

**NORTH MAHARASHTRA UNIVERSITY, JALGAON**



'A' Grade NAAC Re-Accredited (3rd Cycle)

**Faculty of Science and Technology  
Syllabus**

**MASTER OF COMPUTER APPLICATION (MCA)**

**With effect from July- 2017-18**

**NORTH MAHARASHTRA UNIVERSITY, JALGAON**  
**MASTER OF COMPUTER APPLICATION**  
**STRUCTURE**  
**(W.E.F. July 2017)**

**Course Name:** Master of Computer Application

**Short Title of Degree:** M C A

**Faculty to which assigned:** Science and Technology

**Duration:** 3 years full time

**Pattern:** Semester

**Examination Pattern:** 60 (External) + 40 (Internal)

**No of paper per semester:** 5 Theory + 2 Practical

**Eligibility:** Any graduate with 50% Marks (Reserve Category 45%)

& Mathematics at HSC or UG level, having a valid CET Score

Conducted by Competent Authority

**Medium of Instruction:** English

## **Objectives of MCA:**

The educational objectives of the MCA program at North Maharashtra University enable the students to have a holistic and all-round grooming to be a thorough professional in the field of IT .The objectives for the course are designed, considering that MCA graduates will be able to:

- Develop software solutions to problems across a broad range of application domains through analysis and design.
- Contribute to research in their chosen field and function and communicate effectively, to perform both individually and in a multi-disciplinary team
- Continue the process of life-long learning through professional activities; adapt themselves with ease to new technologies, while exhibiting ethical and professional standards and will be able to work collaboratively as a member or leader in multidisciplinary teams
- MCA Graduates will be able to apply knowledge of computing fundamentals, computing specialization and domain knowledge for the abstraction and conceptualization of computing models from defined problems and requirements
- They will have the ability to understand and analyze a given real-world problem and propose feasible computing solutions
- MCA Graduates will be able to analyze customer requirements, create high level design, implement and document robust and reliable software systems
- They will be able to transform complex business scenarios and contemporary issues into problems, investigate, understand and propose integrated solutions using emerging technologies
- MCA Graduates will be able to use the techniques, skills and modern hardware and software tools necessary for innovative software solutions
- They will possess leadership and managerial skills with best professional ethical practices and social concern and will be able to communicate technical information effectively, both orally and in writing.

## COURSE STRUCTURE

### Master Of Computer Application (MCA)

w.e.f. - July 2017-18

#### First Year MCA - (Sem I & II) w.e.f. - July 2017-18

Paper	Semester- I	Paper	Semester –II
CA 101	Computer Organization & Architecture	CA 201	Accounting and Cost Control
CA 102	Database Management System (DBMS)	CA 202	Data Structures and Algorithms
CA 103	Mathematical Foundations of Computer Science	CA 203	Operating Systems
CA 104	OOPs Concepts using C++	CA 204	Java Programming
CA 105	System Programming	CA 205	Computer Networks
CA 106	CA-Lab-I Lab on C++ Programming	CA 206	CA-Lab-III Lab on Data Structures and Algorithms
CA 107	CA-Lab-II Lab on DBMS	CA 207	CA-Lab-IV Lab on Java Programming

#### Second Year MCA - (Sem III & IV) w.e.f. - July 2018-19

Paper	Semester- III	Paper	Semester-IV
CA 301	Internet Computing - I	CA 401	System Analysis and Designing
CA 302	Design and Analysis of Algorithms	CA 402	Internet Computing - II
CA 303	Automata Theory and Computability	CA 403	Network Programming
CA 304	Artificial Intelligence	CA 404	Computer Graphics
CA 305	Data Mining and Warehousing	CA 405	Optimization Algorithms
CA 306	CA-Lab-V Lab on Design and Analysis of Algorithm	CA 406	CA-Lab-VII Lab on Computer Graphics & Internet Computing - II
CA 307	CA-Lab-VI Lab on IC - I	CA 407	CA-Lab-VIII Lab on Socket Programming using Linux

**Third Year MCA - (Sem V & VI) w.e.f. - July 2019-20**

<b>Paper</b>	<b>Semester -V</b>	<b>Paper</b>	<b>Semester-VI</b>
CA 501	Compiler Construction	CA-601	Full time Industrial Training
CA 502	Drupal Framework (Website development framework )		
CA 503	Python Programming		
CA 504	Mobile Computing		
CA 505	Natural Language Processing		
CA 506	CA-Lab-IX Lab on Python Programming		
CA 507	CA-Lab-X Lab on Mobile Computing & Lab on Drupal		

**NORTH MAHARASHTRA UNIVERSITY, JALGAON**  
**MASTER OF COMPUTER APPLICATION**  
**NOTES TO STRUCTURE**  
**(W.E.F. June 2017)**

1. English medium is allowed for instructions to all the courses under this programme.
2. For all the courses (except course no 601 at semester VI) there shall be a semester pattern of examination (Theory / Practical) of 100 marks, comprising of external examination of 60 marks, and 40 marks for continuous internal assessment for every course.

<b>Theory Examination</b>	<b>Maximum marks</b>
Internal Assessment ***	<b>40</b>
External Examination (Term end examination)	<b>60</b>
<b>Total Marks</b>	<b>100</b>

**a. \*\*\***

Two internal tests are to be conducted by the subject teacher. Each test shall be of 20 marks and the concerned teacher shall consider both internal tests for Internal Assessment.

<b>Internal Assessment</b>	<b>Maximum marks</b>
Internal test-I	<b>20</b>
Internal test-II	<b>20</b>
<b>Total Marks</b>	<b>40</b>

3. There shall be External Examination (Viva-Voce) for Full Time Industrial Training. The project must be developed for any organization based on its need as live Computer Software Application.
4. The syllabus of each course shall be taught in 4 lectures per week during the semester.

## Question Paper Pattern for External Examination

**Marks: 60**

**Time: 3hrs**

- Attempt All questions.
- Each Question carries 12 marks.

Que.1 Any Two

A) (6)

B) (6)

C) (6)

Que.2 Any Two

A) (6)

B) (6)

C) (6)

Que.3 Any Two

A) (6)

B) (6)

C) (6)

Que.4 Any Two

A) (6)

B) (6)

C) (6)

Que.5 Any Two

A) (6)

B) (6)

C) (6)



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**FACULTY OF SCIENCE AND TECHNOLOGY**  
**New Syllabus: M.C.A. 2017-18**  
**SEMESTER: I**

**Paper: CA 101: Computer Organization and Architecture**  
**60 + 40 Pattern: External Marks 60 + Internal Marks 40 = Maximum Total Marks: 100**  
**Required Lectures: 60 hours**

**UNIT - 1 Introduction to Digital Logic: [10-L][15-M]**

Functions and Block Diagram of Computer, Number System- Binary, Octal, HEX, BCD and their inter-conversion 1's and 2's Complement., Binary Arithmetic. Logic Gates- NOT, AND, OR, NAND, NOR, XOR, XNOR Boolean Algebra, De-Morgan's Theorem, Duality Theorem, Map Simplifications.

**UNIT – 2 Combinational Circuits: [10-L][15-M]**

Half Adder, Full Adder, Decoder / Encoder, Multiplexer / De-multiplexer, Flip Flops - SR, D, JK, T Flip-Flop, Master – Slave, Level Triggered, Edge Triggered Shift Registers: Unidirectional, Bi-directional serial Shift Register Counters- Synchronous Counter, Asynchronous Counter.

