme: Lectures + Tutorial	3 Hrs. + 1 Hr.
Credits	3 + 1
Evaluation Scheme ESE + CIE for Theory	70 (ESE) + 30 (CIE)

Teaching scheme	Examination scheme
Lectures: 3 Hrs. /Week	Theory: 100 Marks, 70 (ESE) +30 (CIE)
Tutorial: 1 Hr./Week	TW: 25 Marks

Course Outcomes:
1. To understand the basic concepts and functions of operating systems.
2. To understand Processes and Threads
3. To analyze Scheduling algorithms.
4. To understand the concept of Deadlocks.
5. To analyze various memory management schemes.
6. To understand I/O management and File systems.
7. To be familiar with the basics of Distributed Operating System

UNIT 1   **(12 HOURS)**

Introduction: Operating system definition, Functions of Operating System, Logical View, System View, Types of operating System, System Calls, System Programs.

Processes: Process Concept, Thread Concept, Difference between Process and Thread, Process Control Block, Process operations, Inter-process Communication, Communication in Client-Server.

UNIT 2   **(12 HOURS)**

CPU Scheduling: Scheduling Concept, Scheduling Criteria, Scheduling algorithms, Scheduling Evaluation, Simulation Concept.

Process Synchronization: Synchronization concept, Need for Synchronization, Critical Section Problem, Semaphore, Monitor.

Deadlock: Deadlock concepts, Necessary Conditions for Deadlock, Deadlock Prevention, Deadlock Avoidance, Bankers Algorithm, Deadlock Detection, Deadlock Detection Algorithm for Single and Multiple Instance of Resources, Deadlock Recovery.

UNIT 3   **(12 HOURS)**

Memory Management: Concept, Memory Management Techniques, Contiguous &Non Contiguous allocation, Relocation, Compaction, Logical & Physical Memory, Conversion of Logical to Physical address, Paging, Segmentation, Segment with paging, Virtual Memory Concept, Demand paging, Page fault.

File Management: File Structure, Protection, FILE system, Implementation, Directory structure, Free Space Management, File Access Methods, File Allocation Methods, Recovery.

UNIT 4   **(12 HOURS)**

Disk Management: Disk Structure, Disk Scheduling algorithm, Disk management, Swap Space concept and Management, RAID structure, Disk performance issues.

Distributed Operating System: Difference between Distributed & Centralized OS, Advantages of Distributed OS, Types of Distributed OS

Text Books:
1. Operating System Silberschatz, Galvin , Gagne, Wiley publication
2. Operating System Concepts and Design , Milan Milenkovic, MGH

References:
1. Distributed Operating System P.K. Sinha, PHI
2. Operating system AchyutGodbole
3. Operating System In Depth Doeppner Wiley India
4. Operating System Rohit KhuranaVikas pub.

Master of Computer Application (MCA)

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Part I Semester I

MCA-C03: Python Programming

Course Details:

Course Details Class	First Year M.C.A. Sem-I
Course Code and Course Title	PCC- MCA-C03: Python Programming
Prerequisites	Basics of Programming Languages C, C++
Teaching scheme: Lectures + Practical	3 Hrs. + 4 Hr.
Credits	3 + 2
Evaluation Scheme ESE + CIE for Theory	70 (ESE) + 30 (CIE)

Teaching scheme	Examination scheme
Lectures: 3 Hrs. /Week	Theory: 100 Marks, 70 (ESE) +30 (CIE)
Practical: 4 Hr./Week	TW: 50 Marks

Course Outcomes:

1. To Learn Basic Syntax of Python Programming.
2. To understand and implement concepts of object oriented methodology using Python.
3. To learn collections in Python.
4. To develop problem solving skills and their implementation through Python.

UNIT 1   **(12 HOURS)**

Introduction to Python: an interpreted high level language, interactive mode and script mode. Variables, Expressions and Statements, Variables and Types-mutable and Immutable variable and Keywords. Operators and Operands in Python. (Arithmetic, relational and logical operators), Operator precedence .Expressions and Statements (Assignment statement); Taking input (using raw_input() and input()) and displaying output - print statement, Comments in Python. Conditional and Looping Construct if - else statement and nested if – else while, for, use of range function in for, Nested loops, break, continue.

