



Estd. 1962
NAAC 'A' Grade

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दुरध्वनी (ईपीएबीएक्स) २६०९०००० (अभ्यास मंडळे विभाग— २६०९०९४)

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SU/BOS/Science/6144

Date: 18/06/2019

To,

The Principal, All Concerned Affiliated Colleges/Institutions Shivaji University, Kolhapur	The Head/Co-ordinator/Director All Concerned Department (Science) Shivaji University, Kolhapur.
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Subject: Regarding syllabi of M.C.A. Part -I (Sem. I & II) CBCS Structure degree programme under the Faculty of Science and Technology

Sir/Madam,

With reference to the subject mentioned above, I am directed to inform you that the university authorities have accepted and granted approval to the revised syllabi, nature of question paper and equivalence of M.C.A.Part-I (Sem. I & II) CBCS Structure degree programme under the Faculty of Science and Technology.

This syllabi and equivalence shall be implemented from the academic year 2019-2020 (i.e. from June 2019) onwards. A soft copy containing the syllabus is attached herewith and it is also available on university website www.unishivaji.ac.in (Online Syllabus)

The question papers on the pre-revised syllabi of above mentioned course will be set for the examinations to be held in October /November 2019 & March/April 2020. These chances are available for repeater students, if any.

You are, therefore, requested to bring this to the notice of all students and teachers concerned.

Thanking you,

Yours faithfully,

Dy Registrar

Copy to:

1	The Dean, Faculty of Science & Tech.	7	Appointment Section
2	Director, Board of Examinations and Evaluation	8	P.G.Seminar Section
3	The Chairman, Respective Board of Studies	9	Computer Centre /IT cell
4	B.Sc. Exam	10	Affiliation Section (U.G.)
5	Eligibility Section	11	Affiliation Section (P.G.)
6	O.E. I Section	12	P.G.Admission Section

Master of Computer Applications (M.C.A.)

(Under faculty of Science)

(Choice Based Credit System)

MCA (Part I)

Programme Educational Objectives

1. Analyze real life problems, design computing systems appropriate to its solutions that are technically sound, economically feasible and socially acceptable
2. Exhibit professionalism, ethical attitude, communication skills, team work in their profession and adapt to current trends by engaging in lifelong learning.
3. To develop academically competent and professionally motivated personnel, equipped with objective, critical thinking, right moral and ethical values that compassionately foster the scientific temper with a sense of social responsibility.
4. To develop students to become globally competent.

Program Outcomes

1. Computational Knowledge: acquire knowledge of Computing Fundamentals, Basic Mathematics, Computing Specialization, and Domain Knowledge of proper computing models from defined problems.
2. An ability to analyze a problem, and identify and formulate the computing requirements appropriate to its solution.
3. An ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs with appropriate consideration for public health and safety, cultural, societal and environmental considerations.
4. An ability to design and conduct experiments, as well as to analyze and interpret data.
5. An ability to use current techniques, skills, and modern tools necessary for computing practice.
6. An ability to analyze the local and global impact of computing on individuals, organizations, and society.
7. Continuous learning: confidence for self and continuous learning to improve knowledge and competence as a computing professional.
8. An understanding of professional, ethical, legal, security and social issues and responsibilities.
9. An ability to function effectively individually and on teams, including diverse and multidisciplinary, to accomplish a common goal.
10. An ability to communicate effectively with a range of audiences.
11. Recognition of the need for and an ability to engage in continuing professional development.

12. An understanding of technology and management principles and apply these to one's own work, as a member and leader in a team, to manage projects.

Program Specific Outcomes (PSOs)

1. At the end of the programme, the student should be able to Understand the concepts and applications in the field of Computing Sciences like Web designing and development, Mobile application development, and Network and communication technologies.
2. Apply the learning from the courses and develop applications for real world problems.
3. Understand the technological developments in the usage of modern design and development tools to analyze and design for a variety of applications.
4. Communicate in both oral and written forms, demonstrating the practice of professional ethics and the concerns for social welfare

1. Introduction

1. The name of the programme shall be Master of Computer Applications (**MCA**).
2. **The knowledge and skills required** planning; designing and to build Complex Application Software Systems which are highly valued in all industry sectors including business, health, education and the arts. The basic objective of the education in Masters Programme as Computer Applications (MCA) is to provide to the country a steady stream of the necessary knowledge, skills and foundation for acquiring a wide range of rewarding careers into the rapidly expanding world of the Information Technology.
3. **Job Opportunities:** Many graduates begin their career as a junior programmer and, after some experience, are promoted as system analysts. Other seek entrepreneurial role in the Information Technology world as independent business owners, software authors, consultants, or suppliers of systems and equipments. Career opportunities exist in such areas as management software and hardware sales, technical writing, training others on computer, consulting, software development and technical support. Application areas in the Information Technology world as independent business owners, software authors,

consultants, or suppliers of systems and equipments. Career opportunities exist in such areas as management software and hardware sales, technical writing, training others on computer, consulting, software development and technical support. Application areas include transaction processing, accounting functions, sales analysis, games, forecasting and simulation, database management, decision support and data communications.

4. Specific elective courses to be offered in functional areas have to depend on student preferences and needs of the user systems in the region in which the educational institution is located.

5. The MCA programme is a mixture of computer-related and general business courses. The computer related courses includes standard techniques of programming, the use of software packages, databases and system analysis and design tools. The general business courses include the functional areas of management like accounting, sales, purchase, inventory, and production. The course would emphasis the study and creation of business applications. Inclusion of projects in each semester (Except SEM-I, III, V) improves student's technical orientation, understanding of IT environment and domain knowledge. It will build right platform for students to become a successful Software professional. This would emphasize on domain knowledge of various areas, which would help the students to build software applications on it. The students are exposed to system development in the information-processing environment with special emphasis on Management Information Systems and Software Engineering for small and medium computer systems. Inclusion of Business Management Labs will help students to acquire thorough knowledge of management practices in organization. Subjects such as ERP, Information Security and Business Intelligence will work as new application domains. Major focus is also given on Mobile technologies so that student can choose Mobile Technologies as their career options. Also, exposure to microcomputer technology, micro-based systems design and micro applications software, including network and graphical user interface systems is also provided. Advanced Internet and Web technology includes variety of new technologies. Soft skills techniques are covered in first four semesters, which will lead to overall personality development of the student and that will help them in their placement activities and to sustain in the organization successfully.