**UNIT – 3 CPU Organization: [10-L][15-M]**

CPU Building Blocks CPU Registers and System Bus Characteristics. Addressing Modes Interrupts: Concepts and types, Instruction and Execution Interrupt cycle Hardwired and Micro Program control RISC and CISC Pipelining: Arithmetic Pipelining, RISC Pipelining, Types (SISD, SIMD, MIMD, MISD)

**UNIT – 4 Processor Architecture: [10-L][15-M]**

Components of Microprocessor, I/O Ports Microprocessor 8086: Block Diagram, Pin architecture Instruction set of Simple Instructions, Simple Assembly Language Programs of 8086 MP .

**UNIT – 5 Memory Organization: [12-L][18-M]**

Memory Hierarchy Primary Memory – DRAM, SRAM, DDR, RDRAM. ROM, PROM, EPROM, EEPROM Concepts of Auxiliary, Associative, Cache and Virtual Memory Direct Memory Access: Block diagram, DMA Transfer modes, Concepts- cycle stealing, DMA Controller.

**UNIT – 6 Input/output Organization: [08-L][12-M]**

I/O interface, Asynchronous and synchronous data transfer, Modes of transfer, priority Interrupt.



## Reference Books

1. Morris Mano, Computer System Architecture, 3rd Edition, Prentice Hall. **ISBN-10:** 0131755633
2. Barry B. Brey, The Intel Microprocessors, (8th Edition) **ISBN 0-13-502645-8.**
3. Albert P. Malvino , Jerald A Brown ,Digital Computer Electronics , 3rd Edition, Career Education,**ISBN-13: 978-0028005942**
4. Pal Chaudhary, Computer Organization & Design, 3rd Edition, PHI publisher **ISBN: 9788120335110**
5. William Stallings, Computer Organization and Architecture Designing for Performance, PHI, 2004, **ISBN 007-124476-X.**
6. John P.Hayes, Computer Architecture and Organization, 3rd Edition, McGraw Hill International Editions, 1998, ISBN 13: 9780071159975
7. Carl Hamacher, Computer Organization, Fifth Edition, McGraw Hill International Edition, 2002, ISBN 13: 9781259005275.
8. Morris Mano .Digital Logic and Computer Design, Publisher: Prentice Hall, **ISBN-13: 978-0131989269**
9. A.K.Ray, K.M. Bhurchandi, Advanced Microprocessor and Peripherals, Tata McGraw Hill, ISBN 13: **9781259006135.**
10. Yu-Cheng Liu & Glenn A Gibson, Microcomputer systems 8086/8088 family, Architecture, Programming and Design, 2nd Edition- July 2003, Prentice Hall of India. **ISBN 13: 9780135804995**



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New Syllabus: M.C.A. 2017-18  
SEMESTER: I

**Paper: CA-102 Database Management System (DBMS)**  
**60 + 40 Pattern: External Marks 60 +Internal Marks 40 = Maximum Total Marks: 100**  
**Required Lectures: 60 hours**

**UNIT – 1 Introduction:** [05-L][08-M]

Database –System Application, Purpose of Database Systems, View of data, Database Languages, Database architecture, Database Users, Data Models.

**UNIT – 2 Database Design And The E-R Model:** [05-L][08-M]

Overview of the Design Process, the Entity-Relationship Model, Constraints, Entity Relationship Diagrams, Weak entity Sets, Extended ER Features,

**UNIT – 3 Relational Database Model:** [10-L][15-M]

Features of Good Relational Designs, Functional Dependency Theory, Decomposition Using Functional Dependencies, Normal Forms, Structure of relational databases,  
**Relational algebra:** operations, Additional relational algebra operations, extended relational algebra operations.

**UNIT – 5 SQL:** [10-L][15-M]

Background, Data definition, Basic structure of SQL queries, Set operators, Aggregate functions, Null values, Nested sub queries, Complex queries, Query optimization, Views, Modifications of the database, Joined Relations, SQL Data Types and Schemas, Integrity Constraints, Authorizations, Functions and stored Procedure

**UNIT – 6 Transactions:** [10-L][15-M]

Transaction Concept, Transaction State, Implementation of Atomicity and Durability, Concurrent Executions, Serializability, Recoverability.

**UNIT - 7 Concurrency Control:** [10-L][15-M]

Lock-Based Protocols, Timestamp Based Protocols Validation Based Protocols, Multiple Granularity, Deadlock handling.

**UNIT-8 Recovery System:** [10-L][14-M]

Failure Classification, Storage Structure, Recovery and Atomicity, Log-based Recovery, Paging Concept and shadow paging.

## Reference Books

1. Abraham Siberschatz, Henry Korth, S.Sudarshan, Database System Concepts (Fifth Edition),.Mc Graw-Hill International Edition, ISBN 007-124476-X
2. Elmasri, Navathe, Fundamentals of Database Systems (Third Edition). Pearson Education, 2004. ISBN 13: 978-0-136-08620-8
3. J. Ullman, Principles of Database Systems, Galgotia Publications, 2010 ISBN-81-7808-488-0 PHI
4. S. K. Singh, Database Systems: Concepts, Design and Applications, Pearson Education, ISBN 978-81-317-6092-5



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**New Syllabus: M.C.A. 2017-18**

**SEMESTER: I**

**Paper: CA-103 Mathematical Foundation**

**60 + 40 Pattern: External Marks 60 + Internal Marks 40 = Maximum Total Marks: 100**

**Required Lectures: 60 hours**

**UNIT – 1 Mathematical Logic: [L-16] [M-15]**

Meaning of Statement, Logical Operations: Negation, Conjunction & Disjunction Implication, Double Implication, Equivalence, Equivalence of Logical Statements, Truth Tables & Construction of Truth Tables, Tautology and Contradiction, Argument: Valid and Invalid Arguments, Normal Forms using truth table, Statement calculus: Theory of inference (without truth table), Introduction to quantifiers

**UNIT - 2 Algebraic Structures: [L-8] [M-15]**

Groups, Semigroup, Monoid, Abelian Monoid, Abelian Group, Group Codes, Error Detection in Group Codes, Parity Check Matrix

**UNIT – 3 Relations: [L-12] [M-10]**

Relations and Their Properties, n-ary Relations and Their Applications, Representing Relations, Closures of Relations, Equivalence Relations, Congruence Relation

**UNIT – 4 Graphs: [L-12] [M-30]**

Introduction to Graphs and Graph Models, Terminology and Special Types of Graphs, Representations of Graphs, List Structures and storage representation of Graphs, Isomorphism, Connectivity, Euler and Hamiltonian Paths - Shortest Path problems- Dijkstra's shortest path algorithm Planar Graphs- Graph Coloring,

**UNIT – 5 Trees: [L-12] [M-20]**

Introduction to Trees, Applications of Trees, Traversals, Spanning Trees, Minimum Spanning Trees- Kruskal's (without theorem).