UNIT 2   **(12 HOURS)**

Functions: Built-In Function, invoking built in functions, Functions from math, random, time & date,User Define Function. **Strings:** Creating, initializing and accessing the elements; String operators: +, *, in, not in, range, slice [n:m], String built in functions & methods,Strings constants defined in string module, Regular Expression and Pattern Matching.

UNIT 3 (12 HOURS)

Lists: Concept of mutable lists, creating, initializing and accessing the elements of list,List operations. **Tuples:** Immutable concept, creating, initializing and accessing the elements in a tuple; Tuple functions: cmp(), len(), max(), min(), tuple(). **Sets:**Concept of Sets, creating, initializing and accessing the elements of Sets operation(Membership, union, intersection, difference, and symmetric difference. **Dictionaries:**Concept of key-value pair, creating, initializing and accessing the elements in a dictionary, Traversing, Dictionary functions & Methods.

UNIT 4 (12 HOURS)

Modules: Executing modules as scripts, The Module Search Path, "Compiled" Python files Standard Modules , The dir( ) Function ,Packages Importing * From a Package. I/O and File Handling:,Output Formatting ,Reading and Writing Files(text and binary mode).Errors and **Exceptions:** Syntax Errors, Exceptions, Handling Exceptions, Raising Exceptions. Introduction to Object Oriented concepts in Python.

This course should consist of 10 to 12 programming exercises with focus on covering the hands-on aspects.

Text Books
1. Learning Python By Mark Lutz,O'Reilly Publication
2. Programming with python, A users Book, Michael Dawson, Cengage Learning
3. Python Essential Reference, David Beazley, Third Edition 5. Python Bible

References:
1. Practical Programming: An introduction to Computer Science Using Python, second edition, Paul Gries, Jennifer Campbell, Jason Montojo, The Pragmatic Bookshelf.
2. Python for Informatics: Exploring Information, Charles Severance
3. John V Guttag. "Introduction to Computation and Programming Using Python", Prentice Hall of India
4. R. Nageswara Rao, "Core Python Programming", Dreamtech
5. Python Learning Guide (BPB publications)

Master of Computer Application (MCA)

Under Faculty of Science and Technology (Engineering and Technology)

Part I Semester I
MCA-C04: Database Management System

Course Details:

Course Details Class	First Year M.C.A. Sem-I
Course Code and Course Title	**PCC- MCA-C04: Database Management System**
Prerequisites	**Basics of Database**
Teaching scheme: Lectures + Practical	**4 Hrs. + 2 Hr.**
Credits	**4 + 1**
Evaluation Scheme ESE + CIE for Theory	**70 (ESE) + 30 (CIE)**

Teaching scheme	Examination scheme
Lectures: 4 Hrs. /Week	**Theory: 100 Marks,** 70 (ESE) +30 (CIE)
Practical: 2 Hr./Week	**TW: 50 Marks**

Course Outcomes:
1. Learn Basics of DBMS and RDBMS.
2. Learn and practice data modeling using the entity-relationship and developing database designs.
3. Understand the use of Structured Query Language (SQL) and learn SQL syntax.
4. Apply normalization techniques to normalize the database
5. Understand the needs of database processing and learn techniques for controlling the consequences of concurrent data access.

UNIT 1 **(12 HOURS)**

Basics Of DBMS: Database Concept, Characteristics and architecture of DBMS, Database users, 3-tier architecture of DBMS-its advantages over 2-tier, Introduction of Parallel, Distributed Databases, Mobile databases and Cloud databases.

UNIT 2 **(12 HOURS)**

Introduction to RDBMS: Entity introduction, characteristics, Comparison between DBMS, RDBMS, Generalization and Aggregation

Normalization: Functional dependency, types of normalization (1NF, 2NF, 3NF, BCNF).

Data constraint: Primary key, Foreign key, Unique key, Null, Not Null, Default key.

UNIT 3 **(12 HOURS)**
SQL: Introduction to SQL, Features of SQL, Basic data types, SQL statements/commands, Set operations in SQL, order by and group by clause, between, in, like, create index, view and join command Nested queries, GRANT and REVOKE, Commit, Rollback, Save point. Join concept, Join Types, View.
Introduction to PL/SQL: Introduction, Difference between SQL AND PL/SQL, Block definition structure and Data types, Block Functions, cursor, trigger, procedures, exception handling.

