SADGURU GADGE MAHARAJ COLLEGE, KARAD

(An Empowered Autonomous College)

Accredited By NAAC with 'A$^+$ (3.63 CGPA)' Grade ISO- 9001-2015 Certified

Affiliated to Shivaji University, Kolhapur

Faculty of Commerce and Management

Syllabus for

Master of Computer Applications

(MCA)Part I (SEM-I & II)

CBCS Course Structure to be implemented from Academic Year

2025-26

(Subject to the modifications that will be made from
time to time)

SHIVAJI UNIVERSITY, KOLHAPUR.

Estd. 1962

NAAC 'A' Grade

Faculty of Commerce and Management

Syllabus For

MCA Part – I (Sem I & II) (CBCS)

(To be implemented from June 2020 onwards)

(Subject to the modifications that will be made from time to time)

Sadguru Gadge Maharaj College, Karad
(An Empowered Autonomous College)
Affiliaed to Shivaji University, Kolhapur
Master of Computer Applications (M.C.A.)
(Under the Faculty of Commerce and Management)
(Choice Based Credit System)
MCA (Part I) from Academic Year 2025-2026

1. **Introduction**

Master of Computer Applications (MCA) is a two-year (four semesters) professional Master Degree program in computer applications. The program is designed to meet the growing demand for qualified professionals in the field of Information Technology. It is a postgraduate program that can be taken up after obtaining a Bachelor's Degree. The MCA program is inclined more towards Application Development and thus has more emphasis on the latest programming language and tools to develop better and faster applications. It covers various aspects of computational theory, programming, algorithm design and optimization, network and database management, mobile technologies, cyber security, information system audit, etc.

- Discipline Specific elective courses and General Electives to be offered in functional areas have to depend on studentpreferences and needs of the user systems in the region in which the educational institution islocated.
- The MCA program is a mixture of computer-related and general business courses. Thecomputer related courses include Programming Techniques, Database Managements and Data Analytics techniques. The general business courses includethe emerging areas in management like Digital Marketing, Industry 4.0 norms and Entrepreneurship Development including Start-ups.
- The program would emphasis on Experiential Learning which aims at creation of business applications. Inclusion of projectsimproves student's technical orientation, understanding ofIT environment and domain knowledge. It will provide helpful platform for students to become asuccessful Software professional. This would improve domain knowledge of various areas, which would help the students to build software applications on it. The students are exposed to software development in the data processing environment with special emphasis on Software Project Management and Software Engineering for small and medium organizations.
- Subjects such as IS Audit, Design Thinking, Digital Forensics, Cyber Securityand Big Data Management will work as new application domains. Major focus is given on Data Analytics so that student can choose Data Analyst as their career options.Also, exposure to Web applications, Web 2.0, Web MiningandWeb Application Security is also provided.Advanced technology includes Internet of Things, Mobile computing and variety of new technologies. Business communication, personality development and seminar will lead to overall personality developmentof the student and that will help them in theircareer development and to sustain in the dynamic environment of Information Technology.
- MOOC courses help students for self-learning of emerging technologies and trends in market with the help of online platform. List of various certifications possible through SWAYAM is published on Shivaji University's Web site. Students should try to do maximum Value Added certifications during their learning phase through MOOCs like SWAYAM platform to make their resume rich.

- The new curricula would focus on Outcome Based Education including Cognitive and Affective skills with the help of Discipline specific skills, Ability Enhancement Skills and Hands on experience.
- The inclusion of projects ensures the Experiential Learningwhere students can apply their skills at respective levels. It will provide opportunity for students to work on various emerging technologies. It will provide appropriate platform for students to work in IT Industry. It will alsoimprove documentation, Coding and Design standards capabilities in students. Inclusion of project forsubject such as Web Technology and Mobile Computing will definitely improve students' innovativeness and creativity.
- The Institutes should organize placement program for the MCA students by interactingwith the industries and software consultancy houses in and around the region in which theeducational Institution is located. The Institute should also promote entrepreneurship skills through Entrepreneurship Development Cell or Incubation Centre.

2. Job Opportunities:
- After completing MCA, students can start their career as a Software Developer and Web Designer & Developer, after some experience, are promoted as system analysts. Other seek entrepreneurial role in the Information Technology world as independent business owners, software consultants, IT Architecture, Network Engineer. Career opportunities also exist in emerging area as Cyber security. Other areas include Data scientist and Cloud Architect.

3. Duration of the Course
The MCA program will be a **full-time two years** i.e. 4 semesters. Pattern of examinationwill be Semester System.

3. Medium of Instruction
The medium of Instruction will be English only.

4. Teachers Qualification: MCA with First class and Two years' experience prescribed by AICTE and University.

5. Admission Procedure
(A) Eligibility:
Passed BCA/ Bachelor Degree in Computer Science or Engineering or equivalent degree
OR
Passed B.Sc./ B.Com./ B.A. with Mathematics at 10+2 Level or at Graduation Level (with additional bridge Courses as per the norms of the concerned University).
Obtained at least 50% marks (45% marks in case of candidates belonging to reserved category) in the qualifying Examination.

(B) Reservation of Seats
As per rules of by the Competent Authority

(C) Selection Basis
The selection would be done as per the guidelines given by the Directorate of TechnicalEducationMaharashtra State and the competent authority time to time.

6 PEO, PO and COMappings:
Program Educational Outcomes: After completion of this program, the graduates / students would:

PEO I	Technical Expertise	Implement fundamental domain knowledge of core courses for developing effective computing solutions by incorporating creativity and logical reasoning.
PEO II	Successful Career	Deliver professional services with updated technologies in Computer applicationbased career.
PEO III	Interdisciplinary and Life Long Learning	Develop leadership skills and incorporate ethics, team work with effective communication & time management in the profession. Undergo higher studies, certifications and technology research as per market needs.

Program Outcomes: Program outcomes are attributes of the graduates from the program that are indicative of the graduates' ability and competence to work as an IT professional upon graduation. Program Outcomes are statements that describe what students are expected to do now or do by the time of post-graduation. They must relate to knowledge and skills that the students acquire from the program. The achievement of all outcomes indicates that the student is well prepared to achieve the program educational objectives down the road. Master of Computer Applications program has following PO's.

PO1. Computational Knowledge: Understand and apply mathematical foundation, computing and domain knowledge for the conceptualization of computing models from defined problems.

PO2. Problem Analysis: Ability to identify, critically analyze and formulate complex computing problems using fundamentals of computer science and application domains.

PO3. Design / Development of Solutions: Ability to transform complex business scenarios and contemporary issues into problems, investigate, understand and propose integrated solutions using emerging technologies

PO4. Conduct Investigations of Complex Computing Problems: Ability to devise and conduct experiments, interpret data and provide well informed conclusions.

PO5. Modern Tool Usage: Ability to select modern computing tools, skills and techniques necessary for innovative software solutions

PO6. Professional Ethics: Ability to apply and commit professional ethics and cyber regulations in a global economic environment.

PO7. **Life-long Learning**: Recognize the need for and develop the ability to engage in continuous learning as a Computing professional.

PO8. Project Management and Finance: Ability to understand, management and computing principles with computing knowledge to manage projects in multidisciplinary environments.

PO9. Communication Efficacy: Communicate effectively with the computing community as well as society by being able to comprehend effective documentations and presentations.

PO10. **Societal & Environmental Concern:** Ability to recognize economical, environmental, social, health, legal, ethical issues involved in the use of computer technology and other consequential responsibilities relevant to professional practice.

PO11. Individual & Team Work: Ability to work as a member or leader in diverse teams in multidisciplinary environment.

PO12. Innovation and Entrepreneurship: Identify opportunities, entrepreneurship vision and use of innovative ideas to create value and wealth for the betterment of the individual and society.

7. Course Outcome(s): Every individual course under this program has course outcomes (CO). The course outcomes rationally match with program educational objectives. The mapping of PEO, PO and CO is as illustratedbelow:

Program Educational Objectives	Thrust Area	Program Outcome	Course Outcome
PEO I	Technical Expertise	PO1,PO2,PO3,PO4 and PO5	All Core and Lab courses
PEO II	Successful Career	PO6 ,PO7, PO8 PO9 and PO12	All AEC courses
PEO III	Interdisciplinary and Life Long Learning	PO10,PO11	All Electives

8. Program Specific Outcomes (PSO's)

PSO 1. Ability to pursue careers in IT industry/ consultancy/ research and development, teaching and allied areas related to computer applications.

PSO 2. Comprehend, explore and build up computer programs in the areas allied to Algorithms, System Software, Multimedia, Web Design and Big Data Analytics for efficient design of computer-based systems of varying complexity.