**Reference Books**

1. Kenneth. H. Rosen, Discrete Mathematics and its Applications, Sixth Edition Tata McGraw-Hill Publishing Company, New Delhi. ISBN: 978-81-317-0562-9
2. Tremblay, Discrete Mathematics, TATA McgrawHill ISBN 13: **9780074631133**.
3. G. S. S. Bhishma Rao, Mathematical Foundation of Computer Science, Scitech publication, India Pvt. LTD. Edition 2<sup>nd</sup> ISBN 0 – 07 – Y85493 –9
4. G. S. S. Bhishma Rao, Discrete structure & Graph Theory, Scitech publication, India Pvt. LTD. Edition 3<sup>rd</sup> ISBN 13: 9780073383095



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New Syllabus: M.C.A. 2017-18  
SEMESTER: I

Paper: CA-104 Object Oriented Analysis and Programming C++  
60 + 40 Pattern: External Marks 60 + Internal Marks 40 = Maximum Total Marks: 100  
Required Lectures: 60 hours

**UNIT - 1. Introduction:**

[L-4][M-9]

An overview, Object basics, Object state and properties, Behavior, Methods, Messages, Information hiding, Class hierarchy, Relationships, Associations, Aggregations, Identity, Dynamic binding, Persistence, Metaclasses, Object oriented system development life cycle.

**UNIT - 2. Object Oriented Analysis:**

[L-4 ][M-9]

Identifying Usecase, Business object analysis, Usecase driven object oriented analysis, Usecase model, Documentation, Classification, Identifying object, relationships, attributes, methods, Super-sub class, A part of relationships Identifying attributes and methods, Object responsibility.

**UNIT - 3. C++ Basics:**

[L-14][M-9]

**Datatypes and operators in C++:** Standard Input/ Output Statements, Data Types, Size contents, Variables, variable name, Declaration, Operators and expressions: arithmetic, relational, logical, Bit wise, increment, decrement, assignment, compound assignment, conditional, special, Operator precedence and order of evaluation.

**Decision Making and Looping Structures:** Decision Making: if, if-else, switch, break, continue, go to, Looping Structures: while, for, do-while, nesting of loops.

**Functions:** Function and its components, Different types of parameters-arguments, Types of parameter passing mechanisms, Overloaded Function, Inline Function.

**Arrays and String:** Arrays Fundamentals. Arrays as a Member Data, Strings, Array of String, Array of objects, The Standard C++ String Class.

**Pointer:** Addresses and pointers, The Address-of Operator, Pointer and Arrays, Pointer and Function, Pointer and Strings, Memory Management: New and Delete.

**UNIT - 3. OOP using C++:**

[L-6][M-9]

**Introduction:** Object Oriented Paradigm in C++ context, Characteristics of Object-Oriented Programming. Difference of Structured Vs OOPs

**Object and Classes:** Making sense of core object concepts (Encapsulation Abstraction, Polymorphism, Classes, Messages, Aggregation:Class within Class) Implementation of Class in C++, C++ Objects, Constructors and Destructor, The Default Copy Constructor, Object as Function Arguments, Returning Object from Function, Friend Function, Friend Class, Static Data members & functions, Structures and Classes, Structures & Unions. Difference between Class, Structures and Union.

**UNIT - 5.Operator Overloading:**

[L-8][M-9]

Overloading Unary Operators., Overloading Binary Operators, Overloading and Friend Function, Data Conversion, Disadvantages & Advantages of Operators Overloading.

**UNIT - 6.Inheritance:**

[L-8][M-9]

Concept of Inheritance, Derived Class and Base Class, Types of inheritance, Derived Class Constructors, Overriding Member Function, Class Hierarchies, Public and Private Inheritance, Levels of Inheritance, Multiple Inheritance, Ambiguity in Multiple Inheritance, Inheritance and program Development.

**UNIT - 7.**

[L-4][M-9]

**Virtual Functions:**

Difference between Static & Dynamic binding, Virtual Function, Pointers to Objects, this Pointer, Pure Virtual Functions, Abstract classes, and methods.

**UNIT - 8. Templates:**

[L-3][M-9]

Function Templates, Class Templates, , Templates with types of parameters

**UNIT - 9.Exceptions:**

[L-3][M-9]

Exceptions: Difference between exception and error, Basics of exception handling in C++, User define exceptions.

**UNIT - 10. Streams and Files:**

[L-6][M-9]

Streams Classes, Stream Errors. Disk File I/O with Streams, File Pointers, Error Handling in File I/O File I/O with Member Function, Overloading the Extraction and Insertion Operators Memory as a Stream Object, Command line Arguments

**Reference Books**

1. Venugopal, Mastering C++ , Tata Mc Graw Hill Publication ISBN 13: 9780074634547
2. A.N. Kamthane, Object Oriented Programming with ANSI and Turbo C++, Pearson Education, 2009 ISBN: 9788131703830
3. Robert Lafore, Object Oriented Programming in-C++ , Techmedia Publication ISBN-13: 978-0672323089
4. Herbert Schildt, The Complete Reference C++ Tata Mcgraw-hill publication ISBN 13: **9780070411838**
5. Saurav Sahay, Object Oriented Programming in C++, Oxford University Press. ISBN 10: 0198065302 / ISBN 13: **9780198065302**
6. Cay Horstman, OOPS C++ Big C++, Wiley Publication ISBN 10: 8126556781 ISBN 13: 9788126556786
7. Ali Bahrami, Object Oriented System Development, McGraw Hill International Edition, 1999 ISBN 10: 025625348X ISBN 13: 9780256253481
8. Booch, Jacobson, Rumbaugh, Object Oriented Analysis and Design with Applications, Third Edition, Pearson Education, 2010 ISBN-13: 978-0201895513
9. C++ Primer, Book by Josée Lajoie and Stanley B. Lippman, ISBN 13: 9780321714114.



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**SEMESTER: I**

**Paper: CA-105 System Programming**

**60 + 40 Pattern: External Marks 60 + Internal Marks 40 = Maximum Total Marks: 100**

**Required Lectures: 60 hours**

**UNIT - 1 Introduction to System Programming:**

**[L-5][M-8]**

Types of Software, Components of System Software, Comparison of System and Application Software

**UNIT-2 Assembly Language Programming:**

**[L-8][M-16]**

Introduction to Assembly Language Programming - Introduction to Instruction Formats, Data formats - Role of Base Register, Index Register

**UNIT - 3 Assembler:**

**[L-14][M-18]**

Introduction to Assembler, Databases used in Assembler Design, Design of Assembler - Single Pass & Double Pass. Macro Assembler and Preprocessor- Introduction to Macros, Various types of Macros.

**UNIT - 4 Loaders & Linkers:**

**[L-8][M-10]**

Introduction to Loaders, Functions of a Loader, Loader Schemes – Compile & Go Loader, Absolute Loader , Relocation , Linking , Dynamic Linking , Overlay Structure

**UNIT - 5 Grammars:**

**[L-6][M-12]**

Introduction to grammars, Languages, Finite State Machines, Applications of FSM and Grammars in compiler design

**UNIT -6 Compilers:**

**[L-12][M-16]**

Introduction to compilers: Brief discussion on various Phases of Compilers.

**UNIT - 7 Software Tools:**

**[L-7][M-10]**

Introduction to Software Tools, Text Editors, Interpreters, Program Generators, Debug Monitors.