UNIT 4 **(12 HOURS)**
Concurrency Control and Transaction Management: Transaction processing and Concurrency, Concept of transaction processing, ACID properties, Locking techniques, Timestamp based protocols, Granularity of data items, Deadlocks. Database Recovery & Backup.

This course should consist of 10 to 12 programming exercises with focus on covering the hands-on aspects.

Text Books:
1. Introduction to database systems C. J. Date Pearsons Education 8th
2. Database system concept Korth, Silberschatz and Sudarshan MGH 5th

References:
1. Fundamentals of Database Systems Elmasri Navathe PearsonEducation5th
2. SQL /PL SQL For Oracle 11G BlackBook Dr.Deshpande WileyDreamtech2012
3. ORACLE PL/SQL Programming Scott Ulman TMH 9th
4. SQL, PL/SQL the programming language of Oracle Ivan Bayross BPB 4th
5. Advance Database Management System hakrabharati/DasguptaWileyDreamtech2011
6. Database Management systems Ramakrishnan&Gehrke, McGraw-Hill,3rd Ed..

Master of Computer Application (MCA)

Under Faculty of Science and Technology (Engineering and Technology)

Part I Semester I

MCA-B01: Mathematical Foundations

Course Details:

Course Details Class	First Year M.C.A. Sem-I
Course Code and Course Title	**BSC- MCA-B01: Mathematical Foundations**
Prerequisites	**Basics of Set theory, algebra**
Teaching scheme: Lectures + Tutorial	**3 Hrs. + 1 Hr.**
Credits	**3 + 1**
Evaluation Scheme ESE + CIE for Theory	**70 (ESE) + 30 (CIE)**

Teaching scheme	Examination scheme
Lectures: 3 Hrs. /Week	**Theory: 100 Marks,** 70 (ESE) +30 (CIE)
Tutorial: 1 Hr./Week	**TW: 25 Marks**

Course Outcomes:

1. Students completing this course will be able to express a logic sentence in terms of predicates, quantifiers, and logical connectives.
2. Students completing this course will be able to apply the rules of inference and methods of proof including direct and indirect proof forms, proof by contradiction, and mathematical induction.
3. Students completing this course will be able to use tree and graph algorithms to solve problems.
4. Students completing this course will be able to evaluate Boolean functions and simplify expressions using the properties of Boolean algebra.

UNIT 1   (12 HOURS)

Set theory and Relations

Elementary set theory. universal set, subset, representation of sets, operations, distributive and De Morgan's laws, characteristic function, computer representation of sets.

Relations & digraphs.Relation, matrix representation, digraph, paths in relation, Properties, equivalence relation, operations on relation, Computer representation of sets.

UNIT 2   (12 HOURS)

Functions and recurrence relations

Functions, Types of functions, functions for computer science, permutation, functions and their manipulations. Recurrence Relations and Solutions,Linear relations with two indices, Principles of inclusions & exclusions.

UNIT 3 (12 HOURS)

Lattice and Boolean algebra

Order relations and structures, Partially ordered sets, Externals element of poset, Lattices and their properties, Finite Boolean algebras, properties.

UNIT 4 (12 HOURS)

Mathematical logic and Theory of inference

Mathematical Logic: Statements and notations, Connectives, Normal forms, Theory of inference for Statement calculus.

Text Books:

1. A. Doerr, Discrete Mathematics for Computer Science,(Galgotia-86).
2. Kolman B. Busby, Ross S.C.: Discrete Mathematical Structures for Computer Science, (Prentice Hall).