9. Syllabus   Structure:

MCA Part I Semester I

Sr. No.	Course Type	Course Code	Subject Code	Course Title	Theory contact hours per week	Practical hours per week	Credits	University exam	Internal continuous assessment	Total
1	Core	CC101	MCA25-101	Introduction to Programming	4		4	70	30	100
2	Core	CC102	MCA25-102	Computer Architecture & Operating System	4		4	70	30	100
3	Core	CC103	MCA25-103	RDBMS	4		4	70	30	100
4	AEC	AEC 104	MCA25-104	Statistical and Mathematical Foundations	4		4	70	30	100
5	AEC	AEC 105	MCA25-105	Principles of Management and Organizational Behavior	4		4	70	30	100
6	AEC	AEC 106	MCA25-106	Business Communication	2		2	-	50	50
7	GE	GE107	MCA25-107	1. Strategic IT Management 2. Knowledge Management 3. Financial Technologies	4		4	70	30	100
8	Core	CC108	MCA25-108	Lab Based on CC101		2	2	50	-	50
9	Core	CC109	MCA25-109	Lab Based on CC102		2	2		50	50
10	Core	CC110	MCA25-110	Lab Based on CC103		2	2	50	-	50
					26	**9**	**32**	**520**	**280**	**800**

MCA Part I Semester II

Sr. No.	Course Type	Course Code	Subject Code	Course Title	Theory contact hours per week	Practical hours per week	Credits	University exam	Internal continuous assessment	Total
1	Core	CC201	MCA25-201	Web Technology	4		4	70	30	100
2	Core	CC202	MCA25-202	Data Structure	4		4	70	30	100
3	Core	CC203	MCA25-203	Big Data Management	4		4	70	30	100
4	Core	CC204	MCA25-204	Data Comm. & N/W	4		4	70	30	100
5	Core	CC205	MCA25-205	Software Engineering and Project Management	4		4	70	30	100
6	GE	GE206	MCA25-206	1. Digital Marketing 2. Design Thinking and Innovation 3. Information System Audit	4		4	70	30	100
7	Core	CC207	MCA25-207	Lab based on CC201		2	2	50	-	50
8	Core	CC208	MCA25-208	Lab based on CC202		2	2	50	-	50
9	Core	CC209	MCA25-209	Mini Project		4	4	70	30	100
					24	**8**	**32**	**590**	**210**	**800**

Credit Distribution Chart for MCA Program

Sr. No	Particulars	Credits	Percentage of Credits
1	CC- Compulsory Courses	88	68
2	GE- General Electives	8	7
3	DSE- Domain Specific Electives	10	8
4	AEC- Ability Enhancement	22	17
	Total	128	100

10. Standard of Passing and Award of Class:

Internal as well as external examination will be held at the end of semester. The candidate must score 40% marks in each head of internal as well as external Examination. The student should not have more than 5 backlogs for 2nd year admission.

There will be numerical marking on each question. At the time of declaration of the result the marks obtained by the candidate is converted into grade point as shown below;

Grade Point Table

Grade Points	Range of Marks obtained out of 100 or any fractions
0	0To5
1	6To10
1.5	11To15
2	16To20
2.5	21To25
3	26To30
3.5	31To35
4	36To40
4.5	41To45
5	46To50
5.5	51To55
6	56To60
6.5	61To65
7	66To70
7.5	71To75
8	76To80
8.5	81To85
9	86To90
9.5	91To95
10	96To100

Grading: Shivaji University has introduced a Seven-point grading system as follows:

Grades	CGPA Credit Points
O	8.60To10
A+	7.00To8.59
A	6.00To6.99
B+	5.50To5.99
B	4.50To5.49
C	4.00To4.49
D	0.00To3.99

Overall Final Grades	Class Grade
8.60 To 10	Higher Distinction Level Extraordinary O

7.00To8.59	Distinction Level Excellent A+
6.00To6.99	First Class Very Good A
5.50To5.99	Higher Second Class Good B+
4.50To5.49	Second Class Satisfactory B
4.00To4.49	PassFairC
0.00To3.99	FailUnsatisfactoryD

11. Teaching and Practical Scheme
1. Each contact session for teaching or practical should be of 60 minutes each.
2. One Practical Batch should be of 30 students.
3. Practical evaluation should be conducted before the commencement of University examination

a) Nature of Theory Question paper: Nature of question paper is as follows for University end semester examination

i) There will be seven (7) questions and out of which three (3) to be attempted from question no 2 to question no 6.
ii) Question No.1 and question No.7 are compulsory in which question No.1 is of multiple choice questions. There will be8 multiple choice questions and each carries 1 mark. Question No 6 should be a short note for 20 marks, where 5 sub questions will be given, out of which four questions should be attempted
iii) Question No.2 to Question No. 6 may consist 2 sub questions and each carries 7Marks or long answer question for 14 marks
b) Nature of Practical Question Paper:
There will be three questions of 15 Marks each, Out of which student have to attempt any two questions and 10 marks for journal and 10 marks for oral for 2 credit lab course and time duration is two hours.
Practical Examination conducted by the University appointed external examiner panel of two members. The panel members appointed should have more than five years' of experience as full time teacher.

13. Internal Marks Distribution

1   Five Marks for Mid Tests
2   Ten Marks for presentation or activity based learning or Lab Work or Group exercise(Number of students in Group are not more than six)
3   Five Marks for Assignments
4   Five Marks for library activity/ designing apps or software or working model/ Field Work/online learning activity etc.

Five Marks for Attendance.(75% to 80%‐ 02 marks, 81% to 85 %‐ 03 marks, 86% to 90 %‐ 04 ,marks 91% to 100% ‐ 5 mark)
14. Mini‐ Project
The Objective of mini project is, to make aware student with current technology to be used in IT industry. The language/platform of the mini‐project to be selected from the subject studied in previous and present semester. The Group size of maximum three students can undertake mini project. Project Viva‐Voce Examination will be conducted by the University appointed examiner panel of two members. The panel members appointed should have more than five years' of experience as full time teacher.
15. Major Software Development Project:
For major project student should go for in plant training of 50 days after completion of semester II university examination and project report will be submitted to institute/department before 3rd
semester university examination. Project work willbe done individually and students should take guidance from assigned guide and prepare a Project Report on "Project Work" in two copies to be

submitted to the Director of the Institute/Head of the Department. In plant training certificate from respective organisation is mandatory for project certification by Institute. The project viva voce will be conducted after theory examination of 3rd semester by the University appointed examiner panel of two members having doctorate and more than ten years' experience as full time teacher.

16. Fee Structure: As per directives of Shikshan Shulka Samiti, Govt. of Maharashtra and competent authority.

17. Requirements:
1. Core Faculty: As per guidelines of AICTE New Delhi.
2. Computer Infrastructure: Number of Computers, Number of application software, Number of system software's are as per AICTE New Delhi and competent authority guidelines.
3. Internet Bandwidth: 32 MBPS Lease Line and at least 4Mbps Wi-Fi connectivity at 4 or 5 hotspots shall be made available.
4. Arrangement to view MOOC's of NPTEL/ SWAYAM/IIT online Tutorials etc. shall be made available.
5. Class Room, Seminar halls, Tutorial Rooms and Auditorium: As per AICTE Guidelines
6. Each Class Room shall be equipped with LCD projector, Smart Board, Internet etc. Seminar Hall shall have proper furnishing and equipment such LCD projector, Smart Board, PA system and Executive Chairs. Institutions shall have MOOC's Facility Centre and Innovation Laboratory.
7. Language Laboratory shall have a minimum of 20 Computers with appropriate application software.

18. Revision of Syllabus:
As the computer technology experience rapid rate of obsolescence of knowledge, revision of the syllabus should be considered every two years. The Workshops on revised syllabi should be organized at the beginning of every semester.

19. Bridge Course:
1. This bridge course is conducted for the Non IT graduates i.e., BA, B.Com, and B.Sc., excluding B.Sc. (Computer) and B.Sc. Entire-(Computer/IT) students admitted to MCA Part I.
2. The bridge course is compulsory for non-computer background students (i.e., BA, B.Com, and B.Sc., excluding B.Sc. (Computer) and B.Sc. Entire-(Computer/IT)
3. It is mandatory to complete the syllabus of the bridge course at the beginning of MCA I Sem I.
4. There will be an internal evaluation for Bridge course of total 100 marks which includes 50 marks (10 Marks for each unit) for Term work (Assignments/Lab Assignments/Case Analysis) and 50 marks for multiple choice question Examination.
5. Multiple choice questions Examination include 50 questions. Each question is for one mark having four options. All questions will be compulsory.
6. There will be no negative marking for wrong answer.
7. The bridge course should be completed by the students as prescribed by university authorities. MCA degree shall not be awarded unless the students successfully complete the Bridge Course.
8. The student has to secure 40% marks separate passing both in Term Work and multiple choice questions Examination in order to pass the bridge course.
9. Examination fee shall be made applicable as per University rules. The respective affiliated college should arrange for the contact sessions (60 contact sessions- 12 contact sessions for each unit) for completing the Bridge Course. However the College/Department shall not charge any fee for conducting the Bridge Course.

MCA (Commerce & Management) - Bridge Course Syllabus
As per the norms of AICTE

60 contact sessions	4 credits

Unit I

Fundamentals of Computer

Introduction to Digital Computer, Block Diagram of computer, Computer Hardware, Introduction to Software, Types of software, Introduction to operating system, Types of Operating system, Functions of Operating system.

Unit II

Fundamentals of Accounting- Introduction to Accounting, Objectives, Need and Scope of Accounting, Types of Accounts, Branches of accounts, Accounting concepts and conventions. Journal entries, ledger posting, trial balance, financial statements. Accounting with Tally: Introduction to gateway, company creation, ledger creation, voucher entries.

Unit III

Fundamentals of Mathematics and Statistics

Measures of Central Tendency- Mean, Mode, Median, Elementary set theory: Representation of sets, Operations on sets, Distributive and De Morgan's laws, Probability, Permutations and Combinations.

Unit IV-

Fundamentals of Programming-

Introduction to C programing, Data types in C, Operators in C, Branching and looping statements in C. Array in C, Introduction to Object oriented Programming, Introduction to C++, Class, Object, Constructor, Destructor, Inheritance, Polymorphism.

Unit-V

Database Management System

Definition of Database, Needs, features Database Management Systems (DBMS): Definition, components, file system, comparison of file processing system with DBMS, functions of DBMS, advantages, disadvantages of DBMS, Structure of DBMS, Database constraints, .Introduction to SQL.