**Reference Books**

1. Dhamdhare D.M., System Programming, (IInd Revised Edition), Tata McGraw Hill **ISBN 10: 0072957697 ISBN 13: 9780072957693**
2. Donovan, Systems Programming, Tata McGraw Hill **ISBN 10: 0070176035 ISBN 13: 9780070176034**
3. Leland. L. Beck, System Software, Pearson Education **ISBN-10: 0201423006; ISBN-13: 978-0201423006**
4. Adam Hoover, System Programming with C and Unix, Pearson Education, 2010 **ISBN-10: 0136067123; ISBN-13: 978-0136067122**



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**SEMESTER: I**

**Paper: CA-106 Lab on C++ Programming**  
**60 + 40 Pattern: External Marks 60 +Internal Marks 40 = Maximum Total Marks: 100**

1. Write a program to demonstrate encapsulation using of class
2. Write a program to demonstrate use of constructor, constructor overloading and destructor.
3. Write a program to demonstrate use of array manipulations, using addition or multiplication of matrices
4. Write a program to demonstrate use of string manipulations. Demonstrate standard C++ String class.
5. Write a program to demonstrate use of function overloading using shapes Class
6. Write a program to demonstrate use of operator overloading using unary, binary Operator. For Ex... Addition of Complex Nos etc...
7. Write a program to demonstrate use of friend class.
8. Write a program to demonstrate use of friend function
9. Write a program to demonstrate use of recursive function
10. Write a program to demonstrate use of array of objects for Student's class
11. Write a program to demonstrate use of pointers
12. Write a program to demonstrate use of pointer arithmetic
13. Write a program to demonstrate use of all types of inheritance
14. Write a program to demonstrate use of function templates
15. Write a program to demonstrate use of class templates
16. Write a program to demonstrate use of formatted I/O operation
17. Write a program to demonstrate use of unformatted I/O operation
18. Write a program to demonstrate use of Exception handling.





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SEMESTER: I

Paper: CA-107 Lab on DBMS  
60 + 40 Pattern: External Marks 60 +Internal Marks 40 = Maximum Total Marks: 100

**Representative List:**

**1. Creating database tables and using data types.**

- Create table
- Modify table
- Drop table

**2. Practical Based on Data Manipulation.**

- Adding data with Insert
- Modify data with Update
- Deleting records with Delete

**3. Practical Based on Implementing the Constraints.**

- NULL and NOT NULL
- Primary Key Constraint
- Foreign Key Constraint
- Unique Constraint
- Check Constraint
- Default Constraint

**4. Practical for Retrieving Data Using following clauses.**

- Simple select clause
- Accessing specific data with Where
- Ordered By
- Distinct
- Group By

**5. Practical Based on Aggregate Functions.**

- AVG
- COUNT
- MAX
- MIN
- SUM
- CUBE

6. Practical Based on implementing all String functions.

7. Practical Based on implementing Date and Time Functions.

8. Practical Based on implementing use of UNION, INTERSECTION, SET DIFFERENCE.

9. Implement Nested Queries & all types of JOIN operation.

10. Practical Based on performing different operations on a view.

11. Practical based on implementing function.

12. Practical based on implementing stored procedure.



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**SEMESTER: II**

**Paper: CA-201 Accounting & Cost Control**  
**60 + 40 Pattern: External Marks 60 + Internal Marks 40 = Maximum Total Marks: 100**  
**Required Lectures: 60 hours**

Note: For paper setting of this subject refer Question Paper Pattern given in Syllabus Guidelines.

**Section - I**

**Unit1- Introduction to Accounting: (theory only) [L-10][M-15]**

- 1.1 Meaning and definition of Financial Accounting.
- 1.2 Objectives and scope of Financial Accounting,
- 1.3 Meaning and use of Book Keeping
- 1.4 Accounting v/s Book Keeping
- 1.5 Advantages and Limitations of Financial Accounting.

**Unit 2- Basics of Accounting (theory only) [L-08][M-15]**

- 2.1 Types of Accounting
- 2.2 Golden Rules of Accounting.
- 2.3 Double entry system in Accounting
- 2.4 Terms used in accounting : Debtors, Creditors, Bill Receivable, Bills Payable, Credit Note ,Debit Note ,Petty Cash ,Contra Entry ,Trade Discount ,Cash Discount ,Suspense A/c
- 2.5 Users of accounting information

**Unit 3-Recording of transactions: (theory & Practical Problems) [L-12][M-15]**

- 3.1 Accounting Process from Journal to Final Accounts
- 3.2 Journals & Problems on Journal Entries
- 3.3 Subsidiary Books
- 3.4 Cash Book & Problems on Preparation of Cash Book
- 3.5 Ledger
- 3.6 Balancing of Ledger – Balance c /d and Balance b/d (Opening & Closing Balance)
- 3.7 Problems on Ledger Posting and Preparation

**Unit 4- Preparation of final accounts: (theory & Practical Problems) [L-10][M-15]**

- 4.1 Preparation of Trading and Profit & Loss Account and Balance Sheet of sole proprietor
  - 4.1.1 Pro-forma of Trading Accounts
  - 4.1.2 Pro-forma of Profit & Loss Accounts
  - 4.1.3 Pro-forma of Balance sheet
- 4.2 Simple Problems on Final Accounts

**Costing Section-II**

**Unit 5: Fundamentals of Cost Accounting (Theory & Practical Problems) [L-10][M-]**

- 5.1 Cost & Cost Accounting : Meaning
- 5.2 Advantages and Limitations of Cost Accounting
- 5.3 Difference between Financial Accounting, Cost Accounting and Management Account

5.4 Meaning of Cost Sheet

5.5 Meaning of Prime Cost, Factory Cost, Selling & Distribution Cost and Total Cost i.e. Cost of Production

5.6 Simple problem on preparation of Cost Sheet (Practical Problem)

**Unit 6 Materials & Labour Control (Theory & Practical Problem) [L-10][M-15]**

6.1 Meaning of Material

6.2 Economic Order Quantity (EOQ): Meaning & Calculations (Problem)

6.3 Different Level of Materials & their Calculation Maximum Level, Minimum Level, Average Level, Reorder Level, Danger Level (Problem)

6.4 Store Ledger Accounting: (Problems) on LIFO, FIFO

6.5 Meaning of Labour

6.6 Labour Remuneration Methods :Piece Rate Method and Time Rate Method

6.6 Problems on Halsey Plan and Rowan Plan of Labour Incentives

**Reference Books**

1. Financial accounting: By Jane Reimers (Pearson Education) **ISBN:** 9780136115274

2. Accounting Made Easy By Rajesh Agarwal & R Srinivasan (Tata McGraw –Hill) **ISBN,** 0070600600, 9780070600607

3. Financial Accounting For Management: By Amrish Gupta (Pearson Education) **ISBN:**9789332559493

4. Financial Accounting For Management: By Dr. S. N.Maheshwari (Vikas Publishing House) **ISBN,** : 9789325956193

5. Fundamentals of Accounting : S.K Paul **ISBN-10:** 0077862279



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**SEMESTER: II**

**Paper: CA-202 Data Structure and Algorithms**

**60 + 40 Pattern: External Marks 60 +Internal Marks 40 = Maximum Total Marks: 100**  
**Required Lectures: 60 hours**

**Unit – 1. Introduction to Data Structure and Algorithms: [L-05][M-10]**

Concepts, Data types, ADT (Abstract Data Type), Types of data structure, **Algorithm**

**Analysis:** Space complexity, Time complexity, Asymptotic Notations (Big O, Omega, Theta),

**Unit – 2.Linear data structure: [L-08][M-10]**

Array as linear data structure, Representation of array in memory, Operations on array- Insert, Delete, Traverse, Strings as ADT, structure and pointer in C/C++, **Searching:** Linear and Binary search.

**Unit – 3. Sorting and Searching: [L-06][M-10]**

**Sorting:** General Background, bubble sort, Selection sort, Insertion Sorts, Quick sort, Merge and Radix Sorts.

**Unit – 4. Linked List [L-10][M-10]**

**Linked list:** Introduction, Types – Singly, doubly, singly circular, doubly circular, Dynamic representation, Operations on linked list

**Unit – 5. Stack: [L-04][M-10]**

Introduction, Representation: static and dynamic, Operations on stack, Applications- Parsing and validating expression, Infix to Postfix, Evaluation of Postfix expression.