6. The new curricula would focus on learning aspect from three dimensions viz. Conceptual Learning, Skills Learning and Practical / Hands on.

7. The inclusion of projects at each semester (except Sem-I,III,V) ensures the focus on applying the skill learnt at respective levels. It will enhance student's capability to work on various technologies. It will make appropriate platform for students to work in IT

Industry. It will also improve documentation, Coding and Design standards in students. Inclusion of project for subject such as Mobile Computing will definitely improve student's innovativeness and creativity. Student's technical orientation, eagerness will be enhanced.

8. The Institutes should organize placement programme for the MCA students, by interacting with the industries and software consultancy houses in and around the region in which the educational Institution is located.

9. At the end of the syllabus various certifications possible for each Semester is given in the list. Students should try to do maximum certifications in their learning phase only to make their resume rich.

10. Ordinarily, in each class, not more than 60 students will be admitted.

2. Duration of the Course:

The MCA programme will be a full-time three years i.e. 6 semesters. Pattern of examination will be Semester System.

3. Medium of Instruction:

The medium of Instruction will be English only.

4. Admission Procedure

(A) Eligibility The eligibility criteria for appearing to MAH-MCA-CET conducted by

DTE / University Entrance

(B) Reservation of Seats As per rules of Government Of Maharashtra.

5. Course Structure:

Lectures and Practical should be conducted as per the scheme of lectures and practical indicated in the course structure.

6. Teaching and Practical Scheme

1. Period for teaching or practical should be of 60 minutes each.
2. Minimum 45 periods should be conducted for each subject of 80 Marks.
3. One Practical Batch should be of 30 students.
4. Practical evaluation should be conducted before the commencement of University examination.

7. Project Work:

At the end of the sixth semester of study, a student will be examined in the course "Project Work".

1. Project work may be done individually or in groups in case of bigger projects. However if project is done in groups, each student must be given a responsibility for a distinct module and care should be taken to see the progress of individual modules is independent of others.
2. Students should take guidance from an internal guide and prepare a Project Report on "Project Work" in 2 copies to be submitted to the Director of the Institute/Head of the Department.
3. The Project Report should contain an Introduction to Project, which should clearly explain the project scope in detail. Also, Data Dictionary, DFDs, ERDs, File designs and a list of output reports should be included.(Refer annexure 1)
4. The project Work should be of such a nature that it could prove useful or should be relevant from the commercial/management angle.
5. The project report will be duly accessed by the internal guide of the subject and internal marks will be communicated by the Director of the Institute/Head Of the Department.
6. The project report should be prepared in a format prescribed by the University, which also specifies the contents and methods of presentation.
7. The major project work carry 200 marks for internal assessment and 300 marks for external viva. The external viva shall be conducted by a panel of minimum of three external examiners out of which one will be the Chairman of the panel.
8. Project work can be carried out in the Institute or outside with prior permission of the Institute
9. Project viva-voce by the University panel will be conducted in the month of June after completion of 5 months training.

OR

7. Project Work:

The student will be allowed to formulate a proposal for startup and the same will be rated equivalent to an industrial project. A detailed problem statement showing innovation alongwith markability, business plan and cash flow will be part of the

evaluation criteria.

8. Assessment:

The final total assessment of the candidate is made in terms of an internal assessment and an external assessment for each course.

1. For each theory paper, 20% marks will be based on internal assessment and 80% marks for semester examination (external assessment), unless otherwise stated.
2. The division of the 20 marks allotted to internal assessment of theory papers is as follows.

Internal Exam	10 Marks
Assessment by the subject faculty (Presentation/Group Activity/ Assignments)	10 Marks
Total	20 Marks

3. The mini project will be evaluated by the university appointed panel.
4. The final practical examination will be conducted by the university appointed panel at the end of semester for each lab course and marks will be submitted to the university by the panel. The pattern of final Practical Examination will be as follows-

1	Coding and Execution of Program	60 Marks
2	Viva-voce	20 Marks
3	Journal	20 Marks
Total		100 Marks

5. The internal marks will be communicated to the University at the end of each semester, but before the semester end examinations. These marks will be considered for the declaration of the results.

6. Examination The final Examinations shall be conducted at the end of the semester i.e. during November and in May.

7. Nature of question paper:

Nature of question paper is as follows for University end semester examination

a. Theory Examination: There will be seven (7) questions of 16 Marks and out of which four (4) to be attempted from question no 2 to 6. Question NO.1 is compulsory and is of multiple choice questions.

b. Practical Examination:

- i. Duration of Practical Examination: 3 Hrs
- ii. Nature of Question paper: There will be three questions out of which any two questions to be attempted and each question carries 30 Marks.

9. Standard of Passing:

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 and Aggregate 50% marks are required for passing in each head (Internal+External).

10. Backlog

1.No candidate will be admitted to Third Year MCA (Sem-V) of the course unless he/she passes MCA sem-I and Sem- II examination.

11. Board of Paper Setters /Examiners:

For each Semester and examination there will be one board of Paper setters and examiners for every course. While appointing paper setter /examiners, care should be taken to see that there is at least one person specialized in each unit course.

12. Award of Class:

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 classes as shown below.

13. Credit system implementation:

As per the University norms

14. Clarification of Syllabus:

The syllabus Committee should meet at least once in a year to study and clarify any difficulties from the Institutes. The Workshop on syllabi should be organised at the beginning of every semester.

15. Certification:

The students are expected to complete two certifications on latest technology and softskills.

16. Eligibility of Faculty:

MCA(from any faculty) with first class or equivalent with two years relevant experience.

17. Revision of Syllabus:

As the computer technology is changing very fast, revision of the syllabus should be considered every 3 years.