Reference Books -
1. Computer Fundamentals, Sixth Edition, Pradeep K. Sinha, Priti Sinha.
2. Programming in ANSI C, E Balagurusamy, Tata McGraw-Hill Publishing
3. Programming in C++ by YashwantKanetkar (PBP Publications)
4. Koontz and Weirich : Essentials of Management
5. Database System Concept – Silberschatz, Korth
6. Fundamentals of Database System- RamezElmasri,Shamkant B. Navathe(Pearson)
7. SQL, PL/SQL the programminglanguage of OracleIvanBayross BPB 4th
8. Computer System Architecture Morris Mano Pearson 3rd Edition
9. Gupta C. B.: Introduction to Statistics
10. Discrete mathematics - Semyour Lipschutz,Marc Lipson (MGH), Schaum's outlines.
11. Advance Accountancy:- M.C. Shukla & T.S. Grewal
12. Advance Accountancy:- S.C. Jain & K.L. Narang

M.C.A. Part-I Semester I **Paper MCA25-101: Introduction to Programming** **(Choice Based Credit System)**

| **Course Outcomes** | | **Students of this course will be able to :**
1. Understand Basic Syntax of Python Programming.
2. Demonstrate and implement concepts of object oriented methodology using Python.
3. Develop problem solving skills and their implementation through Python
4. Design Graphical user Interfaces in Python. |

| Marks:100 | | Total Hours of Teaching: 60 | University Exam :70 | Internal : 30 |

Syllabus Contents:

Unit 1:	**Introduction to Programming :** Role of programming languages, Need to study programming languages, Characteristics of Programming Languages, Programming language paradigms: Imperative, Object Oriented, Functional, Logic, Event Driven and Concurrent Programming. **OVERVIEW** – History, Features and Applications, Installing and Running Python Program, Modes: interpreter, editor and IDE,– Python Identifiers, Keywords , Indentation, Multi-Line Statements, Quotation, Comments , Waiting for the User Input, Multiple Statements on a Single Line **VARIABLE TYPES -** Assigning Values to Variables, Multiple Assignment, Standard Data Types (Numbers, Strings, Lists, Tuples, Dictionary), Data Type Conversion and Casting **OPERATORS -** Types of Operators, Operators Precedence **STRINGS -** Accessing Values in Strings, Updating Strings, Escape Characters, String Special Operators, String Formatting Operator, Triple Quotes, Unicode String, Built-in String Methods, Regular Expression and Pattern Matching.	**15Periods**
Unit 2:	**DECISION MAKING -** If, if-else, elif Statement, Nesting of If statement, Using if-else as switch-case **LOOPS -** While Loop, The Infinite Loop, For Loop, Iterating by Sequence Index, Using else Statement with Loops, Nested Loops, Break, Continue & Pass Statement. **LISTS -** Python Lists, Accessing Values in Lists, Updating Lists, DeletingList Elements, Basic List Operations, Indexing, Slicing, and Matrixes, Built-in List Functions and Methods. **TUPLES -** Accessing Values in Tuples, Updating Tuples, Deleting Tuple Elements, Basic Tuples Operations, Indexing, Slicing, and Matrixes , No Enclosing Delimiters :, Built-in Tuple Functions, Combining Lists and Tuples. **Sets -**Concept of Sets , creating, initializing and accessing the elements of ,Sets operation. **DICTIONARY-** Accessing Values in Dictionary, Updating Dictionary, Delete Dictionary Elements, Properties of Dictionary Keys, Built-in	**15 Periods**

	Dictionary Functions and Methods.	
Unit 3:	**FUNCTIONS -** Defining and Calling a Function, Function Arguments, Keyword Arguments, Default Arguments, Variable Length Arguments, Passing by Reference Versus Passing by Value, The Anonymous Functions, The return Statement, Returning multiple values, Scope of Variables, Global vs Local variables **MODULES -** The import Statement, The from import and import * Statement, Locating Module, Creating and importing user defined modules, dir( ) Function, The globals( ) and locals( ) Functions, The reload( ) Function, Packages in Python, Creating and using packages. **EXCEPTIONS**– Introduction &, need of Exception, Handling an Exception with try-except, The except Clause with No Exceptions & with Multiple Exceptions, try-finally, try-except-else clause, User-Defined Exceptions	**15 Periods**
Unit 4:	**FILES I/O** – Opening and Closing Files, The open Function, The file Object Attributes, The close( ) Method, Reading and Writing Files, The write( ) and writelines( ) Methods, The read( ), readline( ) and readlines( ) Methods, Opening file in appending mode, File Positions, seek( ) function, Renaming and Deleting Files, rename( )& remove( ) Method, Directories in Python, mkdir( ), chdir( ), getcwd( )&rmdir( ) Methods, File and Directory Related Methods **CLASSES AND OBJECTS -** Overview of OOP Terminology, Creating Classes, Creating Instance Objects, Accessing Attributes, static member attributes & Built-In Class Attributes, Destroying Objects (Garbage Collection, Class Inheritance, Multiple, Hierarchical and Multi-level inheritance, Overriding Methods, Overloading Operators, Data Hiding, **Multithreading, Database Access using python** **GUI Programming using Tkinter –** using Label, Message Widget, Buttons, Radiobuttons, Checkboxes, Entry Widgets, Canvas Widgets, Sliders, Text Widget, Dialogs, Layout Management.	**15 Periods**
	Reference Books: 1. R. NageswaraRao, "Core Python Programming", Dreamtech 2. Programming with python, A users Book, Michael Dawson, Cengage Learning 3. Python Essential Reference, David Beazley, Third Edition 5. Python Bible 4. Practical Programming: An introduction to Computer Science Using Python, second edition, Paul Gries, Jennifer Campbell, Jason Montojo, The Pragmatic Bookshelf. 5. Python for Informatics: Exploring Information, Charles Severance 6. John V Guttag. "Introduction to Computation and Programming Using Python", Prentice Hall of India 7. Learning Python By Mark Lutz,O'Reilly Publication 8. Python Learning Guide (BPB publications)	

M.C.A. Part-I Semester-I
Paper MCA25-102 : Computer Architecture and Operating System
(Choice Based Credit System)

Course Outcomes	Students of this course will be able to : 1. Understand the architecture and working of hardware components in digital computer 2. Compare different memory devices used in digital computer. 3. Describe the basic concepts and functions of Operating System. 4. Illustrate features and significance of Linux operating system.

Marks:100	Total Hours of Teaching:60	University Exam :70	Internal : 30

Syllabus Contents:

Unit 1:	**Introduction to Computer Architecture** Introduction to Digital Computer, Data Processing Components: Logic Gates, Boolean Circuits, Half Adder, Full Adder, Decoder, Multiplexer. Data Storage Components: SR, D, JK, T Flip Flops, Registers, Memory Hierarchy, Architecture of RAM, ROM, Data Representation: Number Systems- Binary, Octal and Hexadecimal Numbers, Inter-conversion between number systems. **CPU Organization:** CPU Building Blocks, Instruction codes, Registers, Addressing Modes, Instruction sets, Instruction execution and Interrupts.	**15Periods**
Unit 2:	**Introduction to Operating System** Definition of Operating System, Operating system structures, Types of Operating systems, **Memory Management:** Concept, Memory Management Techniques, Swapping, Contiguous Memory Allocation, Memory Protection, Memory Allocation, Fragmentation, Segmentation with Paging, Virtual Memory Concept, Demand Paging and Page Replacement. **Process Management:** Process Concept, Process scheduling, CPU Scheduling: Basic Concepts, Scheduling Criteria, Scheduling Algorithms.	**15 Periods**
Unit 3:	**Inter Process Communication:** Critical region, synchronization and semaphore, classic problems of synchronization, Deadlock: Methods for Handling Deadlock, Deadlock Prevention, Deadlock Detection and Deadlock recovery. **Input-Output Processing:** Input/ Output Devices, Input-Output Interface, Modes of Transfer, Direct Memory Access, I/O Processor.	**15 Periods**
Unit 4:	**Introduction to Linux** Features of Linux, History and development of Linux, Architecture of Linux, Concept of Kernel and shell, Linux File Structure, Directory and File handling commands in Linux. **Shell scripting:** Working with VI editor and its mode, Shell variables, operators, conditional and looping statements, Shell functions, Shell scripting with C and Python.	**15 Periods**

Reference Books:
1. Computer System Architecture Morris Mano Pearson 3rd Edition
2. Computer Organization by Carl Hamacher, ZvonkoVranesic, SafwatZaky, 5th Edition, MGH
3. Digital Logic and Computer Design Morris Mano Prentice Hall
4. Computer Architecture & Organization J. P. Hayes MGH 3rd Edition
5. Computer Organization & Design Pal Chaudhary PHI 3dr Edition
6. Digital Computer Electronics Malvino TMH 3rd Edition

7. Computer Architecture & Organization Murdocca Wiley India
8. Computer Architecture and Organization, John P. Hayes, 3rd Edition, McGraw-Hill Series
9. Operating Systems: Concepts: By Abraham Siberschatz, Peter Galvin- Willey- Sixth edition.
10. Operating Systems: Andrew S. Tanenbaum-Pearson Education- Second Edition.
11. System Programming and Operating Systems by D.M. Dhamdhere-TMH –Second Edition.
12. Operating Systems: Internals and Design Principles, Seventh Edition by William Stallings, Pearson Publications

Suggested Additional Reading:
1. Computer Organization & Architecture, William Stallings, 7th Edition, PHI
2. Computer Systems Design and Architecture, Vincent P. Heuring& Harry F. Jordan, 2nd Edition, Pearson Education
3. Advanced Computer Architecture, Hwang, TMH
4. William Stallings, ―Operating Systems, Macmillan Publishing Company.
5. Deitel H.M., ―An Introduction to Operating System, Addison Wesley Publishing Company, 1984.
6. Kenneth Rosen,Douglas Host, The Complelete Reference, Unix, Tata McGraw Hill

Suggested Research Journals:
1. https://swayam.gov.in/nd1_noc20_cs25/preview
2. https://swayam.gov.in/nd1_noc20_cs04/preview