References:

1. Olympia Nicodimi : Discrete Mathematics, (CBS publications and distributors)
2. Joshi K.D., Discrete Mathematics, (Wiely Eastern).
3. Liu C.L: Elements of Discrete Mathematics,(TMH).
4. S. Sahni, Concepts in Discrete Mathematics,(Camclot Publisher,USA).
5. Tremblay J.P. and Manohar, R:Discrete Mathematical Structures with applications to Computer Science.(McGraw-Hill book company)
6. Schaums series: Discrete Mathematics. Isaac, A Somasundaram

Master of Computer Application (MCA)
Under Faculty of Science and Technology (Engineering and Technology)
Part I Semester I
MCA-M01: Communication Skills

Course Details:

Course Details Class	First Year M.C.A. Sem-I
Course Code and Course Title	MNG- MCA-M01: Communication Skills
Prerequisites	Oral, Written Communication
Teaching scheme: Lectures + Practical	1 Hrs. + 2 Hr.
Credits	1 + 1
Evaluation Scheme ESE + CIE for Theory	70 (ESE) + 30 (CIE)

Teaching scheme	Examination scheme
Lectures: 1 Hrs. /Week	Theory: 100 Marks, 70 (ESE) +30 (CIE)
Practical: 2 Hr./Week	TW: 50 Marks

Course Outcomes:

The objectives of this course are to introduce communication techniques, professional correspondence techniques and enhance writing skills of the students.

UNIT 1 (12 HOURS)

Communication: Nature and Importance of Communication, Objectives of Communication, Importance of Communication, Process and barriers to Communication, Elements of Communication, Forms of Communication.

Verbal Communication Techniques: Art of Speaking, Speech Styles. Oral Presentation, Preparation of Formal Speech, Meetings, Interviews, Group Discussion, Debate.

UNIT 2 (12 HOURS)

Non-verbal Communication: Meaning, Characteristics & classification of Non-verbal Communication, Body Language, Gestures, Postures. Listening & observation skills.

Rapid review of Grammar: Corrections of common errors, Verb and its subject, forms of verb, Use of phrases and idioms, Use of infinitive Gerund and Participle, Errors & Use of Adjective and adverb , Punctuation and capitalization.

Text Books:
1. R.K. Chaddha Communication Techniques and skills – DhanpalRai Publication, NewDelhi.
2. Pravil S. R. Bhatia, Professional Communication Skills- S. Chand and Co.,NewDelhi.
3. J.D.O'Connor, Better English pronounciation.

References:
1. Wren and Martin, Highschool English Grammer and Composition – Chand and Co.,New Delhi.
2. Sunita Mishra, C.Muralikrishna, Communication Skills for Engineers – Pearson Education.
3. Aspi Doctor, Principles and Practice of Business Communication Rhoda Doctor, Sheth Publication, Mumbai.
4. John Collin, "Perfect Presentation", Video Arts MARSHAL
5. Jenny Rogers " Effective Interviews", Video Arts MARSHAL
6. Raman Sharma, " Technical Communications", OXFORD

Master of Computer Application (MCA)

Under Faculty of Science and Technology (Engineering and Technology)

Part I Semester II

MCA-C05: Design and Analysis of Algorithms

Course Details:

Course Details Class	First Year M.C.A. Sem-I
Course Code and Course Title	PCC- MCA-C05: Design and Analysis of Algorithms
Prerequisites	Basic of Computer Algorithm and flowchart
Teaching scheme: Lectures + Tutorial	3 Hrs. + 1 Hr.
Credits	3 + 1
Evaluation Scheme ESE + CIE for Theory	70 (ESE) + 30 (CIE)

Teaching scheme	Examination scheme
Lectures: 3 Hrs. /Week	Theory: 100 Marks, 70 (ESE) +30 (CIE)
Tutorial: 1 Hr./Week	TW: 25 Marks

Course Outcomes:
1. Analyze the asymptotic performance of algorithms.
2. Compare algorithms based on time & space complexity.
3. To learn how data structure concepts are useful in problem solving..
4. To implement different ways of data structures such as stacks, linked lists and trees
5. Understand different algorithm design approaches.

UNIT 1 (12 HOURS)

Algorithm Analysis: Introduction to algorithms, analyzing and designing algorithms, Growth functions, asymptotic notations, Recursive algorithm complexity.

Solving recurrences: Substitution method, recursion tree method, master method.

Searching: Binary search.

Sorting: Quick sort, Counting sort, Radix sort, Merge sort, Heap sort, Insertion sort and selection sort.

UNIT 2 (12 HOURS)

Linear Data Structures:

Linked Lists - Linked Representation in memory, traversing and searching a linked list, insertion and deletion from a linked list, singly.