MCA
(Choice Based Credit System)
(Under Faculty of Science)
(Introduced from June 2019 and Onwards)
 To be implemented from the academic year 2019-2020

Sem-I							
Sr. No.	Subject Code	Subject Title	Internal Marks	External Marks	CP	Workload /Week	
						T	P
1	MCA11	Fundamental of Computers	20	80	4	4	-
2	MCA12	Python Programming	20	80	4	4	-
3	MCA13	Discrete Mathematics	20	80	4	4	-
4	MCA14	Database Management System	20	80	4	4	-
5	MCA15	Principles of Management and Accounting	20	80	4	4	-
6	MCA1L1	LAB -I (Python)	-	100	4	-	4
7	MCA1L2	LAB -II (Database Management System)	-	100	4	-	4
8	MCA1S	Seminar	50	-	2	2	-
Total			150	600	30	22	08

Sem-II							
S r. N o.	Subject Code	Subject Title	Internal Marks	External Marks	CP	Workload /Week	
						T	P
1	MCA21	Linux Foundation	20	80	4	4	-
2	MCA22	Data Structures with Python	20	80	4	4	-
3	MCA23	Statistical Computing	20	80	4	4	-
4	MCA24	* Web Designing Technologies	20	80	4	4	-
5	MCA25	Software Engineering	20	80	4	4	-
6	MCA2L1	LAB- III (Linux and Web lab)	-	100	4	-	4
7	MCA2L2	LAB - IV (DSP Lab)	-	100	4	-	4
8	MCA2MP	Mini Project	50	-	2	2	-
Total			150	600	30	22	08

***open to all under CBCS**

Sem-III							
Sr. No.	Subject Code	Subject Title	Internal Marks	External Marks	CP	Workload / Week	
						T	P
1	MCA31	Computer Network	20	80	4	4	-
2	MCA32	Java Programming	20	80	4	4	
3	MCA33	Advance Web Technology	20	80	4	4	-
4	MCA34	Cyber Security	20	80	4	4	
5	MCA35	Probability and Combinatorics	20	80	4	4	
6	MCA3L1	LAB I (Java)		100	4	-	4
7	MCA3L2	LABII(Advance Web Technology)		100	4	-	4
8	MCA3C C	Corporate Communication	50		2	2	-
		Total	150	600	30	22	08

Sem-IV							
Sr. No	Subject Code	Subject Title	Internal Marks	External Marks	CP	Workload / Week	
						T	P
1	MCA41	Advanced Java	20	80	4	4	-
2	MCA42	Open Source Languages(PHP)	20	80	4	4	-
3	MCA43	Artificial Intelligence	20	80	4	4	-
4	MCA44E	Elective-I i)Image Processing MCA44E.1 ii)Cloud computing MCA44E.2 iii)Data warehousing and Data Mining MCA44E.3 iv)Theory Of Computation & Compiler Construction MCA44E.4	20	80	4	4	-
5	MCA45E	Elective-II i)Organizational Behavior MCA45E.1 ii)Enterprise Resource Planning MCA43E.2 iii)Management Information System MCA45E.3iv)Human Resource Management MCA45E.4	20	80	4	4	-
6	MCA4L1	LAB III (Advance Java lab)		100	4	-	4
7	MCA4L2	LAB IV (PHP Lab)		100	4	-	4
8	MCA4MP	Mini Project	50		2	2	-
		Total	150	600	30	22	08

Sem-V							
Sr. No	Subject Code	Subject Title	Internal Marks	External Marks	CP	Workload / Week	
						T	P
1	MCA51	Data Science	20	80	4	4	-
2	MCA52	Mobile Application Development	20	80	4	4	-
3	MCA53E	Elective-I i)Network Security MCA53E.1 ii)Big Data Analytics MCA53E.2 iii)Software Quality Assurance MCA53E.3 iv)Natural Language Processing MCA53E.4	20	80	4	4	-
4	MCA54E	Elective-II i)Ecommerce MCA54E.1 ii)Business Intelligence MCA54E.2 iii)Start up Management MCA54E.3 iv) Entrepreneurship Development MCA54E.4	20	80	4	4	
5	MCA56	Operation Research & Optimization Techniques	20	80	4	4	-
6	MCA5L1	LAB III (Data Science)		100	4	-	4
7	MCA5L2	LAB IV(Mobile Application Development)		100	4	-	4
8	MCA5IS	Industrial Seminar	50		2	2	-
		Total	150	600	30	22	08

Semester – VI					
Sr. No.	Subject Code	Subject Title	Internal	External	CP
1	MCA61	Project Work	200	300	20

MCA (Choice Based Credit System)

(Under Faculty of Science)

(Introduced from June 2019 and Onwards)

To be implemented from the academic year 2019-2020

Semester-I

MCA11-Fundamentals of Computer

Internal Marks -20

External Marks-80

Theory-04 h/week

Course Learning Outcome:

After successful completion of this course, student will be able to

1. Understand basic components and capabilities of a typical computing system
2. To impart the knowledge in the field of digital electronics
3. To understand the importance of the hardware interface
4. To understand the working of Multiprocessor systems

UNIT I**(15 hrs)**

Digital computers, Components of Computer, Input / Output devices, Memory, Introduction to software, Programming Languages, Operating System: Concept, Functions, Booting. Types of Operating System, Batch processing, Multiprogramming, Multitasking, Multi processing, Time Sharing . Computer Networks: Topology -Bus, Star, Ring, Tree, Mesh and combined, OSI Model and its layers, Error detection and correction – Types of errors, Parity check, LRC, CRC and checksum methods .

UNIT II**(15 hrs)**

Number Systems and Conversions, Boolean Algebra and Simplification, Minimization of Boolean Functions, Karnaugh Map, Logic Gates, NAND – NOR Implementation, Design of Combinational Circuits, Adder/Subtractor, Encoder, Decoder, MUX/DEMUX, Comparators, Flip Flops , Triggering , Master, Slave Flip Flop, State Diagram and Minimization, Counters , Registers.

UNIT III**(15 hrs)**

Functional units, Basic operational concepts, Bus structures, Performance and Metrics, Instruction and instruction sequencing , Addressing modes, ALU design, Fixed point and Floating point operation . Processor basics, CPU Organization, Data path design, Control design, Basic concepts , Hard wired control, Micro programmed control, Pipeline control, Hazards, Super scalar operation.