M.C.A. Part-I Semester I Paper MCA25-103: RDBMS (Choice Based Credit System)			
Course Outcomes	**Students of this course will be able to :** 1. Understand the fundamentals of relational systems including data models, database architectures, and database manipulations using SQL. 2. Design normalized database for business applications. 3. Understand the use of procedural Structured Query Language (PL/SQL). 4. Demonstrate programs using PL/SQL.		
Marks:100	Total Hours of Teaching:60	University Exam :70	Internal : 30
Syllabus Contents:			
Unit 1:	**Relational Database Management System:** Introduction to RDBMS, Objectives of RDBMS, Difference between DBMS and RDBMS, Architectures of RDBMS, Data Models(Network, Hierarchical, Entity Relationship (E-R) Model, relational data model), CODD Rules , Normalization(1st NF, 2nd NF, 3rd NF and BCNF), Transaction Management: ACID properties of transaction, Concurrency control	**15Periods**	
Unit 2:	**Structured Query Language:** Introduction, Data Types in SQL, Different types of Commands in SQL, Different level of Constraints, Built in functions(String, date time, mathematical and Aggregate functions), In and Between operator, Like operator, Join Operation, Set Operation, View, Sub Query, Embedded SQL.	**15 Periods**	
Unit 3:	**PL/SQL:** Introduction, Shortcomings in SQL, Structure of PL/SQL, PL/SQL Language Elements, Data Types, Operators, Precedence, Control Structure, Steps to create a PL/SQL Program, Iterative Control.	**15 Periods**	
Unit 4:	**Advance PL/SQL:** Cursors, Steps to create a Cursors, Procedure, Function, Packages, Exceptions Handling, Database Triggers, Types of Triggers Advance PL/SQL Triggers, Types of Triggers, Stored Procedures, Function, Packages, Exceptions Handling, Database	**15 Periods**	
	Reference Books: 1. Introduction to database systems C. J. Date Pearsons Education 8th 2. SQL, PL/SQL the programming language of Oracle Ivan Bayross		

BPB 4th
3. Practical Oracle SQL -Mastering the Full Power of Oracle Database, Kim Berg Hansen
4. Advance Database Management System hakrabharati/DasguptaWileyDreamtech2011
5. Structured Query Language- by Osbome
6. SQL by Scott UllmanSQL & PL/SQL Black Book for Oracle by Dr,P.S.Deshpande.

Suggested Additional Reading:
1. Oracle Database 12c,Ian Abramson
2. https://support.oracle.com

Suggested Research Journals:
1. Oracle: The Research Journal of the Association of Fraternity/Sorority Advisors (Oracle)

M.C.A. part-I Semester I Paper MCA25-104: Statistical and Mathematical Foundations (Choice Based Credit System)			
Course Outcomes	**Students of this course will be able to :** 1. Understand Basic algorithms and techniques of modern data analysis 2. Implement the algorithms using descriptive Statistical Analysis. 3. Apply a variety of methods for explaining, summarizing and presenting data and interpreting results clearly. 4. Perform the data analysis using classification and present the results of the analysis.		
Marks:100	Total Hours of Teaching:60	University Exam :70	Internal : 30
Syllabus Contents:			
Unit 1:	**Dispersion and Correlation** Measures of Dispersion: range, sample standard deviation, Variance, Coefficient of Variation, interquartile range. Quartiles and quantiles. Boxplots. Correlation: Concept of correlation between two variables, Types of correlation, Scatter diagram and its utility. Pearson's and Spearman's coefficients of correlation.	**15Periods**	
Unit 2:	**Probability Distribution and Regression** Probability Distribution: Binomial, Poisson and Normal distribution, Skewness and Kurtosis. Regression: The simple linear regression model, Fitting the linear regression model, Introduction to multiple linear regression, Multiple regression assumptions, diagnostics, and efficacy measures. Fitting the multiple regression model.	**15 Periods**	
Unit 3:	**Classification** Logistic regression: Estimating the regression coefficients and making predictions. Logistic regression with several variables. Case-control sampling and logistic regression. Logistic regression with more than two classes. Linear Discriminant Analysis (LDA): Using Bayes' theorem for	**15 Periods**	

	classification. Discriminant functions. Fisher's discriminant plots. Naive Bayes approach. Quadratic discriminant analysis. K-nearest neighbour algorithm.	
Unit 4:	**Logic & Graph Theory** Logic: Propositional Calculus - Statements and Notation, Connectives - Negation, Conjunction, Disjunction, Conditional, Biconditional, Statement formulas and truth tables, well-formed formulas, Theory of inference for Statement calculus, Predicate calculus, Rules of Inference, Inference theory for the predicate calculus. Graph Theory: Basic concepts of graphs, Storage representation and manipulation of graphs, Traversing of Graph.	**15 Periods**
	Reference Books: 1. Fundamentals of Statistics by S. C. Gupta. 2. Business Analytics - the science of Data - Driven Decision Making, U Dinesh Kumar. 3. Multivariate Data Analysis, Joseph F. Hair Jr. Barry J. Babin, Wiliam C. Black, Rolph E. Anderson. 4. Discrete Mathematics, Seymour Lipschutz, Marc Lars Lipson. 5. Discrete Mathematical Structures with Applications to Computer Science, J. P.Tremblay and P. Manohar, Tata McGraw Hill. 6. Elements of Discrete Mathematics - A Computer Oriented Approach, C. L. Liu and D. P. Mohapatra, 3rd edition, Tata McGraw Hill. 7. Discrete Mathematics and its Applications with Combinatorics and Graph Theory, K. H. Rosen, 7th edition, Tata McGraw Hill. 8. Discrete Mathematics for Computer Scientists and Mathematicians, J. L. Mott, A. Kandel, T.P. Baker, 2nd edition, Prentice Hall of India. 9. Discrete Mathematical Structures, Bernand Kolman, Robert C. Busby, Sharon Cutler Ross, PHI. 10. Discrete Mathematics, S. K. Chakraborthy and B. K. Sarkar, Oxford, 2011.	

M.C.A. Part-I Semester I			
Paper MCA25-105: Principles of Management and Organizational Behavior (Choice Based Credit System)			
Course Outcomes	Students of this course will be able to : 1. Understand basics of principles of management and organization behavior. 2. Understand concepts of Personality, learning, emotions, motivation and staffing & controlling 3. Understand Group behavior, team building, communication and leadership. **4.** Understand Organizational culture, change and development.		
Marks:100	Total Hours of Teaching:60	University Exam=70	Internal : 30
Syllabus Contents:			
Unit 1:	**Introduction and Evolution of Management-** Definition-Scope of Management- Functions of management- -Levels		**15Periods**

	of Management-Roles of a manager, Functional areas of Management, Planning and Organizing: Planning- Nature, types, steps in planning, process and limitation of planning. Organizing- Meaning, Process, Organization structure, Types of organizational structure, Centralization and Decentralization, Departmentalization, Span of management, Concept of Authority, Responsibility and Accountability, Delegation. Management by Objectives (MBO) – Definition, Meaning and Significance, MBO process.	
Unit 2:	**Staffing, Directing & Controlling -** Staffing- Meaning need, Human Resource Planning, Recruitment sources and selection. Procedure. Directing-Concept, need Elements of directing- supervision, communication, Motivating – Meaning and importance - Theories of motivation- Maslow's Hierarchy of needs Theory, Herzberg's Two- factor Theory, McGreger's Theory 'x' and Theory 'y' , Financial and Non-financial incentives Leading- Meaning of Leadership- Functions and qualities of leader, Leadership styles. Likert's four systems of leadership, Charishmatic Leadership. Controlling- Concept, Types of control, steps in control process, Importance of controlling, Techniques of controlling- Break Even Analysis, Budgetary Control, Zero based budgeting PERT, CPM.	**15 Periods**
Unit 3:	**Introduction to Organizational Behavior and Individual Behavior** Introduction of Organizational Behavior- Meaning of organizational Behavior , Definition of OB, key elements of OB, importance of OB, contributing disciplines to OB, the challenges faced by management, models of OB. Individual Behavior- Personality, Learning, and Motivation, Concept of Personality, Determinants of Personality, Meaning of Learning Means of Learning, Meaning of Motivation, Theories of Motivation	**15 Periods**
Unit 4:	**Group Behavior and Organizational Change and Development** Group Behavior- definition and characteristics of group, theories of group formation, types of groups Organizational Change and Development- organizational change, resistance to change, managing resistance to change, organizational development (OD) – meaning of OD, characteristics of OD, objectives of OD, OD models	**15 Periods**
	Reference Books: **Principles of Management** 1. Essentials of Management, Koontz and Weihrich, McGraw-Hill 2. Principles of Management, L.M. Prasad, 3. Management Concept and Strategies, J.S.Chandra, 5. Essentials of Management, Koontz and Weirich **Organizational Behavior** 1) Organisational Behaviour, Stephan P. Robbins, Prentice Hall Publication 2) Organisational Behaviour, Fred Luthans, McGrow Hill Publication. 3) Organisational Behaviour, Keith Davis, McGrow Hill Publication 4) Management & Organisational Behaviour, Laurie J. Mullincs, Pearson Education. 5) Organization Behavior, Jit Chandan.	