Stack - Definition, array and linked representation of stacks, arithmetic expression, polish notation, application of stack.

Queue - Definition, array and linked representation of Queue.

UNIT 3   **(12 HOURS)**

Non-Linear Data Structures:

Trees - General tree, Binary tree, binary search tree, operations on binary search tree, AVL tree, Red-Black Trees, B-trees.

Graphs - Representations of graph, Traversing Graphs, Breadth-first search, Depth-First Search, topological sort.

UNIT 4   **(12 HOURS)**

Algorithm design approaches:

Greedy Algorithm - General Characteristics of greedy algorithms, Elements of Greedy Strategy, Huffman code, Job Scheduling Problem

Branch and Bound – Introduction, Travelling Salesman problem

Backtracking - Introduction, N Queen Problem.

Text Books:
1. Introduction to algorithms, Third Edition. by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, PHI
2. Fundamentals of Computer Algorithms, Second edition. By Ellis Horowitz, SartajSahani, SanguthevarRajasekaran, University Press.

References:
1. Data structures and algorithm analysis in C, Second edition. By Mark Allen weiss
2. Fundamental algorithms by Donald E. Knuth, Pearson Education.
3. Data and file structure by A. Tanenbaum by PHI

Master of Computer Application (MCA)
Under Faculty of Science and Technology (Engineering and Technology)
Part I Semester II
MCA-C06: Web Technology

Course Details:

Course Details Class	First Year M.C.A. Sem-I
Course Code and Course Title	**PCC- MCA-C06: Web Technology**
Prerequisites	**Basics of HTML, CSS, Database**
Teaching scheme: Lectures + Practical	**3 Hrs. + 4 Hr.**
Credits	**3 + 2**
Evaluation Scheme ESE + CIE for Theory	**70 (ESE) + 30 (CIE)**

Teaching scheme	Examination scheme
Lectures: 3 Hrs. /Week	**Theory: 100 Marks,** 70 (ESE) +30 (CIE)
Practical: 4 Hr./Week	**TW: 50 Marks**

Course Outcomes:
1. To familiarize a student with Client-side and Server-side Programming.
2. To understand the website development using ASP.NET.
3. To inculcate skills pertaining to data access technology geared to facilitate the development of disconnected systems using .NET platform.
4. To familiarize the student with the development of N-tier web-based application.

UNIT 1   **(12 HOURS)**

Overview of HTML, Structure of HTML document. Formatting text with HTML, adding local and remote links, adding graphics, creating lists in HTML, creating tables in HTML, Dividing the window with frames, Building interactivity with forms, Formatting site with cascading style sheets. Image maps – creating client-side and server-side image maps, Various HTML Editors JavaScript Overview, Data types, variables, scope of variables, casting, data type conversion rules, Expressions and operators. Arrays. Built-in functions, and Built-in objects- String, Date, Math, Types of dialog boxes-alert, prompt, confirm. Custom Functions. Working with Frames, Forms, Form elements and Form validation
.

UNIT 2   **(12 HOURS)**

Comparison between ADO and ADO.NET and benefits offered by ADO.NET, ADO.NET managed providers, SQL managed providers, ADO.NET, OLEDBmanaged providers, creating, Data binding in ADO.NET. Introduction to SQL Server, Creatingtables, Views and stored procedure.

UNIT 3   **(12 HOURS)**

Architecture of ASP.NET web application. Understanding ASP.NET page structure. Page level events. Using standard controls, validation controls, Rich controls. Designing web sites with master pages and themes. ASP.NET folder structure, Validation process. Validation controls. Validation Groups and Custom Validation, Performing data access – Using SqlDataSource control, using GridView control, FormView, Repeater, DataList and ListView Developing 3-tier application using ObjectDatasource.

UNIT 4   **(12 HOURS)**

State management, Caching, AJAX, AJAX Extenders. Building and understanding web services, anatomy of a web service, overview of web service namespaces, building a simple web service, Introduction to CSS, Types of CSS, Applying CSS to Master pages in ASP.NET.

The laboratory course should consist of 10 to 12 programming exercises with focus on covering the hands-on aspects covered in theory course.