**Unit – 6. Queues: [L-05][M-10]**

Introduction, Representation: static and dynamic, Operations on queue, Circular queue, priority queue.

**Unit – 7. Tree: [L-12][M-10]**

Concept & terminologies, Binary tree - Representation: static and dynamic, Types: full, complete, skewed. Traversal: inorder, preorder, postorder.

**Binary Search Tree :** Concept & Operations: create, insert, delete. Height balanced tree – AVL tree, Application - Heap Sort, Expression tree

**Unit – 8. Graph: [L-06][M-10]**

Concept & terminologies, Representation: Adjacency matrix, Adjacency list. Traversal: DFS, BFS, All pairs shortest path, Spanning tree, minimum spanning tree, Prim's Algorithm.

**Unit – 9. Hashing: [L-4][M-10]**

Hash table concepts, Hash functions, Overflow handling techniques

## Reference Books

1. Horowitz, Sahni, Mehta, Fundamentals of Data Structures in C++, Universities Press. **ISBN 10:** 8173716064 **ISBN 13:** 9788173716065
2. Tenenbaum, Langsam, Augenstein, Data Structures using 'C' , Pearson Education. **ISBN-10:** 9332549311
3. BalaGuruswamy, Data Structures Using 'C' TMH **ISBN-10:** 1259029549;**ISBN-13:** 978-1259029547
4. Weiss, Data Structures Using 'C' Pearson Education **ISBN,** 8177583581, 9788177583588



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**New Syllabus: M.C.A. 2017-18**

**SEMESTER: II**

**Paper: CA-203 Operating System**

**60 + 40 Pattern: External Marks 60 +Internal Marks 40 = Maximum Total Marks: 100**

**Required Lectures: 60 hours**

**UNIT –1 Introduction to Operating System [L-3][M-10]**

What is an Operating System? Functions of OS? Types of OS

**UNIT –2 Processes Concept: [L-5][M-10]**

Process Concept, Process Scheduling, Operations on Processes, Cooperating Processes, Inter-process Communication, Communication in Client-Server Systems.

**UNIT –3 Threads: [L-3][M-5]**

Overview, Multithreading Models, Thread Libraries, Thread Pools.

**UNIT –4 CPU Scheduling: [L-5][M-10]**

Basic Concepts, Scheduling Criteria, Scheduling Algorithms, Real-Time Scheduling, Algorithm Evaluation.

**UNIT –5 Process Synchronization: [L-5][M-10]**

Background, The Critical Section Problem, Synchronization Hardware, Semaphores, Classical Problems of Synchronization, Critical Regions, Monitors.

**UNIT –6 Deadlocks: [L-15][M-20]**

System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock.

**UNIT –7 Memory Management: [L-10][M-10]**

Background, Address Binding, Linking and Loading, Swapping, Contiguous Allocation, Paging, Segmentation, Segmentation with Paging.

**UNIT –8 Virtual Memory [L-7][M-10]**

Background, Demand Paging, Process Creation, Page Replacement, Allocation of Frames, Thrashing.

**UNIT –9 Mass Storage: [L-7][M-5]**

Overview of Mass Storage, Disk Mechanism, Disk Structure, Disk Scheduling.

## Reference Books

1. Nutt, Chaki, Neogy, Operating Systems, Pearson Education, Third Ed., 2009. **ISBN 10:** 8131723593 **ISBN 13:** 9788131723593
2. Peterson Silberschats, Operating System Concepts, Addition Wesley Publication. **ISBN 0-471-69466-5**
3. AchutGodbole, Operating System, TMH **ISBN 10:** 0070702039 **ISBN 13:** 9780070702035
4. Andrew s. Tenenbaum, A.S. Woodhill, Operating Systems Design & Implementation, Pearson Education **ISBN 0-471-69466-5**
5. B. Mohamed Ibrahim, Linux A Practical Approach, FirewallMedi **ISBN,** 8170087236, 9788170087236



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**SEMESTER: II**

**Paper: CA-204 Java Programming**

**60 + 40 Pattern: External Marks 60 +Internal Marks 40 = Maximum Total Marks: 100**

**Required Lectures: 60 hours**

**UNIT -1. An Introduction to Java:**

**[L-4][M-10]**

Java As a Programming Platform, The Java "White Paper" Buzzwords, Java Applets and the Internet, A Simple Java Program, Comments, Data Types, Variables, Operators, Strings, Input and Output Control Flow

**UNIT -2. Objects and Classes:**

**[L-6][M-10]**

Introduction to Object-Oriented Programming, Using Predefined Classes, Defining Your Own Classes, Static Fields and Methods, Method Parameters, Object Construction, Packages

**UNIT -3. Inheritance, Interfaces and Inner Classes:**

**[L-8][M-10]**

Classes, Super classes, and Subclasses, Object: The Cosmic Super class, Generic Array Lists, Object Wrappers and Auto boxing, Methods with a Variable Number of Parameters, Enumeration Classes, Reflection, Interfaces, Object Cloning, Inner Classes.

**UNIT -4. Graphics Programming:**

**[L-8][M-10]**

Introducing Swing, Creating a Frame, Positioning a Frame, Displaying Information in a Component, Working with 2D Shapes, Color, Special Fonts for Text, Displaying Images

**UNIT -5. Event Handling and User Interface Components with Swing:**

**[L-10][M-15]**

Basics of Event Handling, Actions, Mouse Events, the AWT Event Hierarchy, Swing and the Model-View-Controller Design Pattern, Introduction to Layout Management, Text Input Choice Components, Menus, Sophisticated Layout Management, Dialog Boxes.

**UNIT -6. Deploying Applications and Applets:**

**[L-4][M-5]**

JAR Files, Java Web Start, Applets, Storage of Application Preferences

**UNIT -7. Exceptions, Logging and Assertions:**

**[L-4][M-5]**

Dealing with Errors, Catching Exceptions, Tips for Using Exceptions,

**UNIT -8. Multithreading:**

**[L-4][M-10]**

What Are Threads?, Interrupting Threads, Thread States, Thread Properties, Synchronization, Blocking Queues, Thread-Safe Collections, Executors, Synchronizers, Threads and Swing

**UNIT -9. Streams, Files:**

**[L-4][M-5]**

Streams, Text Input and Output, Reading and Writing Binary Data, ZIP Archives, Object Streams and Serialization, File Management, New I/O Regular Expressions

**UNIT -10. JDBC:**

**[L-4][M-10]**

The Design of JDBC, JDBC Configuration, Executing SQL Statements , Query Execution



Scrollable and Updatable Result Sets, Row Sets, Metadata, Transactions.