M.C.A. Part-I Semester I		
Paper MCA25-106: Business Communication **(Choice Based Credit System)**		
Course Outcomes	**Students of this course will be able to :** 1. Determine competency level with the basic Communication Skills 2. Adapt Proficiency in handling Professional Communication	
Marks:50	Total Hours of Teaching:30	University Exam :00	Internal : 50
Syllabus Contents:		
Unit 1:	Basic Communication Skills **Listening Skills:** What is listening; Types of Listening; Barriers and Strategies for Effective Listening **Reading Skills:** Meaning of Reading, Purpose of Reading, Types of Reading, SQ3R Technique of Reading **Writing Skills:** Paragraph Writing, Business Letters, Job Application Letters, Resume, E-Mail Writing, Reports- Types, Formats and structure, Meeting Documentation- Notice, Agenda and Minutes. **Oral Skills**: Strategies for effective speaking, Formal Oral Communication: Telephonic Conversation, Meetings, Presentations, Public Speaking and Interviews	**15Periods**
Unit 2:	Business Communication: Meaning, Process and Importance; Types of Communication – Verbal and Nonverbal; Barriers to effective communication, Overcoming the barriers ; Seven C's of Communication; Forms of Communication in an organization-Formal-Upward, Downward , Horizontal and diagonal and Informal (Grapevine)-Advantages and Disadvantages	**15 Periods**

	Reference Books:
	 1. Professional Communication Skills, ArunaKoneru
	 2. A to Z of Interview, Prof. (Dr.) Kishore.C. Padhy and Madhuchhanda
	 3. Business Correspondence and Report Writing, R.C.Sharma and Krishna Mohan
	 4. Business Communication, Meenakshi Raman and Prakash Singh
	 5. Business Communication, UrmilaRai and S.M.Rai
	 Suggested Additional Reading:
	 1.http://elibrary.bsu.az/books_250/N_186.pdf
	 2.https://www.airuniversity.af.edu/Portals/10/AUPress/Books/AU-4.PDF
	 3.https://www.pdfdrive.com/the-presentation-secrets-of-steve-jobs-how-to-be-insanely-great-in-front-of-any-audience-d158747912.html
	 Suggested Research Journals:
	 1.International Journal of Business Communication
	 2.Journal of Business Communication
	 3.International Journal of Applied Research
	 Nature of Internal Evaluation:
	     1. Assignment and Language Lab Activity :10 M
	     2. Group Activity/ Seminar presentation :10M
	     3. Listening Activity :10M
	     4. Reading Comprehension :10M
	     5. Class Test :10M	

M.C.A. Part-I Semester I
Paper GE107:Elective 1) Strategic IT Management
(Choice Based Credit System)

Course Outcomes	**Students of this course will be able to :** 1. Understand emerging Technologies and strategic role of IT in strategy 2. Develop IT strategy for any manufacturing or service organization. 3. Understand IT governance areas and determine IT governance implementation problems in business organization. 4. Develop IT Governance framework for IT enabled organizations.		
Marks :100	Total Hours of Teaching:60	University Exam :70	Internal : 30

Syllabus Contents:		
Unit 1:	Strategic Role of IS in Business: Evolving Role of IS in organization, Strategic Information System Era, Evolving nature of Strategy and strategic planning in organization, strategic framework, Strategic use of IS, Success factors, Organizational IS capability. Emerging trends in IT to device business strategies- web related technologies, mobile technologies.	**15 Periods**
Unit 2:	IT Strategy Overview and Developing an IT Strategy, Strategy implementation, strategy tools and techniques, resource based view of strategy, approaches to information strategy development, problems, and barriers. The challenges of planning strategically for IT today, Establishing an IT strategy, process, scope objectives and expectations. Strategies for managing IT Infrastructure, outsourcing strategies, guideline for outsourcing decisions.	**15 Periods**
Unit 3:	IT Governance: Definition and Purpose of IT Governance, Areas of IT Governance- strategic alignment, Value Delivery, Risk Management, Resource management, Performance measurement. Challenges in IT Governance.	**15 Periods**
Unit 4:	IT Governance Framework: concept, need of IT governance framework, Information criteria, Integrated IT Governance Framework –COBIT, Key governance Roles, Responsibilities and Accountability, IT Governance Decision Rights, Key IT Resources and Functions to be managed.	**15 Periods**

Reference Books:
1. ITGovernance,PeterWeillandJeanneWRoss,HarwardBusinessSchoolPress
2. StrategiesforInformationTechnologyGovernance,WimVanGrembrgen,IdeaGroupPublishing
3. IT Governance, Martin Frohlich and Kart Glasher, Gabler Publication
4. IT Governance, A Practical Guide by Christopher BGillies
5. IT Governance: How Top managers manages IT decisions right for superior results--- by Peter Weill, Harward Business School Press
6. Corporate Information strategy and Management by L M Applegate
7. Information Technology Management by Raner, Potter and Turban.
8. Strategic Technology Management by Betz
9. IT strategy and Management by SanjivaDubay
Suggested Additional Reading:
Information Technology Management by Yadhav
Suggested Research Journals:
1. The Journal of Strategic Information Systems
2. International Journal of Strategic Information Technology and Applications(IJSITA)

M.C.A. Part-I Semester I
Paper MCA25-107: Elective 2.Knowledge
Management (Choice Based Credit System)

Course Outcomes	**Students of this course will be able to :** 1) Understand concept of knowledge management and technology application for knowledge management. 2) Use the knowledge management tools. 3) Understand knowledge management Applications. 4) Design knowledge management strategy for organization.		
Marks:100	Total Hours of Teaching:60	University Exam :70	Internal : 30
Syllabus Contents:			
Unit 1:	**INTRODUCTION** An Introduction to Knowledge Management - The foundations of knowledge management- including cultural issues- technology applications organizational concepts and processes- management aspects- and decision support systems. The Evolution of Knowledge management: From Information Management to Knowledge Management - Key Challenges Facing the Evolution of Knowledge Management - Ethics for Knowledge Management.	**15 Periods**	
Unit 2:	**CREATING THE CULTURE OF LEARNING AND KNOWLEDGE SHARING** Organization and Knowledge Management - Building the Learning Organization. Knowledge Markets: Cooperation among Distributed Technical Specialists – Tacit Knowledge and Quality Assurance.	**15 Periods**	
Unit 3:	**KNOWLEDGE MANAGEMENT-THE TOOLS** Telecommunications and Networks in Knowledge Management - Internet Search Engines and Knowledge Management - Information Technology in Support of Knowledge Management - Knowledge Management and Vocabulary Control - Information Mapping in Information Retrieval - Information Coding in the Internet Environment - Repackaging Information.	**15 Periods**	

Unit 4:	**KNOWLEDGEMANAGEMENT-APPLICATION** Components of a Knowledge Strategy - Case Studies (From Library to Knowledge Center, Knowledge Management in the Health Sciences, Knowledge Management in Developing Countries). **FUTURE TRENDS AND CASE STUDIES** Advanced topics and case studies in knowledge management - Development of a knowledge management map/plan that is integrated with an organization's strategic and business plan - A case study on Corporate Memories for supporting various aspects in the process life - cycles of an organization.	**15 Periods**
	Reference Books: 1. Knowledge Management – Sudhir Warier, Vikas Publications. 2. Knowledge Management Systems – Stuart Barnes, Thomson Learning. 3. Key issues in the New Knowledge Management – J.M. Firestone, M.W. Mcelroy. 4. Developing Expert System for Business – Chandler/Liang. 5. Knowledge Management – Pankaj Sharma, APH Pub. **Suggested Additional Reading:** Nonaka, I., Takeuchi, H., "The Knowledge-Creating Company: How Japanese Companies Create the Dynamics of Innovation", Oxford University Press, 1995.	

<table>
<tr><td colspan="3" align="center">M.C.A. Part-I Semester I
Paper GE107: Elective 3.Financial Technologies
(Choice Based Credit System)</td></tr>
<tr><td>Course Outcomes</td><td colspan="2">Students of this course will be able to :
1. Understand about the transformation in traditional to Modern Banking systems.
2. Describe the Financial Technologies (current and emerging technology) and infrastructure.
3. Understand financial business ideation, technology adoption, and challenges in implementation technologies.
4. Describe the importance of security, privacy and ethical issues in financial technologies</td></tr>
<tr><td>Marks:100</td><td>Total Hours of Teaching:60</td><td>University Exam :70   Internal : 30</td></tr>
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Syllabus Contents:

Unit 1:	**Introduction to Financial Technology** Financial technology brief history, Evolution of financial Technologies, Challenges in Financial technologies , Infrastructural needs, Financial Applications in banking, share market and insurance sector	**15 Periods**
Unit 2:	**Core Banking Solution:** Introduction and benefits of CBS , Evolution of CBS, CBS infrastructure , CBS Modules (HO and Branch modules), Delivery Channels , Market Trends in CBS implementation. Challenges in CBS implementation	**15 Periods**
Unit 3:	**Electronic Payment Systems** Introduction and working of electronic payment systems , Electronic payment Types, E- currency (**Crypto- currency and digital cash**), **Mobile/digital wallets ,** Payment gateways , Challenges in electronic payment systems	**15 Periods**
Unit 4:	**Emerging Trends in Financial Technologies** Applications of AI for financial services, Applications of Block-chain Technology for financial services, Financial institutions and cloud based offering**,** Deception technology, IoT based customized products for financial services.	**15 Periods**
	Reference Books: 1. The Future of Finance: The Impact of FinTech, AI, and Crypto on Financial Services Henri Arslanian, Fabrice Fischer 2. CORE BANKING SOLUTION: Evaluation of Security and Controls Kindle Edition M. REVATHY SRIRAM 3. Digital Banking (2019 Edition) Paperback – 1 January 2019by Indian Institute of Banking & Finance 4. The AI Book: The Artificial Intelligence Handbook for Investors, Entrepreneurs and Fintech Visionaries Paperback Susanne Chishti, IvanaBartoletti, Anne Leslie, Shan M. Millie **Suggested Additional Reading:** 1. https://www.amazon.com/Future-Finance-FinTech-Financial-Services/dp/3030145328?creativeASIN=3030145328&linkCode=w61&imprToken=NNtR2HDrmHVpnkIgy2aGcA&slotNum=106&tag=uuid10-20 2. https://www.amazon.in/CORE-BANKING-SOLUTION-Evaluation-Security-ebook/dp/B015DY3J8C 3. https://www.amazon.in/Digital-Banking-Indian-Institute-	

M.C.A. Part-I Semester I Paper
MCA25-108: Lab Based on CC101
(Choice Based Credit System)

Marks:50	Total Hours of Teaching:30	University Exam :50	

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

M.C.A. Part-I Semester I Paper
MCA25-109: Lab Based on CC102
(Choice Based Credit System)

Marks:50	Total Hours of Teaching:30		Internal : 50

1. Demonstrate the use of ls command with different arguments.
2. Demonstrate the command to list all files contained in home directory, including hidden files.
3. Demonstrate the command to move file from one directory to another directory.
4. Demonstrate the command to sort the directory listing by file size.
5. Demonstrate the command to print the current working directory.
6. Demonstrate the command to view a file on screen.
7. Write a shell script that takes a command –line argument and reports on whether it is directory, a file, or something else.
8. Write a shell script to check whether given number is Armstrong or not.
9. Write a shell script to display first fifty prime numbers.
10. Write a shell script to perform the following string operations to find the length of a given string.
11. Write a shell script to perform to extract a sub-string from a given string
12. Write a shell script to copy the contents of one file into another