UNIT IV**(15 hrs)**

Memory, I/O System Memory technology, Memory systems, Virtual memory, Caches, Design methods, Associative memories, Input/Output system, Programmed I/O, DMA and Interrupts, I/O Devices and Interfaces. Parallel Processing: Multiprocessor Organization, Symmetric multiprocessors, Cache Coherence, Clusters: Non Uniform Memory Access, Vector Computation.

REFERENCE BOOKS:

- 1) Fundamentals of Computers, V. Rajaraman, Neeharika Adabala PHI, Sixth Edition.
- 2) Fundamentals of Computers, E.Balagurusamy, TMH.
- 3) Computer System Architecture, Morris Mano, PHI
- 4) Fundamentals of Computers, Pradeep K Sinha, Priti Sinha, Sixth Edition, BPB Publications
- 5) Computer Organization and Architecture, P N Basu, Vikas Publication.
- 6) Operating System, Gary Nutt, Nabendu Chaki, Sarmistha Neogy, Third Edition, Pearson Education.
- 7) Computer Network, Andrew S Tanenbaum, Fourth Edition, PHI.
- 8) William Stallings, “Computer Organization & Architecture – Designing for Performance” 9th Edition 2012.
- 9) John P. Hayes, “Computer Architecture and Organization”, Third Edition, Tata McGraw Hill, 1998

MCA (Choice Based Credit System)

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(Introduced from June 2019 and Onwards)

To be implemented from the academic year 2019-2020

Semester-I

MCA12-Python Programming

Internal Marks -20

External Marks-80

Theory-04 h/week

Course Learning Outcome:

1. Understand principles of Python
2. Understand object oriented programming
3. Demonstrate file handling techniques
4. Understand how Python can be used for application development
5. Design Real life problems and think creatively about solution of them
6. Apply a solution clearly and accurately in a program using python

UNIT-I**(15 hrs)**

Installing Python, Simple program using Python, Expressions and Values, Variables and Computer Memory, error detection, multiple line statements, Designing and using functions, Functions provided by Python, Tracing function calls in memory model, omitting return Statement. Working with Text: Creating Strings of Characters, Using Special Characters in Strings, Creating a Multiline String, Printing Information, Getting Information from the Keyboard.

UNIT-II**(15 hrs)**

A Boolean Type , Choosing Statements to Execute, Nested If Statements , Remembering the Results of a Boolean Expression Evaluation, a Modular Approach to Program Organization, Importing Modules , Defining Modules, Testing Code Semi automatically Grouping Functions Using Methods: Modules, Classes, and Methods , Calling Methods the Object-Oriented Way, Exploring String Methods, Underscores.

UNIT-III**(15hrs)**

Storing Collections of Data Using Lists: Storing and Accessing Data in Lists, Modifying Lists, Operations on Lists , Slicing Lists , Aliasing, List Methods , Working with a List of Lists. Repeating Code Using Loops: Processing Items in a List, Processing Characters in Strings, Looping Over a Range of Numbers, Processing Lists Using Indices, Nesting Loops in Loops, Looping Until a Condition Is Reached, Repetition Based on User Input, Controlling Loops Using Break and Continue Reading and Writing Files: Kinds of files, Opening a File, Techniques for Reading Files, Files over the Internet, Writing Files, Writing Algorithms that use the File-Reading Techniques, Multiline Records.

UNIT-IV**(15hrs)**

Storing Data Using Other Collection Types: Storing Data Using Sets, Storing Data Using Tuples, Storing Data Using Dictionaries, Inverting a Dictionary

Creating Graphical User interface: Building a Basic GUI, Models, Views, and Controllers, Customizing the Visual Style Widgets, Object-Oriented GUIs, Regular expressions
Databases: Overview, Creating and Populating, Retrieving Data, Updating and Deleting, Using NULL for Missing Data, Using Joins to Combine Tables, Keys and Constraints.

REFERENCE BOOKS:

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. Learning Python, Fourth Edition, Mark Lutz, O'Reilly publication
4. Introduction to Python for Computational Science and Engineering (A beginner's guide), Hans Fangohr
5. John V Guttag. "Introduction to Computation and Programming Using Python", Prentice Hall of India
6. R. Nageswara Rao, "Core Python Programming", Dreamtech

MCA (Choice Based Credit System)

(Under Faculty of Science)

(Introduced from June 2019 and Onwards)

To be implemented from the academic year 2019-2020

Semester-I

MCA13- Discrete Mathematics

Internal Marks -20

External Marks-80

Theory-04 h/week

Course Learning Outcome:

To develop logical thinking and its application to computer science (to emphasize the importance of proving statements correctly and de-emphasize the hand-waving approach towards correctness of an argument). The subject enhances one's ability to reason and ability to present a coherent and mathematically accurate argument. About 40% of the course time will be spent on logic and proofs and remaining 60% of the course time will be devoted to functions, relations, etc.

UNIT-I**(15 hrs)**

Set theory and Relations: (a) Elementary set theory: universal set, subset, representation of sets, operations, distributive and De Morgans laws, characteristic function, computer representation of sets, product sets (b) Relations and digraphs: Relation, matrix representation, digraph, paths in relation,

Properties, equivalence relation, operations on relation, related algorithm, closures, Computer representation of sets.

UNIT-II**(15 hrs)**

Functions and recurrence relations: (a) Functions: Types of function, functions for computer science, permutation, functions and their manipulations. b) Recurrence Relations and Solutions: Linear relations with two indices, Principles of inclusions & exclusions, Formula derangement, Restrictions on relative positions.

UNIT-III**(15 hrs)**

Lattice and Boolean algebra (a) Order relations and structures : Partially ordered sets, External element of poset, Lattices and their properties, (b) Finite Boolean algebras, properties, Function on Boolean algebras.

UNIT-IV**(15 hrs)**

Mathematical logic and Theory of inference (a) Mathematical Logic: Statements and notations, Connectives, Normal forms, Theory of inference for Statement calculus, Predicate calculus, Inference theory of the predicate calculus.