**UNIT -11. Sockets & Networking in Java :**

**[L-4][M-5]**

Client server architecture, Java API for creating sockets, developing a simple client sever interface using sockets in java

**References**

1. Horstman Cay, Cornell Gary, Core JavaTM2, Vol.1&2, Seventh Edition, Pearson education **ISBN-10:** 0-13-708160-X
  2. Herbert Schildt, The Complete Reference, Seventh Edition, Tata McGraw-Hill **ISBN 10:** 007063677X **ISBN 13:** 9780070636774
  3. Steven Holzner, JAVA 2 Programming Black Book, Wiley India **ISBN 13 :** 9788126512607
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**SEMESTER: II**

**Paper: CA-205 Computer Networks**

**60 + 40 Pattern: External Marks 60 +Internal Marks 40 = Maximum Total Marks: 100**

**Required Lectures: 60 hours**

**UNIT - 1 Introduction:**

**[L-4][M-10]**

Data communications, Networks, The Internet, Protocol & Standards

**UNIT-2 Network Models:**

**[L-4][M-10]**

Layered tasks, Internet model, OSI model

**UNIT - 3 Physical Layer:**

**[L-10][M-20]**

Signals: Analog and digital signals, data rate limits, Transmission impairment, Signal measurements like throughput, propagation speed and time, wave length

**.Digital Transmission:** Line coding, block coding, sampling, transmission mode.

**Analog Transmission:** Modulation digital data, telephone modem, Modulation analog signals. Multiplexing: FDM, WDM, TDM. Transmission Media: Guided media, unguided media.

**UNIT - 4 Data Link Layer:**

**[L-12][M-25]**

Error detection and Correction: Type of errors, detection and correction of errors. Data Link Control & Protocol: Flow & error control, Stop-And-Wait ARQ, Go-Back-N ARQ, Select Repeat ARQ, and HDLC. Point-To-Point Access: Point-to-point protocol, PPP stacks. Local Area Network: Traditional Ethernet, fast and gigabit Ethernets. Connecting LANs, Backbone Networks and Virtual LANs: Connecting devices, Backbone networks, Virtual LANs.

**UNIT - 5 Network Layer:**

**[L-10][M-10]**

Internetworks, Addressing, Routing. Network Layer Protocols: ARP, IP, ICMP, IPV6. Unicast routing, Unicast routing protocols, Multi routing, Multicast routing protocols.

**UNIT - 6 Transport Layer:**

**[L-10][M-5]**

Process-To-Process delivery, user data gram, Transmission control protocol.

**UNIT - 7 Application Layer:****[L-10][M-10]**

Client-Server Model: Client-Server model, Socket interface. A brief introduction to DNS, SMTP, FTP.

**References**

1. Behrouz A. Forouzan, Data Communications and Networking, 3rd Edition, Tata McGrawHill Publishing Co **ISBN** 0073376221
2. A. S. Tanenbaum, Computer Networks, Pearson Education **ISBN-10:** 0-13-212695-8
3. William A Shay, Understanding Data Communications and Networks, 2nd Edition, Vikas Publishing **ISBN-10:** 053495054X; **ISBN-13:** 978-0534950545



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**SEMESTER: II**

**Paper: CA-206 Lab on Data Structure and Algorithms**

**60 + 40 Pattern: External Marks 60 + Internal Marks 40 = Maximum Total Marks: 100**

1. Implementation of Linear array (static) operations: Insert, Delete, Traverse.
2. Implementation of Linear and Binary Search.
3. Implementation of Bubble Sort
4. Implementation of Selection Sort
5. Implementation of Insertion Sort
6. Implementation of Quick Sort
7. Implementation of Merge Sort
8. Implementation of Radix Sort
9. Implementation of Linked List – Singly, Circular, Doubly, Circular Doubly.
10. Implementation of Stacks (Static and dynamic)
11. Applications of Stack: Infix to Postfix Conversion, evaluation of postfix expression.
12. Implementation of linear queue (static & Dynamic), circular queue, priority queue.
13. Implementation of Binary tree operations: Insert, Delete, Traverse
14. Implementation of Binary tree traversal algorithms (recursive & non-recursive).
15. Implementation of Heap tree and application (Heap sort).
16. Implementation of Binary Search Tree operations: Insert, Delete, Search.
17. Implementation of Graph traversal techniques (DFS, BFS)
18. Implementation of All pairs shortest path.
19. Implementation of Prim's algorithm.



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**SEMESTER: II**

**Paper: CA-207 Lab on Java Programming**

**60 + 40 Pattern: External Marks 60 +Internal Marks 40 = Maximum Total Marks: 100**

1. Write a program that demonstrates program structure of java.
2. Write a program that demonstrates string operations.
3. Write a program that demonstrate package creation and use in program.
4. Write a program that demonstrates inner class.
5. Write a program that demonstrates inheritance.
6. Write a program that demonstrates 2D shapes on frames.
7. Write a program that demonstrates text and fonts.
8. Write a program that demonstrates event handling for various types of events.
9. Write a program to illustrate multicasting.
10. Write a program to illustrate use of various swing components.
11. Write a program that demonstrates use of dialog box.
12. Write a program to create own dialog box.
13. Write a program to create toolbar, menu & popup menu.
14. Write a program to implement file handlings.
15. Write a program that demonstrates Applet programming.
16. Write a program to implement generic programming.
17. Write a program that demonstrates JDBC on applet/application.
18. Write a program that demonstrates multithreading.



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**SEMESTER: III**

**Paper: CA-301 Internet Computing – I (HTML, PHP and MySQL)**  
**60 + 40 Pattern: External Marks 60 +Internal Marks 40 = Maximum Total Marks: 100**  
**Required Lectures: 60 hours**

**UNIT: I Introduction to Html and CSS:** **[L-8][M-15]**

HTML & CSS–Introduction to Html, html controls, Formatting tags , Commenting Code, Anchors, Backgrounds, Images, Lists ,Tables, Frames , HTML Forms. The need for CSS, Introduction to CSS, Basic syntax and structure ,Inline Styles , Embedding Style Sheets , Linking External Style Sheets, Backgrounds, Manipulating text, Margins and Padding , Positioning using CSS, Introduction of HTML 5.0.

**Unit II: PHP Language Basics** **[L-12][M-15]**

Structure and Syntax, Using HTML, Constants and Variables, Passing Variables between Pages, Using if/else, Switch, Loops, String Manipulation, Operators, Includes, Functions. Arrays: syntax, Sorting Arrays, foreach Constructs, Using PHP \$\_GET, PHP \$\_POST,

**Unit III: Advanced PHP Concepts** **[L-10][M-20]**

Working with Forms: Processing Forms,Form Validation , Emailing Form Data, Linking Form Together, Hidden Form Fields, Validating User Input Handling and Avoiding Errors, Files & Directories ,Advanced PHP : Session, Cookies, \$\_REQUEST, User Logins, Profiles, and Personalization

**Unit IV: MySQL** **[L-8][M-15]**

Introduction to MySQL, installation & configuration with PHP, MySQL Structure and Syntax, Interacting with Databases, Create, Insert, select, Where, Order by, Update, Delete,Desc

**Unit V: PHP with MySQL** **[L-12][M-15]**

Php functions for accessing and Manipulating mysql data : MySQL Database ,MySQL Connect, MySQL Create DB ,MySQL Create Table, MySQL Insert Data, MySQL Get Last ID, MySQL Insert Multiple , MySQL Prepared , MySQL Select Data ,MySQL Delete Data ,MySQL Update Data, MySQL Limit Data.