M.C.A. Part-I Semester I Paper
MCA25-110: Lab Based on CC103
(Choice Based Credit System)

Marks:50	Total Hours of Teaching:30	University Exam :50	

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

1. Table Creation, Renaming a Table, Copying another Table, Dropping a Table,Describing Table Definitions, Modifying Tables, Joining Tables, Number and Date Functions
2. SQL Queries: Queries, Sub Queries, and aggregate functions
3. DDL: Experiments using database DDL SQL statements
4. DML: Experiment using database DML SQL statements
5. DCL: Experiment using database DCL SQL statements
6. Index : Experiment using database index creation, Renaming a index, Copying another index, Dropping a index , Views: Create Views, Partition and locks
7. Exception Handling: PL/SQL Procedure for application using exception handling
8. Cursor: PL/SQL Procedure for application using cursors
9. Trigger: PL/SQL Procedure for application using triggers
10. Stored Procedure: PL/SQL Procedure for application using stored procedure
11. Function: PL/SQL Procedure for application using function

M.C.A. Part-I Semester II Paper MCA25-201: Web Technology (Choice Based Credit System)			
Course Outcomes	**Students of this course will be able to :** 1: Apply the concept and usages web based programming techniques. 2: Demonstrate the development of XHTML documents using JavaScript and CSS. 3: Design and implement user interactive dynamic web based applications. 4:Demonstrate client side and server side scripting languages and validation techniques.		
Marks:100	Total Hours of Teaching:60	University Exam :70	Internal : 30
Syllabus Contents:			
Unit 1:	Web browsers, web servers, MIME, URL, HTTP, Introduction to HTML, essentials HTML tags, XHTML5 tags, Basic syntax and structure, text markups, images,, lists , tables , Media tags-audio and video, forms, frames.		**15 Periods**
Unit 2:	Introduction to CSS, Levels of CSS, Selectors, Font, color and Text Properties, BOXModel, Span and Div tags. Introduction to JavaScript, controls statements, Arrays andfunctions, pattern matching, Element Access, JavaScript objects, and validations		**15 Periods**
Unit 3:	**Introducing PHP:** History, General Language Feature **PHP Basics:** Embedding PHP code in Your Web Pages, Commenting Your Code, Outputting Data to the Browser, PHP supported Data Types, Identifiers, Variables, Constants, Expressions, String Interpolation, and Control Structures **Functions:** Invoking a Function, Creating a Function, Function Libraries **Array:** What is Array?, Creating an array, outputting an Array, Merging, slicing, splicing and Dissecting Arrays, Other useful Array Functions.		**15 Periods**
Unit 4:	**Object-Oriented PHP:** The benefits of OOP, Key OOP Concepts, Constructor and Destructors, Static Class Members, The instanceof Keyword, Helper Functions. **Advanced OOP Features:** Object Cloning, Inheritance, Interfaces, Abstract classes and Introducing namespaces. **Strings and Regular Expressions:** Regular Expressions, Other String-Specific Functions, Alternatives for Regular Expression Functions **Working with HTML Forms:** PHP and Web Forms, Validating Form Data **Handling File Uploads:** Uploading Files with PHP **Using PHP with MySQL:** Installation Prerequisites, Using the MySqli Extension, Interacting with the Database, Executing Database Transactions **Session Handlers:** What Is Session Handling, Configuration Directives, Working with Sessions, Practical Session-Handling Examples, Creating Custom Session Handlers		**15 Periods**
	Reference Books: 1. Web Technologies, Black Book, dreamtech Press 2. HTML 5, Black Book, dreamtech Press 3. Learning PHP, MySQL, JavaScript, CSS and HTML 5, Robin Nixon, O'Reilly publication 4. Beginning PHP and MySQL: From Novice to Professional, Fourth Edition - W. Jason Gilmore 5. Professional PHP Programming, Jesus Caspagnetto, Etal. Wrox Publication.		

6. Internet and World Wide Web How to program, P.J. Deitel& H.M. Deitel, Pearson
7. **Developing Web Applications, Ralph Moseley and M. T. Savaliya, Wiley-India.**

M.C.A. Part-I Semester II Paper MCA25-202: Data Structure
(Choice Based Credit System)

Course Outcomes	Students of this course will be able to :
	1. Differentiate between primitive and non-primitive data types.
	2. Select appropriate data type/structure to solve the problem.
	3. Design and implement appropriate data structures for solving computing problems.
	4. Understand and use various file structures.

Marks:100	Total Hours of Teaching:60	University Exam :70	Internal : 30

Syllabus Contents:

Unit 1:	**Introduction to Data Structure :** Data Management concepts, Data types – primitive and non-primitive, Types of Data Structures- Linear &Non Linear Data Structures, implementation of some of the user defined data types such as – rational number, complex number, string, matrix etc.	**15Periods**
Unit 2:	**Stack and Queue :** Stack-Definitions & Concepts, Operations on Stacks, Implementation of stack using array and linked list, Applications of Stacks – Parenthesis checker, Infix to postfix conversion, Expression evaluation, Queue-operations and implementation Of Queue, Circular Queue, Priority Queue, Double Ended Queue, Applications of Queue.	**15 Periods**
Unit 3:	**Linked List and Tree :** Singly Linked List, Doubly Linked list, Circular linked list, Linked, Applications of linked list. Binary tree - Definitions and Concepts, Representation of binary tree, Binary tree traversal (In order, post order, preorder), Threaded binary tree, Binary search trees, Applications Of Trees- balanced tree-AVL trees, Height Balanced, Weight Balance.	**15 Periods**
Unit 4:	**Hashing and File structures :** Hashing: The hash table concept, Hashing Functions, Collision-Resolution Techniques, File Structure: Concepts of fields, records and files, Sequential, Indexed and Relative/Random File Organization, Indexing structure for index files, hashing for direct files, Multi-Key file organization and access methods.	**15 Periods**
	Reference Books: 1. An Introduction to Data Structures with Applications. by Jean-Paul Tremblay & Paul G. Sorenson Publisher-Tata McGraw Hill. 2. Data Structures using C & C++ -By Ten Baum Publisher – Prentice-Hall International. 3. Fundamentals of Computer Algorithms by Horowitz, Sahni,Galgotia Publication, 2001 edition. 4. Fundamentals of Data Structures in C++-By Sartaj Sahani. 5. **Data Structures: A Pseudo-code approach with C -By Gilberg & Forouzan Publisher-Thomson Learning.**	

M.C.A. Part-I Semester II

	Paper MCA25-203: Big Data Management (Choice Based Credit System)		
Course Outcomes	**Students of this course will be able to :** 1. Identify evolution of Big Data Management. 2. Understand Components and Tools of Big Data. 3. Apply Big Data Management techniques for processing data. 4. Evaluate role of different Big Data Storage Models and NOSQL for Business Applications.		
Marks: 100	Total Hours of Teaching:60	University Exam :70	Internal:30
Syllabus Contents:			
Unit I	**Understanding of Big Data** Introduction to Big Data, Definition of Big Data, Need of Big Data Management, Sources of Big Data, Characteristics of Big Data, Evolution of Big Data, Differentiating between Data Warehouse and Big Data, Real time data processing, Structure of Big Data, Big Data Life Cycle and processing, Applications of Big Data, Benefits of Big Data Management, **Challenges of Big Data** Privacy, Visualization, Compliance and Security.		**15Periods**
Unit II	**Overview of Hadoop** Hadoop Architecture, Features of Hadoop, Architecture of Hadoop, Hadoop daemons, Introduction to HDFS, HDFS operations, Introduction to Map-Reduce, Map-Reduce Architecture, Examples of Map-Reduce and Limitations of HDFS. **Overview of HBase** Introduction to HBase, Storage mechanism in HBase, Differentiating between HDFS and HBase, Features of Hbase, HBase Architecture, Applications of HBase.		**15 Periods**
Unit III	**Higher Level Tools** **Pig Programming:** Introduction to Pig, Features of Pig, Applications of Pig, Pig architecture, Components of Pig: Pig Latin, Grunt Shell, Pig relations and alias, Pig data types, Defining schema, Reading and storing data through Pig, Pig operators, Performing Inner and Outer joins in Pig, Splitting data sets, User defined functions in Pig, Examples of Pig. **Hive Programming:** Introduction to Hive, Features of Hive, Applications of Hive, Architecture of Hive, Components of Hive: Hive shell, HiveQL, Hive Database and tables, Data types, Operators in Hive, Performing Inner and Outer joins in Hive, Built-in functions in Hive, Database operations inHive, Hive Vs RDBMS, Examples of Hive.		**15 Periods**
Unit IV	**Big Data Storage Models** Distributed Hash-table, Key-Value Storage Model (Amazon's Dynamo), Document Storage Model (Facebook's Cassandra), Graph storage models. **Working with NOSQL Database** Introduction to NOSQL, Different NOSQL products, Interfacing and Interacting with NOSQL, NOSQL Storage Architecture, Introduction to MongoDB, CRUD operations with MongoDB, Querying, Modifying and Managing NOSQL Data stores, Indexing and ordering datasets in MongoDB, Differentiating between RDBMS and NOSQL, NOSQL Database Administration.		**15 Periods**
	Reference Books: 1. Chris Eaton, Dirk deroos et al. , "Understanding Big data ", McGraw Hill, 2012.		

2. Tom White, Hadoop: The Definitive Guide, O'Reilly, 3rd edition
3. Alan Gates, Programming Pig, O'Reilly
4. Edward Capriolo, Dean Wampler, Jason Rutherglen, - Programming Hive, O'Reilly
5. Tom Plunkett, Brian Macdonald et al, "Oracle Big Data Handbook", Oracle Press, 2014.
6. Data Modeling with NOSQL Database, Ajit Singh, Sultan Ahmad

Suggested Additional Reading:
1. http://www.bigdatauniversity.com
2. http://www.cloudera.com/content/cloudera/en/solutions/enterprisesolutions/security-for-hadoop.html
3. http://hortonworks.com/blog/hadoop-security-today-and-tomorrow/"

Suggested Research Journals:
1. International Journal of Big Data Management
2. International Journal of Big Data Intelligence
3. Journal of Big Data
4. Frontiers in Big DataOpen Journal of Big Data.