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

MCA (Choice Based Credit System)

(Under Faculty of Science)

(Introduced from June 2019 and Onwards)

To be implemented from the academic year 2019-2020

Semester-I

MCA14–Database Management System

Internal Marks -20

External Marks-80

Theory-04 h/week

Course Learning Outcome:

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

UNIT-I**(15 hrs)**

Comparison between different databases: Significance of Databases, Database System Applications, Advantages and Disadvantages of different Database Management systems, Comparison between DBMS, RDBMS, Distributed and Centralized DB. **RDBMS and SQL:** Relational Query Languages, The SQL Query Language, Querying Multiple Relations, Creating Relations in SQL, Destroying and Altering Relations, Adding and Deleting Tuples, Integrity Constraints (ICs), Primary and Candidate Keys in SQL, Foreign Keys, Referential Integrity in SQL, Enforcing Referential Integrity, Categories of SQL Commands, Data Definition, Data Manipulation Statements: SELECT - The Basic Form Subqueries, Functions, GROUP BY Feature, Updating the Database, Data Definition Facilities, Views, Embedded SQL *, Declaring Variables and Exceptions, Embedding SQL Statements, Transaction Processing, Consistency and Isolation, Atomicity and Durability, Dynamic SQL.: **Normalization:** Functional Dependency, Anomalies in a Database, The normalization process and types Denormalization

UNIT-II**(15 hrs)**

Query Optimization: Algorithm for Executing Query Operations: External sorting, Select operation, Join operation, PROJECT and set operation, Aggregate operations, Outer join, Heuristics in Query Optimization, Semantic Query Optimization, Converting Query Tree to Query Evaluation Plan, multiquery optimization and application, Efficient and extensible algorithms for multi-query optimization, execution strategies for SQL sub queries, Query Processing for SQL Updates **Query Execution:** Introduction to Physical-Query-Plan Operators, One-Pass Algorithms for Database, Operations, Nested-Loop Joins, Two-Pass Algorithms Based on Sorting, Two-Pass, Algorithms Based on Hashing, Index-Based Algorithms, Buffer Management, Parallel Algorithms for Relational Operations, Using Heuristics in Query Optimization, Basic Algorithms for Executing Query Operations

UNIT-III (15 hrs)

Concurrency Control Serializability: Enforcing, Serializability by Locks, Locking Systems With Several, Lock Modes, Architecture for a Locking Scheduler Managing Hierarchies of Database Elements, Concurrency Control by Timestamps, Concurrency Control by Validation, Database recovery management **Transaction processing:** Introduction of transaction processing, advantages and disadvantages of transaction processing system, online transaction processing system, serializability and recoverability, view serializability, resolving deadlock, distributed locking. Transaction management in multi-database system, long duration transaction, high-performance transaction system. **Parallel Database Architectures for parallel databases:** Parallel query evaluation, Parallelizing individual operations, I/O Parallelism, Interquery Parallelism, Intraquery Parallelism, Intraoperation Parallelism, Interoperation Parallelism, Design of Parallel Systems.

UNIT-IV (15 hrs)

Object Oriented DBMS Overview of object: oriented paradigm, OODBMS architectural approaches, Object identity, procedures and encapsulation, Object oriented data model: relationship, identifiers, Basic OODBMS terminology, Inheritance, Basic interface and class structure, Type hierarchies and inheritance, Type extents and persistent programming languages, OODBMS storage issues. **DDB:** Distributed Database Introduction of DDB, DDBMS architectures, Homogeneous and Heterogeneous databases, Distributed data storage, Advantages of Data Distribution, Disadvantages of Data Distribution Distributed transactions, Commit protocols, Availability, Concurrency control & recovery in distributed databases, Directory systems, Data Replication, Data Fragmentation. Distributed database transparency features, distribution transparency. **Object Relational and Extended Relational Databases:** design techniques used in RDBMS, extension techniques in RDBMS, standards for OODBMS

REFERENCE BOOKS:

- 1.Date C.J., "An Introduction to Database System", Addison Wesley
- 2.Korth, Silbertz, Sudarshan, "Database Concepts", Mc Graw Hill
- 3.Elmasri, Navathe, "Fundamentals of Database System", Addison Wesley
- 4.Paul Beynon Davies, "Database System", Palgrave Macmillan
- 5.Bipin C. Desai, "An Introduction to Database System", Galgotia Publication
- 6.Majumdar & Bhattacharya, "Database Management System", TMH
- 7.Ramakrishnan, Gehrke, "Database Management System", Mc Graw Hill
- 8.Bharti P.K., "An Introduction to Database Systems", JPNP

MCA (Choice Based Credit System)

(Under Faculty of Science)

(Introduced from June 2019 and Onwards)

To be implemented from the academic year 2019-2020

Semester-I

MCA15– Principles of Management and Accounting

Internal Marks -20

External Marks-80

Theory-04 h/week

Course Learning Outcome:

1. Students will get foundation of the process of management's four functions: planning, organizing, leading, and controlling.
2. Students will have effective decision making and controlling skills for working as a team leader.
3. Students can understand the nature and role of the principal financial statements.
4. Students can understand the basic concepts of costs in financial statements.

UNIT-I

(15 hrs)

Principles of Management : Management Concept, Managerial functions: Planning, Organizing, Staffing, Directing, Controlling. Planning-Concept, steps , Process, types of plan, importance and limitations , Organizing , Staffing- Meaning need, Human Resource Planning , Elements of directing- supervision, communication, Leadership and motivation Leadership styles, types of motivation.

UNIT-II

(15 hrs)

Managerial Decision Making and controlling : Decision making –types of decisions, decision making process, Decision Making Tools, Herbert Simon's Model, Principle of Rationality / Bounded Rationality Importance of controlling, Techniques of controlling- Break Even Analysis, Budgetary Control, Zero-based budgeting PERT, CPM. Benchmarking –importance and limitations of benchmarking, Six Sigma importance, limitations and process of six sigma, Total Quality Management.

UNIT-III

(15 hrs)

Basic Accounting: Concepts and conventions underlying preparation of financial statements - balance sheet, profit and loss statement, accounting process, basic accounts, trail balance and financial statements issues such as provisions for bad debts, tax dividend loses such as bad debts missing information, classification effect, cost of assets rental etc. Income measurement - revenue recognition and matching costs and revenues inventory valuation.