**Unit VI : Data parsing using JSON object in PHP.** **[L-10][M-10]**

Parsing of Objects, JSON Vs XML , JSON PHP, JSON HTML

## References

1. Thomas A. Powell, Complete reference HTML, 4th Edi., TMH. ISBN-10: **0072119772**
2. Ivan Bayross , Web Enabled Commercial Application Development using HTML, DHTML, JavaScript, PERL-CGI, 3 rd Edi., BPB Publications **ISBN : 8183330088**
3. Dave Mercer, Allan Kent, Steven Nowicki, David Mercer, Dan Squier, Wankyu Choi, Beginning PHP5 **ISBN: 0-7645-5783-1**
4. Wiley Publishing(Wrox) ISBN: 0-7645-5783-1
5. Michael K. Glass, Yann Le Scouarnec, Elizabeth Naramore, Gary Mailer, Jeremy Stolz, Jason Gerner **ISBN 10: 0764579665 ISBN 13: 9780764579660**
6. “Beginning PHP, Apache, MySQL Web Development”, Wiley Publishing(WROX),March 2004, ISBN: 978-0-7645-5744-6
7. Lorna Jane Mitchell PHP Web Services, 2nd Edition by , Oreilly Publication **ISBN 10: 1491933097 ISBN 13: 9781491933091**



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**SEMESTER: III**

**Paper: CA-302 Design and Analysis of Algorithm**

**60 + 40 Pattern: External Marks 60 +Internal Marks 40 = Maximum Total Marks: 100**

**Required Lectures: 60 hours**

**UNIT – 1 Introduction:** [L-5][M-7]

Problem, Instance, Analysis of Algorithms, Principles of Algorithm Design, Phases of Algorithm design and analysis, Asymptotic complexity, Recursion, Rules of Removal of Recursion,

**UNIT – 2. Elementary Data Structures** [L-5][M-8]

Stack, Queue, Binary trees, Heap Tree and Heap sort, Sets and Disjoint Set Union, Graphs.

**UNIT – 3 Divide and Conquer:** [L-10][M-15]

Introduction, DC 1: Binary Search, DC 2: MaxMin, DC 3: Merge Sort, DC 4: Quick Sort, DC 5: Median Finding, DC 6: Strassen's Matrix multiplication.

**UNIT – 4 Greedy Algorithms:** [L10][M-15]

Introduction, GA 1: Fractional Knapsack, GA 2: Job Sequencing with deadlines, GA 3: Minimum spanning trees: Prims and Kruskal algorithm, GA 4: Optimal Storage on Tape Single, GA 5: Source Shortest Path: Dijkstra's Algorithm, GA 6: Huffman Coding.

**UNIT – 5 Dynamic Programming:** [L-10][M-15]

Introduction, DP1: All Pair ShortestPath, DP 2: Knapsack (0/1), DP 3: Travelling salesman problem, DP 4: Matrix chain Multiplication, DP 5: Longest common subsequence.

**UNIT – 6 Basic Search and Traversal Techniques:** [L-8][M-12]

Introduction, Binary Tree Traversal, Search and Traversal Techniques for Graphs, Topological sort, CodeOptimization.

**UNIT – 7 Backtracking:** [L-8][M-12]

Introduction, N-queen problem: 4 Queen, 8 Queen, Graph coloring problem, Branch and Bound technique, LC-search

**UNIT – 8 NP-Completeness:** [L-4][M-6]

Non deterministic algorithms: searching, sorting, Introduction to NP-Complete, Search/Decision, SAT, Independent Set, 3VC, Subset Sum & Partition, Hamiltonian Circuit.



## References

1. Horowitz and Sahni, Fundamentals of Computer Algorithms, Galgotia publications **ISBN-10:** 8173716129
2. Cormen, Leiserson and Rivest, Introduction to Algorithms, Prentice Hall of India **ISBN:** 9780262259460
3. AnanyLevitin Introduction to the design and analysis of Algorithms, Pearson Education **ISBN9788131718377**
4. P. Dave, H. Dave, Design and Analysis of Algorithms, Pearson Education, 2008. **ISBN-81-7808-488-0 PHI**
5. Sanjay Dasgupta, Christos Papadimitriou and UmeshVazirani, Algorithms, Tata McGraw-Hill Edition **ISBN 10: 0073523402 ISBN 13: 9780073523408**
6. Aho, Hopcroft and Ullman, The Design and Analysis of Algorithms, Addison-Wesley Publication, 2000 **ISBN 10: 146128757X ISBN 13: 9781461287575**
7. Simon Harison, James Ross, Algorithms, Wiley India, 2006 **ISBN 007-124476-X**



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FACULTY OF SCIENCE AND TECHNOLOGY  
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SEMESTER: III

**Paper: CA-303 Automata Theory and Computability**  
**60 + 40 Pattern: External Marks 60 + Internal Marks 40 = Maximum Total Marks: 100**  
**Required Lectures: 60 hours**

**Unit - 1 Finite Automata:**

**[L-12][M-20]**

Sets, relations, functions, graphs, trees, mathematical induction, Finite Automata (FA), Definition, description, transition systems, acceptability of a string, NFA, DFA, equivalence of DFA and NFA, Melay Moore model, minimization of automaton, Applications.

**Unit – 2 Formal Languages:**

**[L-4][M-10]**

Formal languages, Chomsky classification of languages, languages, their relation and automaton.

**Unit - 3 Regular Expressions:**

**[L-16][M-15]**

Regular expressions, FA and regular expressions, pumping lemma for regular sets, applications of pumping lemma, closure properties of regular sets, regular sets and regular grammars.

**Unit - 4 Context Free Languages:**

**[L-12][M-15]**

CFLs and derivation trees, ambiguity in Context-Free Grammars (CFGs), simplification of CFGs, Normal Forms for CFGs(CNF and GNF), pumping lemma for CFLs, decision algorithms for CFLs.

**Unit - 5 Push Down Automata:**

**[L-8][M-15]**

Pushdown Automaton (PDA), informal description, basic definitions, acceptance by a PDA, PDA and CFLs.

**Unit - 6 Turing Machine:**

**[L-8][M-15]**

Turing Machine, Model, computable languages and function, representation of TMs, Language Acceptability by TMs, Design of TM, Halting Problem of TMs.

**References**

1. SmitaRajpal, Theory of Automata and Formal Languages, GALGOTIA Publications.  
**ISBN 10:** 0139138153 **ISBN 13:** 9780139138157
2. J.E.Hopcraft, R. Motwani and J.D.Ullman, Introduction to Automata Theory languages & Computation, Pearson Education Asia **ISBN 81-203-1630-4**
3. K. L. P. Mishra, N. Chandrashekharan, Theory of Computer Science, PHI. **ISBN-10:** 8120329686
4. Martin John C., Introduction to Language & Theory of computation (TMH). **ISBN-10:** 0072322004; **ISBN-13:** 978-0072322002



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SEMESTER: III

Paper: CA-304 Artificial Intelligence

60 + 40 Pattern: External Marks 60 + Internal Marks 40 = Maximum Total Marks:  
100

Required Lectures: 60 hours

**UNIT - 1. Introduction:**

[L-4][M-6]

What is Artificial Intelligence? The AI Problems, The Underlying Assumption, What is an AI Technique, The Level of the Model, Criteria for Success, Some General References, OneFinal Word.

**UNIT - 2. Problems, Problem Spaces, and Search:**

[L-6][M-12]

Defining the Problem as a State Space Search, Production systems, Problem Characteristics, Production System Characteristics, Issues in the Design of Search Programs, AdditionalProblems.

**UNIT - 3. Heuristic Search Techniques:**

[L-8][M-12]

Generate-and- Test, Hill Climbing, Best-First Search, Problem Reduction, ConstraintSatisfaction, Means-Ends Analysis.

**UNIT - 4. Knowledge Representation:**

[L-6][M-12]

Knowledge Representation Issues, Representations and Mappings, Approaches to knowledgeRepresentation, Issues in Knowledge Representation, The Frame Problem.