M.C.A. Part-I Semester II
Paper MCA25-204 : Data Communication & Network
(Choice Based Credit System)

Course Outcomes	Students of this course will able to :
	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.

Marks:100	Total Hours of Teaching:60	University Exam :70	Internal : 30

Syllabus Contents:

Unit 1:	**Introduction to Networking** 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, Multiplexing: Frequency-Division Multiplexing, Wavelength-Division Multiplexing, Time-Division Multiplexing, Switching: Circuit switching, Packet Switching, Message Switching.	15Periods
Unit 2:	**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	15 Periods

	(FTP), Introduction to 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:	**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,	15 Periods
Unit 4:	**Network Vulnerabilities** Introduction to Vulnerabilities and Threats, Threats in transit, Protocol flaws, Impersonation, Active/Passive and Passive attacks: Virus, Worm. Malware, Hacking, Cracking, Sniffing, Spoofing, Dos, DDos, Masquerade, Trojan Horse. Ransomware, Logic bombs, Botnets, Keyoggers, Rootkits, Identification of Network vulnerabilities. Network security controls: Authentication, Access Controls, Basic Cryptography terminologies.	15 Periods
	Reference Books: 1. Andrew S. Tanenbaum: Computer Networks, 4th Edition, PHI. 2.Computer Networks – Protocols, Standards, and Interfaces, 2nd Edition by Uyless Black. 3.Computer Networking - A Top-Down Approach Featuring the Internet, 5th Edition, J. F. Kurose and K. W. Ross, Pearson Education, 2009. 4.Computer Networks: An Open Source Approach, 1st Edition, R2. Y. D Lin, R. H Hwang, and F.Baker, McGraw-Hill, 2011. 5.BernardMenezes, 'Network Security and Cryptography', Cengage Learning, ISBN: 978- 81-315-1349—1. **Suggested Additional Reading:** 1. Dhraj K. Pradhan, " Fault Tolerant Computer System Design", Prentice Hall, ISBN-13: 978-0130578877 2. Martin L. Shooman, "Reliability of Computer Systems and Networks: Fault Tolerance", ISBN: 471464066 2. William Stallings, 'Cryptography and Network Security: Principle and Practice', 5th Edition, Pearson, ISBN: 978-81-317-6166-3. 3.Computer Network Architecture and Protocols by Paul E. Green, Jr. **Suggested Research Journals:** 1. The International Journal of Computer and Telecommunications Networking Editors-in- Chief	

: Tommaso Melodia, Antonio Iera.
2. A Study on Fault Tolerance Solution by Dr. J MeenaKumari and Shaima'a, Ghamdan in InternationalJournal of Engineering Research & Technology (IJERT) ISSN: 2278-0181 Published by, www.ijert.org ICRET - 2016 Conference Proceedings
3. A Review paper on Network Security and Cryptography Dr. Sandeep Tayal1, Dr. Nipin Gupta2,Dr.Pankaj Gupta3 , Deepak Goyal4 , Monika Goyal in Advances in Computational Sciences and Technology ISSN 0973-6107 Volume 10, Number 5 (2017) pp. 763-770 © Research India Publications http://www.ripublication.com.

M.C.A. part-I Semester II			
Paper MCA25-205: Software Engineering and Project Management			
(Choice Based Credit System)			
Course Outcomes	**Students of this course will be able to :** 1. Understand various software Process Models 2. Design SRS document for Software Project 3. Understand Software Project Life Cycle 4. Describe Software quality attributes and identify IT project risk		
Marks:100	Total Hours of Teaching:60	University Exam :70	Internal : 30
Syllabus Contents:			
Unit 1:	**Introduction to software Engineering** Introduction to Software Engineering: Software, Evolving role of software, Three "R"-Reuse, Reengineering andRetooling, **Software Process Models** Waterfall Model, Evolutionary Process Model: Prototypeand Spiral Model, Incremental Process model: Iterativeapproach, RAD, JAD model, Concurrent DevelopmentModel, Agile Development: Extreme programming,Scrum.	**15Periods**	
Unit 2:	**Software Requirement Analysis and Specification** Types of Requirement, Feasibility Study, RequirementAnalysis and Design: DFD, Data Dictionary, Introduction to UML Diagrams, Requirement Elicitation: Interviews, Questionnaire, Brainstorming, Facilitated Application Specification Technique (FAST),SRS Case study, Software Project Estimation: Function Point,COCOMO, COCOMO-II.	**15 Periods**	
Unit 3:	**Introduction to Project Management** An Overview of IT Project Management: Define project, project management framework, The roleof project Manager, Systems View of Project Management, Stakeholder management, Project phases and the project life cycle. **Software Project Planning** Business Case, Project selection and Approval, Project charter, Project Scope management: Scope definition and Project Scope management, Creating the Work Breakdown Structures, Scope Verification, Scope Control Out Sourcing: The Beginning of the outsourcing phenomenon, Types of outsourcing relationship, The realities of outsourcing, Managing the outsourcing relationship. **Project Team Management**	**15 Periods**	

	Human Resource Planning, Acquiring the Project Team: Resource Assignment, Loading, Leveling, Developing the Project Team: Team Structures, Managing the Project Team,	
Unit 4:	**Software Quality and Project Risk Management:** **Software Quality** Software and System Quality Management: Overview of ISO 9001, SEI Capability Maturity Model, Six Sigma, Formal Technical Reviews, Tools and Techniques for Quality Control, Pareto Analysis, Software Metrics: Understanding software Metrics, definitions of Metrics, attributes of measures, metrics for different types of projects. **Risk Management and Reliability Issues** Risk Management: Identify IT Project Risk, Risk Analysis and Assessment, Risk Strategies, Risk Monitoring and Control, Risk Response and Evaluation. Software Reliability: Reliability Metrics, Reliability Growth Modeling.	**15 Periods**
	Reference Books: 1. Software Engineering, 5th and 7th edititon, by Roger S Pressman, McGraw Hillpublication. 2. Managing Information Technology Project, 6edition, by Kathy Schwalbe, CengageLearning publication. 3. Information Technology Project Management by Jack T Marchewka Wiley Indiapublication. 4. Software Engineering 3rd edition by KK Agrawal, Yogesh Singh, New Age InternationalPublication. 5. Software Engineering Project Management by Richard H. Thayer Wiley IndiaPublication. 6. Software Engineering for students: A Programming Approach by Douglas Bell, PearsonPublication. 7. Project Management Absolute Beginner's Guide (3rd Edition) by Greg Horine8. Software Project Management: A Concise Study By S. A. KELKAR **Suggested Additional Reading:** 1. Software Development for Engineers,1st Edition by William Buchanan 2. Software Engineer's Reference Book, Elsevier edited by John A McDermid, 1st Edition **Suggested Research Journals:** 1. International Journal of Software Quality http://www.guide2research.com/?p=8194 2. International journal of software engineering and knowledge engineering **3.** *International Journal* **of Information Systems** **and** *Project* **Management**	

M.C.A. Part-I Semester II Paper MCA25-206: Elective 1.Digital Marketing (Choice Based Credit System)	
Course Outcomes	**Students of this course will be able to :** 1. Understand concept and significance of Digital Marketing. 2. Demonstrate the Technical Elements of Digital Marketing.

	3. Learn contemporary developments in Digital Marketing.		
	4. Use Google analytics tools for generating various reports.		
Marks:100	Total Hours of Teaching:60	University Exam :70	Internal : 30

Syllabus Contents:

Unit 1:	**Principles of Digital Marketing** Basics of Marketing,What is Digital Marketing? Comparison of Traditional and Digital Marketing. Statistics of Digital Marketing Benefits of Digital marketing Emerging trends in Digital marketing Digital marketing platforms Digital Marketing strategy for websites Career opportunities in Digital Marketing	15Periods
Unit 2:	**Website Designing (WordPress)** Types of Websites Basics of HTML/CSS/JavaScript WordPress Installation on Server Understanding the Dashboard Changing the Default Settings Installing and customizing themes Content management in WP Creating categories, pages, and posts Adding a menu, widgets to the website Installing useful plugins for site features SEO specific plugins	15 Periods
Unit 3:	**SEO (Search Engine Optimization) and SEM (Search Engine Marketing):** **I: SEO** Introduction to SEO How Do Search engines work? Search Engine Algorithms Google Algorithm Updates Google Search Console Keyword Research Process Keyword Research Tools Competition Analysis On page Optimization strategies Content development strategy Title & Meta Tags Semantic SEO Rich Snippets Integration Speed Optimization Off Page Optimization Link Building Techniques as per latest standards Local SEO Strategies Penguin & Panda update recovery process Reports and SERP Management Click here for detailed SEO Curriculum **II. SEM** Introduction to Paid Marketing Google Ads (Google AdWords) account and billing settings Types of Campaigns	15 Periods