UNIT-IV

(15 hrs)

Cost Accounting: Understanding published annual accounts including fund flow statement. Basic costs concepts: Introduction cost, classification, allocation, appointment and absorption costs centers. Cost analysis for managerial decisions - direct costing break even analysis, relevant costs, pricing, pricing joint costs. Make or buy, relevant fixed costs and sunk costs, Cost analysis for control -Standard costing variances, material, labor, overhead sales and profit, Standard cost accounting-budgeting and control of manufacturing and manufacturing expenses, performance appraisal, evaluation of costs control systems.

REFERENCE BOOKS:

1. Koontz and Weirich : Essentials of Management
2. L.M. Prasad : Principles of Management
3. R.M. Srivastara : Principles of Management
4. Stephen P. Robbins Management
5. Sherlekar S.A.- Modern Business Administration and Management
6. Principles and Practices of Management Shejwalkar
7. Essential of management 7th edition Koontz H & Weirich H TMH
8. Bhattacharya S.K. and Dearden John, "Accounting for Management", Prentice Hall of India, New Delhi.
9. Chanwick, "The Essence of financial accounting", Prentice Hall of India, New Delhi.
10. Horngren Sundem and Selio, "Introduction to Management Accounting", Prentice Hall of India, New Delhi.
11. Hilton and Gordon, "Budgeting Profit planning and control", Prentice Hall of India, New Delhi.

MCA (Choice Based Credit System)

(Under Faculty of Science)

(Introduced from June 2019 and Onwards)

To be implemented from the academic year 2019-2020

Semester-II

MCA1L1-LAB-I Python

Practical should consists of min. 10 to 12 practical assignments based on the syllabus, Emphasis should be given on solving programming problems relating to the concerned topics .

MCA (Choice Based Credit System)

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(Introduced from June 2019 and Onwards)

To be implemented from the academic year 2019-2020

Semester-II

MCA1L2-LAB-II Database Management Sytem

Internal Marks -00

External Marks-100

Practical -04 h/week

Programs based on the syllabus MCA14- Database Management System

-----**Semester-II**-----

MCA (Choice Based Credit System)

(Under Faculty of Science)

(Introduced from June 2019 and Onwards)

To be implemented from the academic year 2019-2020

Semester-II

MCA21– Linux Foundation

Internal Marks -20

External Marks-80

Theory-04 h/week

Course Learning Outcome:

1. Learn the Linux Command Line interface and become a skilled user of this powerful operating system.
2. In this course, students will learn the principles of shell programming .
3. Learn how to write and build C programs within the Linux operating system.
4. Students will learn basics of Linux administration and socket programming with linux.

UNIT-I**(15 hrs)**

Introduction to Linux: Linux features , Block Diagram Of Kernel, Architecture of Linux System, Linux Distributions, Installation and Configuration of Linux, System bootup and shutdown, Linux File Structure ,General Purpose Utilities file management, directory management , file permissions, shell environment, file attributes, Pipes and filters, Process management, Network Communication utilities, Advanced Filters Sed & Awk, vi Editor ,Advanced vi Editor, Introduction to Development Tools of Linux.

UNIT-II**(15 hrs)**

Shell programming: Shell scripting, shell variables, Array, operators, conditional and looping statement, case statement, shell functions, advanced shell programming.

UNIT-III**(15 hrs)**

Shell scripting with c and python: C programme with linux, Configuring Ubuntu for python, Introduction to python, shell scripting with python.

UNIT-IV**(15 hrs)**

Linux Administration and Socket Programming User Management- Create, delete, and modify local user accounts, Socket, Socket types,socket client-server model,,socket structures,ports and services, making of TCP server and TCP client.

REFERENCE BOOKS:

1. The design of the UNIX operating system- By Maurice J.Bach.
2. Unix Concepts and Applications : Sumitbha Das
3. Unix Network Programming ,W.R.Steven
4. C.Schirmer, Programming in C for UNIX
5. Recharad Petersen, “Linux :The complete Reference”, Mc Graw Hill
6. Wale Soyinka, “Linux Administration A Beginners Guide” Mc Graw Hill
7. Kaare Christian, The UNIX operating system.

MCA (Choice Based Credit System)

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(Introduced from June 2019 and Onwards)

To be implemented from the academic year 2019-2020

Semester-II

MCA22– Data Structures using Python

Internal Marks -20

External Marks-80

Theory-04 h/week

Course Learning Outcome:

1. Select appropriate data structures as applied to specified problem definition.
2. Implement operations like searching, insertion, and deletion, traversing mechanism etc. on various data structures.
3. Students will be able to implement linear and Non-Linear data structures.
4. Implement appropriate sorting/searching technique for given problem.
5. Design advance data structure using Non-Linear data structure.
6. Be familiar with advanced data structures such as balanced search trees, hash tables, priority queues, Red-Black trees, Btrees.
7. Be familiar with some graph algorithms such as shortest path and minimum spanning tree
8. Determine and analyze the complexity of given Algorithms.

UNIT-I**(15 hrs)**

Fundamental notions: Primitives and composite data types, complexity of an algorithm, Various sort, search algorithms and their complexities. Arrays : Representation, Multidimensional Arrays, Stacks : Processing the stacks, Linked list implementation, Application of Stacks for expression solving. Recursion.

UNIT-II**(15 hrs)**

Queues : Processing the queues, Linked list implementation, Deques, Priority queues and their applications. Linked List: Processing linked list, Circularly linked, list, Doubly linked list, Multilinked lists . Hashing: Functions, collision resolution techniques.

UNIT-III**(15 hrs)**

Trees : Representation of hierarchical relationships, General Trees, Binary trees, Binary Search trees, linked list implementation, traversal algorithms, threaded binary trees, height balanced trees, Heap tree, Huffman tree, B-tree indexing, Red black trees.

UNIT-IV**(15 hrs)**

Graph: Graph representations, Breadth first and Depth first search, Topological sort, Single source Shortest path, Minimum Spanning tree, All pairs shortest path: Floyd-Warshall algorithm.