Books:
1. The Complete Reference HTML- Thomas A.Powell
2. The ABC's of JavaScript – Lee Purcell & May Jane Mara
3. ASP.NET Unleashed – Stephen Walther - Sams Publishing
4. The Complete Reference ASP.NET - Matthew Macdonald
5. Designing Microsoft ASP.Net Applications (Microsoft Press) – Jonathan Goodyear, Brian Peek, Brad Fox.
6. Microsoft ASP.NET – Step by Step (Microsoft Press) - G. Andrew Duthie
7. Programming ASP .NET - Jesse Liberty, Dan Hurwitz, Publisher: O'Reilly Media

Master of Computer Application (MCA)
Under Faculty of Science and Technology (Engineering and Technology)
Part I Semester II
MCA-C07: Software Engineering
Course Details:

Course Details Class	First Year M.C.A. Sem-I
Course Code and Course Title	PCC- MCA-C07: Software Engineering
Prerequisites	Basics of software development
Teaching scheme: Lectures + Tutorial	3 Hrs. + 1 Hr.
Credits	3 + 1
Evaluation Scheme ESE + CIE for Theory	70 (ESE) + 30 (CIE)

Teaching scheme	Examination scheme
Lectures: 3 Hrs. /Week	Theory: 100 Marks, 70 (ESE) +30 (CIE)
Tutorial: 1 Hr./Week	TW: 50 Marks

Course Outcomes:
1. Students will get foundation of software engineering, various process models and can apply the new models in development process.
2. Students will have effective communication and interaction skills for requirement engineering tasks.
3. Students can implement good coding practices and testing strategies thoroughly using testing tools.
4. Students will understand the need of lifelong learning and adapt to new software engineering concepts.

UNIT 1 (12 HOURS)
Introduction to Software Engineering: Software definition, characteristics, unique nature of web apps, seven principles of software engineering, software development process, Waterfall Model, prototyping, spiral model, 12 Principles of Agility, Extreme Programming (XP), Scrum process flow.
Responsibilities of a Software Project Manager, Project Planning, Project Scheduling and Risk Management.

UNIT 2 (12 HOURS)
Requirements engineering and Design Concepts: Seven tasks of requirement engineering, Eliciting Requirements, Types of requirement, fundamental problem in defining requirements, SRS template. Translating the requirement model into the design model, software design concepts, abstraction, architecture, pattern, separation of concerns, modularity, information hiding, functional independence-cohesion, coupling, refinement, aspects, refactoring.

UNIT 3   (12 HOURS)

Coding and Testing: Coding & Code Review, 5 Components of Coding, Good Coding Practices,Testing, UnitTesting,Black Box Testing,White Box Testing, Program Analysis Tools,Integration Testing, System Testing.

UNIT 4   (12 HOURS)

Software Deployment, Maintenance and Continuous Improvement:

Deployment - Key issues around deployment, Software evolution and release management.

Maintenance - Components of Software Maintenance Process.

Continuous Improvement - Benefits of continuous improvement, Implementation of continuous software development.

Text Books:
1. Software Engineering by Roger Pressman. 7th edition.
2. Software Engineering: A precise Approach – Pankaj Jalote (Wiley India)

References:
1. Software Engineering by Roger Pressman. 7th edition.
2. Software Engineering: A precise Approach – Pankaj Jalote (Wiley India)
3. Software Engineering for students: A Programming Approach by Douglas Bell, Pearson publication.
4. Software Engineering Sommerville 8th edition.
5. Software Quality Engineering by Jeff Tian.
6. Software Testing And Quality Assurance Theory And Practice By Kshirasagar Naik, Priyadarshi Tripathy.
7. The art of software testing by GJ Myers, Wiley
8. Software Testing: Principles and Practices by Srinivasan D and Gopalswamy R, PearsonEd, 2006
9. Software Testing Foundations, Andreas Spillner, Tilo Linz, Hans Schaefer, Shoff Publishers and Distributors.