	PPC Campaign Setup AdGroups and Keywords setup Bidding strategies & Conversion Tracking AdRank, Quality Score Optimization Ad Formats & Ad Extensions Shopping Campaigns Dynamic search campaigns Display Ads Campaigns Remarketing campaigns Mobile Apps Marketing Video Marketing Google Ads (Google AdWords) tools MCC Account AdWords Editor Tool	
Unit 4:	Google Analytics: Purpose of website analytics Tools for website analytics Installing Google Analytics Google Tag Manager How to use Google Tag Manager Implement Conversion Tracking Basic terminology and KPI's Audience Reports Customer Acquisition Reports Behavior Reports Goals and Conversion Reports Segmentation and Filters	15 Periods
	Reference Books: 1. MARKETING IN THE DIGITAL AGE Dinesh Kumar Professor of Marketing, JagranLakecity University, Bhopal Marketing faces a huge challenge in the digital era. T• Index SAGE TEXTS 2016 • 456 pages • Paperback (978-93-515-0869-4) 2. Marketing 4.0: Moving from Traditional to Digital" by Philip Kotler 3. The Art of Digital Marketing: The Definitive Guide to Creating Strategic, Targeted, and Measurable Online Campaigns Hardcover – 1 January 2016 ,by Ian Dodson Digital Marketing Paperback – 1 November 2017 by Seema Gupta 4. Digital Marketing: Cases from India Paperback – 1 January 2018 by Edited by RajendraNargundkar and RomiSainy (Autho **Suggested Additional Reading:** 1. Digital Marketing For Dummies, Russ Henneberry and Ryan Deiss 2. Google Analytics, Justin Cutroni 3. Google Search Engine Marketing Ready Reckoner 4. Search Engine Optimization All-in-One for Dummies, Book by Bruce Clay and Susan EsparzaSearch Engine Marketing, Bill Hunt and Mike Moran	

M.C.A. Part-I Semester II **Paper GE206: 2) Design Thinking and Innovation** **(Choice Based Credit System)**	
Course	Students of this course will be able to :

Outcomes	1. Develop a strong understanding of the Design Process and how it can be applied in a variety of business settings. 2. Learn to research and understand the unique needs of a company around specific challenges. 3. Build empathy for target audiences from different "cultures" and Cultivate and test innovative ideas through a rapid iteration cycle. 4. Develop physical prototypes and visual representation of an idea.			
Marks:100	**Total Hours of Teaching:60**	**University Exam :70**		**Internal : 30**
Syllabus Contents:				
Unit 1:	Introduction To Design Thinking, Human- Centred Design History Of Design Thinking, Design Thinking Process – Define-Ideate-Prototype -Test, Case Studies in Design Thinking			**15 Periods**
Unit 2:	Design thinking: Design perspective, Needs Finding User personas, Ideation, Interviewing and Empathy Mental models, Conceptual model, Journey Mapping, Storyboards			**15 Periods**
Unit 3:	Prototype Development : Wireframes- Developing and Testing Prototypes, Ideation and Prototyping Strategies; User Testing; Story Telling, Introduction and Importance of Research, Types of Research- Ethnography Research Case study: Implement design thinking process for any Social Project			**15 Periods**
Unit 4:	Innovation, Role of design Thinking in Innovations, Types and techniques of Innovation, qualities for Managing Innovation, Impact of Innovation, Process in driving innovation			**15 Periods**
	Reference Books: 1. Roger, M. (2013). *The Design of Business: Why Design Thinking is the Next Competitive Advantage*. Boston: Harvard Business Review Press. 2. Kelley, D. & Kelley, T. (2014). *Creative Confidence: Unleashing the Creative Potential Within Us All*. New York: William Collins. 3. Lee, S. M., & Lim, S. (2018). *Living Innovation : From Value Creation to the Greater Good: Vol. First edition. Emerald Publishing Limited.* 4. Jeanne Liedtka, & Tim Ogilvie. (2011). *Designing for Growth : A Design Thinking Tool Kit for Managers. Columbia Business School Publishing.* Fraser, H. M. A. (2012). *Design Works : How to Tackle Your Toughest Innovation Challenges Through Business Design. University of Toronto Press, Scholarly Publishing Division.* **Suggested Additional Reading:** 1. Kelley, Tom; Kelley, David. (2013). *Creative Confidence.* Currency. 2. Brown, Tim. (2019). *Change By Design.* Harper Business. Kelley, Tom; Littman, Jonathan. (2001). *The Art of Innovation.* Currency. **Suggested Research Journals:** 1. HBR's 10 Must Reads on Design Thinking (with featured article "Design Thinking" By Tim Brown), 2020 2. HBR's 10 Must Reads on Business Model Innovation (with featured article "Reinventing Your Business Model" by Mark W. Johnson, Clayton M. Christensen, and Henning Kagermann), 2019			

	M.C.A. Part-I Semester II Paper GE206: Elective 3.Information System Audit (Choice Based Credit System)		
Course Outcomes	**Students of this course will be able to :** 1) Understand system audit phases and functions 2) Describes IS assets and audit controls 3) Explain VAPT process and tools 4) Understand IT ACT and various provisions in IT Act		
Marks:100	Total Hours of Teaching:60	University Exam :70	Internal : 30
Syllabus Contents:			
Unit 1:	**Systems Audit –** An Overview – Nature, Significance and Scope of Systems Audit – Steps Involved in Conducting Systems Audit – Systems Audit and Management Functions – Systems Audit of Computerized Secretarial Functions – Norms and Procedure for Computerization, Computers Control and Security – Testing of Computer Systems – Documentation Standards, Policies and Procedures, Audit Approach, preparation of audit report.	**15Periods**	
Unit 2:	**IS Assets and Control**s: Information System Assets, Types of IS assets , Need of audit of computers effects of computers on auditing, types of audit, audit procedure, audit risks, Information System Control: framework of management control, introduction, top management control, evaluating the planning, organizing, leading and controlling function,	**15 Periods**	

Unit 3:	**Vulnerability Assessment & Penetration Testing (VAPT) :**
	  Introduction and purpose of VAPT, VAPT goals and scope,
	  Vulnerability Assessment Methodology, Types of Vulnerability,
	  Tools for Vulnerability Scanning-Host based, network based and
	  database based;
	  Advantages and disadvantages of Vulnerability Assessment,
	  Vulnerability testing methods and tools
	  Penetration testing methods and tools
		15 Periods	

Unit 4:	**Information Technology Law** – Information Technology Act – Definitions, Important terms under Information Technology Legislation – Digital Signatures – Electronic Records – Certifying Authority – Digital Signature Certificate – Cyber Regulation Appellate Tribunal – Offences and Penalties	**15 Periods**	
	Reference Books: 1 EDP Auditing - Ron Weber 2 PC and LAN security – Stephen Cobb 3 Enterprise Security - Protecting Information Assets - Michel E. Kabey 4 Enterprise Disaster Recovery Planning – Miora 5 Computer Security -Summies 6 Internet Security – Derek, Alkins 7 Information security policies procedures and standards by Thomas Pettier 8 Information System Security: security Management frameworks and best Practices by NinaGodbole 9.. D.P. Mittal : Law of Information Technology (Cyber Law) with Information Technology (Certifying Authorities) Rules, 2000, TaxmannPublications Pvt. Ltd.		

	Suggested Additional Reading: 1. https://www.softwaretestinghelp.com/penetration-testing-guide/ 2. https://www.ijrter.com/papers/volume-4/issue-3/vulnerability-assessment-penetration-testing-vapt.pdf **Suggested Research Journals:** 1. International Journal of Auditing Technology 2. Information Systems Journal (ISJ) Wiley	

M.C.A. part-I Semester II Paper MCA25-207: Lab based on CC201
(Choice Based Credit System)

Marks:50	Total Hours of Teaching:30	University Exam :50	Internal : 00
Programs Based on CC201 Web Technology. This laboratory course should consist of 10 to 12 programming exercises with focus on covering the hands-on aspects covered in theory course.			

M.C.A. Part-I Semester II Paper MCA25-208: Lab based on CC202
(Choice Based Credit System)

Marks:50	Total Hours of Teaching:30	University Exam :50	Internal : 00
List of Practical's 1. Implement rational number as new data type. 2. Implement complex number as new data type. 3. Write your own function for string operations. 4. Implement matrix as new data type. 5. Implement stack using array. 6. Implement stack using linked list. 7. Use of stack for checking brackets in mathematical expression. 8. Conversion of infix to postfix expression. 9. Evaluation of postfix expression. 10. Implementation of queue using array. 11. Implementation of queue using linked list. 12. Implementation of priority queue. 13. Implementation of Dqueue. 14. Implementation of circular queue. 15. Implementation of singly linked list. 16. Implementation of singly circularly linked list. 17. Implementation of doubly linked list. 18. Implementation doubly circularly linked list. 19. Solving polynomial arithmetic using linked list. 20. Implementation of binary tree and operations. 21. Traversal of binary tree. 22. Implementation of hash table. **23.** Implementation of hash collision resolution techniques.			

M.C.A. part-I Semester II
Paper MCA25-209: Mini Project
(Choice Based Credit System)

Marks:100	Total Hours of Teaching:60	University Exam :70	Internal : 30
	A group of maximum three students prepare a mini project under the guidance		

| | of internal guide. Project report will be evaluated by the internal teacher out of 30 marks and there will be viva-voce examination for 70 marks.(Documentation – 30Marks, Viva-Voce -- 40 Marks.) The student should prepare theproject report based on courses studied in Sem I and Sem II. |

20. Course Equivalence:

Semester I			
Course Code	**Old Syllabi Course Title**	**Course Code**	**Revised Syllabi Course Title**
MCA11	Fundamental of Computers	CC102	Computer Architecture & Operating System
MCA12	Python Programming	CC101	Introduction to Programming
MCA13	Discrete Mathematics	No	Two Additional attempts should be given
MCA14	Database Management System	CC103	RDBMS
MCA15	**Principles of Management and Accounting**	-	Two Additional attempts should be given
MCA1L1	LAB -I (Python)	CC108	Lab Based on CC101
MCA1L2	LAB -II (Database Management System)	CC109	Lab Based on CC102(RDBMS)
MCA1S	Seminar	-	Two Additional attempts
Semester II			
MCA21	Linux Foundation	No	Two Additional attempts should be given
MCA22	Data Structures with Python	CC202	Data Structure
MCA23	Statistical Computing	AEC 104	Statistical and Mathematical Foundations
MCA24	Web Designing Technologies	CC201	Web Technology
MCA25	Software Engineering	CC205	Software Engineering and Project Management
MCA2L1	LAB- III (Linux and Web lab)	CC207	Lab based on CC201(Web Technology only)
MCA2L2	LAB - IV (DSP Lab)	CC208	Lab based on CC202
MCA2MP	Mini Project	CC209	Mini Project

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