REFERENCE BOOKS:

1. Aho, Hop craft and Ulman, Data structures and algorithms (Addision - Wesley)
2. Michael T. Goodrich et al., Data Structures and Algorithms in Python, John Wiley & Sons
3. Classic data structures- D. Samantha- PHI
4. <http://interactivepython.org/runestone/static/pythonds/index.html>
5. Kent D. Lee, Steve Hubbard, Data Structures and Algorithms with Python, Springer

MCA (Choice Based Credit System)

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Semester-II

MCA23-Statistics Computing

Internal Marks -20

External Marks-80

Theory-04 h/week

Course Learning Outcome:

The main objective of this course is to acquaint students with some basic concepts in statistics. They will be introduced to some elementary statistical methods of analysis of data and at the end of this course students are expected to be able to compute various measures of central tendencies, dispersion, Correlation and Regression analysis.

UNIT-I**(15 hrs)****Introduction to Statistics and Nature of Data:**

1.1: Meaning of the word Statistics.

1.2: Scope of Statistics: In industry, Management, Biological and Medical Sciences, Economics, Social and Sciences.

1.3: Classification of data: Discrete and continuous frequency distribution, inclusive and exclusive methods of classification, Tabulation of statistical data.

1.4: Graphical presentation of data: Histogram, ogive curves. Illustrative Examples.

1.5: Concept of statistical population and sample. Advantages of sampling method over census method Simple random sampling, Stratified random sampling.

UNIT-II**(15 hrs)****Measures of Central Tendency:**

2.1: Concept of measures of central tendency, Statistical average, Requirements of good statistical average.

2.2: Arithmetic Mean (A.M): Definition, Effect of change of origin and scale, Mean of pooled data, Weighted A.M.

2.3: Median: Definition, Derivation of formula for grouped frequency distribution.

2.4: Mode: Definition, Derivation of formula for grouped frequency distribution.

2.5: Empirical relation between Mean, Median and Mode. Comparison between averages in accordance with requirements of good Average. Illustrative examples.

UNIT-III**(15 hrs)****Measures of Dispersion:**

3.1: Concept of dispersion, Absolute and Relative measures of dispersion, Requirements of a good measure of dispersion.

3.2: Range: Definition, Coefficient of range.

3.3: Quartile Deviation (Semi-interquartile range): Definition, Coefficient of Q.D.

3.4: Mean Deviation: Definition, Coefficient of M.D., Minimal property of M.D.

- 3.5: Standard Deviation: Definition, Effect of change of origin and scale, S.D. of pooled data (with out proof), Variance, Coefficient of Variation,
 3.6: Moments, Skewness and Kurtosis. Illustrative examples.

UNIT-IV**(15 hrs)****Correlation and Regression:**

- 4.1: Concept of correlation between two variables, Types of correlation, Scatter diagram, its utility.
 4.2: Karl Pearson's coefficient of correlation (r): Definition, Computation for Ungrouped, Interpretation when $r = -1, 0, 1$, Properties (with proof): i) $-1 \leq r \leq 1$, ii) Effect of change of origin and scale.
 4.3: Spearman's rank correlation coefficient: Definition, Computation (for with and without ties). Illustrative examples.
 4.4: Concept of regression, Equations of lines of regression, Regression coefficients (b_{xy}, b_{yx}), Properties: i) $b_{xy} \times b_{yx} = r^2$, ii) $b_{xy} \times b_{yx} \leq 1$, iii) $(b_{xy} + b_{yx}) / 2 \geq r$
 4.5: The point of intersection of two regression lines. Derivation of acute angle between the two lines of regression. Illustrative examples.

REFERENCE BOOKS:

1. Bhat B. R., Srivenkatramana T. and Madhava Rao K. S. (1996): Statistics: A Beginner's Text, Vol. 1, New Age International (P) Ltd.
2. Croxton F. E., Cowden D.J. and Kelin S. (1973): Applied General Statistics, Prentice Hall of India.
3. Goon A.M., Gupta M.K., and Dasgupta B.: Fundamentals of Statistics Vol. I and II, World Press, Calcutta.
4. Gupta C. B.: Introduction to Statistics
5. Gupta S. P. (2002): Statistical Methods, Sultan Chand and Sons, New Delhi.
6. Gupta S. C. and Kapoor V. K.: Fundamentals of mathematical Statistics.
7. Saxena H. C. and Kapur J. N.: Mathematical Statistics
8. Snedecor G.W. and Cochran W. G. (1967): Statistical Methods, Iowa State University Press.
9. Thigale T. K and Dixit P. G. (2007): A Book of Paper-I for B. Sc.-I, Nirali Publication, Pune.
10. Waiker and Lev.: Elementary Statistical Methods.

MCA (Choice Based Credit System)

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(Introduced from June 2019 and Onwards)

To be implemented from the academic year 2019-2020

Semester-II

MCA24–Web Designing Technology

Internal Marks -20

External Marks-80

Theory-04 h/week

Course Learning Outcome:

1. Understand the basic structure of web designing technology.
2. Apply the concepts of web technology in designing static and dynamic web pages.
3. Select and apply markup languages for processing, identifying, and presenting of information in web pages.
4. Design interactive web pages using scripting technology like JavaScript, AJAX and XML.

UNIT-I**(15 hrs)**

Web Basics: Introduction WWW, Web browser, Web Server, services of web server, IP address, Internet Protocols – TCP/IP, FTP, HTTP, Telnet, feature of HTTP protocol HTTP request-response model, Hyper Text Transfer Protocol Secure (HTTPS), DTD (Document Type Declaration) **HTML:** Introduction, History of HTML, Dynamic HTML- Introduction of DHTML, HTML vs. DHTML, HTML Elements, Attributes, HTML Headings, Paragraphs, HTML Formatting, Fonts, Styles, HTML Links, Images, Tables, HTML Lists, Forms, Frames, HTML Colors, Colornames, Color values, HTML Quick List.

UNIT-II**(15 hrs)**

HTML5: New standard for HTML, XHTML, HTML DOM, Features, Browser Support, Elements, Markup Elements, Media Elements, Canvas Element, Form Elements, HTML5 New Input Types, Browser Support, Input Type – email, Input Type – url, Input Type – number, Input Type – range, Input Type - Date Pickers, Input Type – search, Input Type – color, autocomplete and autofocus Attribute, HTML5 Web Storage: Storing Data on the Client, The localStorage Object, HTML5 Global Attributes, HTML5 Event Attributes, Window Event Attributes, Form Events, Keyboard Events, Mouse Events, Media Events.