Master of Computer Application (MCA)

Under Faculty of Science and Technology (Engineering and Technology)

Part I Semester II

MCA-C08: Java Programming

Course Details:

Course Details Class	First Year M.C.A. Sem-I
Course Code and Course Title	PCC- MCA-C08: Java Programming
Prerequisites	Computer Programming Language C++
Teaching scheme: Lectures + Practical	3 Hrs. + 4 Hr.
Credits	3 + 2
Evaluation Scheme ESE + CIE for Theory	70 (ESE) + 30 (CIE)

Teaching scheme	Examination scheme
Lectures: 3 Hrs. /Week	Theory: 100 Marks, 70 (ESE) +30 (CIE)
Practical: 4 Hr./Week	TW: 50 Marks

Course Outcomes:
1. To become familiar with the features of Java Language.
2. To become comfortable with concepts such as Classes, Objects, Inheritance, Polymorphism and Interfaces.
3. To understand Database connectivity using JDBC Drivers.
4. To design application using JSP, Servlet and RMI 5. To familiar with hibernate, struts and spring framework.

UNIT 1 (12 HOURS)

Features of Java: OOP in Java,Objects and classes, Inheritance, Polymorphism,Interfaces, inner classes, Constructor, Garbage collector, Method Overloading Method Overriding, Packages. Understanding Class path, Introduction to Java Utility classes and collection classes, Date, DateFormat and Gregorian calendar classes. A Simple Java Program, Object Creation, Using Java.lang. Object class in program, programs using inheritance.

UNIT 2 (12 HOURS)

Java Database Connectivity: JDBC overview, Architecture, Steps to create JDBC Application, Drivers, database connection statements, Resultsets, transaction, Metadata and Aggregate functions, callable statements. Connection pooling, Java Servlets, Servlet vs. CGI, Servlet life cycle, Servlets basics, Generic Servlets, HTTPServlet, The Servlets, Cookies, session tracking, databases and non-HTML content , request dispatching , shared attributes, resource abstraction.

UNIT 3 **(12 HOURS)**

RMI and Java Beans: Introduction & Architecture of RMI, Stubs & skeleton,Java RMI classes and interfaces ,Writing simple RMI application, Parameter passing in remote methods (marshalling and unmarshalling), Java Beans Introduction, design pattern, Beans persistence & introspection, writing simple bean. JSP(Java Server Pages: Introduction to JSP, Use of JSP, JSP Architecture, JSP tags, Implicit and Explicitobjects, Request forward, Request –time include,use of Beans in JSP and their scopes.

UNIT 4 **(12 HOURS)**

Hibernate framework application, Introduction Working on Hibernate framework, Introduction Hibernate framework, its advantage and disadvantage, Introduction Using Hibernate framework in a live application. Struts framework Architecture and details, Struts frameworks Components.

The laboratory course should consist of 10 to 12 programming exercises with focus on covering the hands-on aspects covered in theory course.

Text Books:
1. The complete Reference Java- 5th edition – Herbert Schildt- Tata McGraw Hill
2. Java 8 Programming Black Book

References:
1. Inside Java 2 Virtual Machine by Venners Bill, Mcgraw Hill Education
2. Developing Java Servlets James Goodwill, Techmedia Pub.
3. Professional JSP Wrox press
4. JDBC, Servlet and JSP, Black Book, Santosh Kumar K. Dremtech publication
5. Java unleashed,; Micheal Morrison

Master of Computer Application (MCA)
Under Faculty of Science and Technology (Engineering and Technology)
Part I Semester II
MCA-C09: Data communication and Network

Course Details:

Course Details Class	First Year M.C.A. Sem-I
Course Code and Course Title	BSC- MCA-C09: Data communication and Network
Prerequisites	Basics of Computer Network
Teaching scheme: Lectures + Practical	3 Hrs. + 2 Hr.
Credits	3 + 1
Evaluation Scheme ESE + CIE for Theory	70 (ESE) + 30 (CIE)

Teaching scheme	Examination scheme
Lectures: 3 Hrs. /Week	Theory: 100 Marks, 70 (ESE) +30 (CIE)
Practical: 2 Hr./Week	TW: 25 Marks

Course Outcomes:
1. Understand the basic concepts of data communication and Networking.
2. Evaluate the performance of various networking models.
3. Analyze the performance of network on the basis of different services provided by it.
4. Identify security threats to network and tools to control network security.