UNIT-III**(15 hrs)**

HTML Audio, Video and Canvas: <audio> Attributes, Video on the Web, Video Formats, All <video> Attributes, audio & video examples, What is Canvas? Create a Canvas Element, Draw With JavaScript, Understanding Coordinates, Canvas Examples.

CSS: Introduction – Features – Style Sheet basics - Working with CSS files – Syntax - Types of Style Sheets Inline Styles - Embedded Styles - External or Linked Styles examples on it. CSS box model, CSS preprocessor. Exploring CSS Class and ID Attributes, Defining the CSS ID Attribute - Dynamic effects with CSS - Lists- Tables – Forms - simple Examples using above properties.

UNIT-IV

(15hrs)

JavaScript: Introduction to JavaScript, JavaScript syntax, variables and their types, JavaScript operators, arrays and array methods, Control statements, built-in objects in JavaScript, Array, String, Math, Date objects, validation using JavaScript, **XML:** Concept of XML, features of XML Writing XML elements, attributes, **AJAX** Introduction- Introduction, AJAX Introduction, AJAX Components, Handling Dynamic HTML with Ajax.

REFERENCE BOOKS:

1. Web Technology - N.P. Goplan, J.Akilandeswari
2. Internet Technology and Web Design - ISRD Group
3. HTML and Web designing - Kris Jamsa and Konrad King
4. Ajax for Beginners – Ivon Bayross Sharanam Shah
5. Teach yourself Web Technologies - Ivan Bayross - Reprinted 2011 Second Edition
6. Web Technology - Ramesh Bangia - Reprint 2008 • HTML for Beginners - Firuza Aibava-Second Edition
7. JavaScript Bible, Wiley Pub. Beginning XML Wrox Pres
8. HTML and Web designing - Kris Jama and Konrad King, Tata McGraw Hill Publishing Ltd
9. Using HTML 4, XML and Java 1.2 - Eric Ladd and Jin O' Donwell, Prentice Hall of India, New Delhi
10. Web Technology and Design- C. Xavier, New Age International Publishers
11. Java Server Pages-Ivan Bayross, Shroff publishers & Distributors Pvt Ltd, Delhi
12. Teach yourself web Technologies - Ivon Bayross , BPB publications – 2002
13. Web programming -Chris Bates, Wiley – Dreamtech India Pvt Ltd.
14. Professional Ajax, 2nd Edition Wrox Press

MCA (Choice Based Credit System)

(Under Faculty of Science)

(Introduced from June 2019 and Onwards)

To be implemented from the academic year 2019-2020

Semester-II

MCA25– Software Engineering

Internal Marks -20

External Marks-80

Theory-04 h/week

Course Learning Outcome:

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 apply design principles for various types of software and designing object oriented software using UML tools.
4. Students can implement testing strategies thoroughly using testing tools.
5. Students will understand the need of lifelong learning and adapt to new software engineering concepts.

UNIT-I**(15hrs)**

Introduction to Software Engineering: Software definition, characteristics, software application domains, unique nature of web apps, seven principles of software engineering, software development process, Waterfall Model, prototyping, spiral model, Concurrent Models, The Formal Methods Model, 12 Principles of Agility, Extreme Programming (XP), Scrum process flow, Selection of Software Process models.

UNIT-II**(15hrs)**

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-III**(15hrs)**

Introduction to UML: The design model: Developing use cases, Relationships, class diagrams, associations, generalizations, object diagram, Dynamic modeling – State diagrams, Sequence diagrams, Collaboration diagrams, Activity diagrams etc. Logical and physical architecture – Component diagram, Deployment diagrams etc.

Case Studies: Courseware management system, ATM, Airline reservation System

UNIT-IV

(15hrs)

Introduction to Testing: A Strategic Approach to Software Testing, Strategic Issues, Unit testing, Integration testing, Validation Testing, System Testing, Black box testing and white box testing, The Art of Debugging.

Testing web applications- testing strategy, testing process, content testing, user interface testing, navigation testing, configuration testing, security testing, performance testing.

Study of any software testing tool.

REFERENCE BOOKS:

1. Software Engineering by Roger Pressman. 7th edition.
2. Software Engineering for students: A Programming Approach by Douglas Bell, Pearson publication.
3. Software Engineering Sommerville 8th edition.
4. The unified modeling language user guide Grady Booch, James Rumbaugh, Ivar Jacobson AddisonWesley 2005.
5. UML A Beginners Guide Jason T. Roff McGraw Hill Professional.
6. Learning UML 2.0 Kim Hamilton, Russ Miles O'Reilly Media 2006.
7. Software Quality Engineering by Jeff Tian.
8. SOFTWARE TESTING AND QUALITY ASSURANCE Theory and Practice by KSHIRASAGAR NAIK, PRIYADARSHI TRIPATHY.
9. The art of software testing by GJ Myers, Wiley
10. Software Testing: Principles and Practices by Srinivasan D and Gopalswamy R, PearsonEd, 2006
11. Software Testing Foundations, Andreas Spillner, Tilo Linz, Hans Schaefer, Shoff Publishers and Distributors

MCA (Choice Based Credit System)

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(Introduced from June 2019 and Onwards)

To be implemented from the academic year 2019-2020

Semester-II

MCA2L1-LAB-III Linux and Web lab

Internal Marks -00

External Marks-100

Practical -04 h/week

Programs based on the syllabus MCA21 and MCA 24 Linux and Web Designing Technologies.

MCA (Choice Based Credit System)

(Under Faculty of Science)

(Introduced from June 2019 and Onwards)

To be implemented from the academic year 2019-2020

Semester-II

MCA2L2-LAB-IV DSP Lab

Internal Marks -00

External Marks-100

Practical -04 h/week

Practical should consist of min. 10 to 12 practical assignments based on the syllabus, Emphasis should be given on solving programming problems relating to the concerned topics .