UNIT 1   (12 HOURS)
Introduction to Networking and Data communication: Need of Networking, Components of Data communication - sender, receiver, message, transmission media, Network Architecture-Client-Server and Peer to peer, Categories of Networks- LAN, WAN. MAN, Network topologies
- Bus, Ring, Star, Mesh, Transmission Media - Guided Media -Twisted-Pair Cable, Coaxial Cable, Fiber-Optic Cable, Unguided Media: Radio Waves, Microwaves, Infrared, and satellite communication,

UNIT 2   (12 HOURS)
Network Models and Services: OSI reference model, TCP/IP reference model, Comparison of OSI and TCP/IP reference model, Protocol Standards, Introduction to Application Layer: Domain name system (DNS), Hypertext Transfer Protocol (HTTP), Simple Mail Transfer Protocol (SMTP), Telnet, File Transfer Protocol (FTP), Introduction to Presentation Layer, Services of Presentation Layer: Data encoding, Data encryption and data compression. Introduction to Session Layer, Services of session layer: Data Flow control, simplex, half-duplex, or full-duplex, Token Management, Synchronization.

UNIT 3 (12 HOURS)

Network Performance: Transport layer - Transport Layer Primitives: listen, connect, send, receive, disconnect, Protocols: TCP, UDP, Network layer- IP Protocol and IP addressing, Connection oriented and connectionless services, Routing algorithm: Shortest path, Flooding, distance vector, Congestion control, Data link Layer- Data Link Layer protocols: Stop and Wait protocol, Sliding window protocol, Services of Data Link Layer: Framing, Error detection and correction, Flow control.

UNIT 4 (12 HOURS)

Network Vulnerabilities: Introduction to Vulnerabilities and Threats, Threats intransit, Protocol flaws, Impersonation, Active/Passive and Passive attacks: Virus, Worm. Malware, Hacking, Cracking, Sniffing, Spoofing, Dos, DDos, Masquerade, Trojan Horse. Ransomware, Logic bombs, Botnets, Key oggers, Rootkits, Identification of Network vulnerabilities. Network security controls: Authentication, Access Controls, Basic Cryptography terminologies.

Text Books:
1. Andrew S. Tanenbaum: Computer Networks, 4th Edition, PHI.
2. Computer Networks – Protocols, Standards, and Interfaces, 2nd Edition by Uyless Black.

Reference Books:
1. Computer Networking - A Top-Down Approach Featuring the Internet, 5th Edition, J. F. Kurose and K. W. Ross, Pearson Education, 2009.
2. Computer Networks: An Open Source Approach, 1st Edition, R2. Y. D Lin, R. H Hwang, and F.Baker, McGraw- Hill, 2011.
3. BernardMenezes, 'Network Security and Cryptography', Cengage Learning, ISBN: 978-81-315-1349—1.

Master of Computer Application (MCA)
Under Faculty of Science and Technology (Engineering and Technology)
Part I Semester II
MCA-M02: Business Communication

Course Details:

Course Details Class	First Year M.C.A. Sem-I
Course Code and Course Title	MNG- **MCA-M02: Business Communication**
Prerequisites	**Business Management**
Teaching scheme: Lectures + Practical	**1 Hrs. + 2 Hr.**
Credits	**1 + 1**
Evaluation Scheme ESE + CIE for Theory	**70 (ESE) + 30 (CIE)**

Teaching scheme	Examination scheme
Lectures: 1 Hrs. /Week	**Theory: 100 Marks,** 70 (ESE) +30 (CIE)
Practical: 2 Hr./Week	**TW: 25 Marks**

Course Outcomes:
To empower the students towards general and technical writing, oral communications and listening skills: letter writing, technical report writing, and business communication.

UNIT 1   **(12 HOURS)**
Expression: Practical communication skill development, business presentation with multimedia, speaking skill, prepared speech, extempore speech.

UNIT 2   **(12 HOURS)**
Writing: Technical/business letter, Resume Preparation, organization of writing material, poster presentation, writing technical document, preparing software user manual, preparing project documentation.

Text Books:
1. Business Correspondence & Report Writing, Sharma, TMH
2. Business Communication Strategies, Monipally, TMH

References:
1. English for Technical communication,Laxminarayanan,Scitech
2. Business Communication, Kaul,PHI
3. Communication Skill for Effective Mgmt., Ghanekar,EPH