**UNIT - 5. Using Predicate Logic:**

[L-8][M-12]

Representing Instance and Isa Relationships, Computable Functions and Predicates,Resolution, Natural Deduction.

**UNIT - 6. Representing Knowledge Using Rules:**

[L-8][M-12]

Procedural Versus Declarative knowledge, Logic Programming, Forward versus Back wardReasoning, Matching, Control Knowledge.

**UNIT - 7. Reasoning under Uncertainty**

[L-10][M-12]

Introduction to Nonmonotonic Reasoning, Probability and Baye"s Theorem, Certainty Factors and Rule-Based Systems, Bayesian Networks, Dempster-Shafer Theory, Fuzzy Logic.

**UNIT – 8 Slot-and-Filler Structures:**

[L-10][M-12]

Semantic Nets, Frames, Conceptual Dependency, Scripts, CYC.

## References

1. Elaine Rich, Kevin Knight, Artificial Intelligence, Tata McGrawHill. **ISBN 10:** 0070087709 **ISBN 13:** 9780070087705

2. Stuart Russel, Peter Norwig, Artificial Intelligence – A Modern Approach ,  
Pearson Education **ISBN 0-13-103805-2**



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**SEMESTER: III**

**Paper: CA-305 Data Warehousing and Mining**

**60 + 40 Pattern: External Marks 60 +Internal Marks 40 =Maximum Total Marks:  
100**

**Required Lectures: 60 hours**

**UNIT-1 DATA WAREHOUSING:**

**[L-10] [M-15]**

Data warehousing Components -Building a Data warehouse -- Mapping the Data Warehouse to a Multiprocessor Architecture - DBMS Schemas for Decision Support – Data Extraction, Cleanup, and Transformation Tools -Metadata.

**UNIT-2 BUSINESS ANALYSIS**

**[L-5] [M-15]**

Reporting and Query tools and Applications - Tool Categories - The Need for Applications - Cognos Impromptu - Online Analytical Processing (OLAP) - Need - Multidimensional Data Model - OLAP Guidelines - Multidimensional versus Multirelational OLAP - Categories of Tools - OLAP Tools and the Internet.

**UNIT-3 DATA MINING**

**[L-15] [M-20]**

Introduction - Data - Types of Data - Data Mining Functionalities - Interestingness of Patterns - Classification of Data Mining Systems - Data Mining Task Primitives - Integration of a Data Mining System with a Data Warehouse - Issues -Data Preprocessing.

**UNIT-4 ASSOCIATION RULE MINING AND CLASSIFICATION [L-15] [M-20]**

Mining Frequent Patterns, Associations and Correlations - Mining Methods – Mining Various Kinds of Association Rules - Correlation Analysis - Constraint Based Association Mining - Classification and Prediction - Basic Concepts - Decision Tree Induction - Bayesian Classification - Rule Based Classification - Classification by Backpropagation - Support Vector Machines - Associative Classification - Lazy Learners - Other Classification Methods – Prediction

**UNIT-5 CLUSTERING & APPLICATIONS AND TRENDS IN DATA MINING**

**[L-15] [M-20]**

Cluster Analysis - Types of Data - Categorization of Major Clustering Methods – Kmeans Partitioning Methods - Hierarchical Methods - Density-Based Methods -Grid Based Methods - Model-Based Clustering Methods - Clustering High Dimensional Data Constraint - Based Cluster Analysis - Outlier Analysis - Data Mining Applications.

## References

1. Pang-Ning Tan, Michael Steinbach and Vipin Kumar, " Introduction To Data Mining", Person Education, 2007 **ISBN**. 0321321367
2. K.P. Soman, Shyam Diwakar and V. Ajay ", Insight into Data mining Theory and Practice", Easter Economy Edition, Prentice Hall of India, 2006 ISBN-10: **8120328973**. ISBN-13: **978-8120328976**
3. G. K. Gupta, " Introduction to Data Mining with Case Studies", Easter Economy Edition, Prentice Hall of India, 2006 **ISBN** 10: 8120343263 **ISBN** 13: 9788120343269
4. Daniel T.Larose, "Data Mining Methods and Models", Wile-Interscience, 2006 ISBN-13 **978-0-471-66656-1**. ISBN-10 **0-471-66656-4**



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**SEMESTER: III**

**Paper: CA-306 Lab on Design and Analysis of Algorithm**  
**60 + 40 Pattern: External Marks 60 + Internal Marks 40 = Maximum Total Marks:**  
**100**

**1. Removal of Recursion**

Write a program to implement removal of recursion for –

- a. Finding Maximum from array.
- b. Finding GCD of two numbers.
- c. Binomial Coefficient  $B(n,m) = B(n-1, m-1) + B(n-1, m)$ ,  $B(n,n) = B(n,0) = 1$
- d. Searching element from array.

**2. Elementary Data Structures–Tree**

- a. Write a program for creating Max/Min. heap using INSERT.
- b. Write a program for creating Max/Min. heap using ADJUST/HEAPIFY.
- c. Write a program for sorting given array in ascending/descending order with  $n=1000, 2000, 3000$ . Find exact time of execution using Heap Sort.
- d. Write a program to implement Weighted UNION and Collapsing FIND operations.

**3. Divide and Conquer**

- a. Write a program for searching element from given array using binary search form  $n=1000, 2000, 3000$ . Find exact time of execution.
- b. Write a program to find minimum and maximum from a given array using MAXMIN.
- c. Write a program for sorting given array in ascending/descending order with  $n=1000, 2000, 3000$  find exact time of execution using –
  - Merge Sort
  - Quick Sort
- d. Write a program to find Median using divide and conquer algorithm.
- e. Write a program for matrix multiplication using Strassen's Matrix Multiplication.

**4. Greedy Algorithms**

- a. Write a program to find solution of Fractional Knapsack instance.
- b. Write a program to find Minimum Spanning Tree using Prim's algorithm.
- c. Write a program to find Minimum Spanning tree using Kruskal's algorithm.
- d. Write a program to find Single Source Shortest Path using Dijkstra's algorithm.

**5. Dynamic Programming**

- a. Write a program to find solution of Knapsack Instance (0/1).
- b. Write a program to find solution of LCS.
- c. Write a program to find solution of Matrix Chain Multiplication.
- d. Write a program to find shortest path using All Pair Shortest Path algorithm.

**6. Basic Search and Traversal Techniques:**

- a. Write a program to Traverse Graph – Depth First Search.
- b. Write a program to Traverse Graph – Breadth First Search.

- c. Write a program to implement topological sort.
- d. Write a program to implement CODE1.
- e. Write a program to implement CODE2.

**7. Backtracking**

- a. Write a program to find all solutions for N-Queen problem using backtracking.
- b. Write a program to find only In-Equivalent solutions for N-Queen problem using backtracking.
- c. Write a program for Graph Coloring using backtracking.





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**SEMESTER: III**

**Paper: CA-307 Lab on IC-I**

**60 + 40 Pattern: External Marks 60 +Internal Marks 40 =Maximum Total Marks:  
100**

1. Create a simple HTML document with title heading paragraph emphasise strong and image elements
2. Create a simple HTML Form covering major form elements
3. Create a HTML document to demonstrate Tables tag , Table Attributes
4. Create a HTML document with HTML tags and apply CSS for Font Faces, Manipulating the display of Text, Background Colors and Images.
5. Create a HTML document with HTML & HTML5 tags and apply CSS to demonstrate The Box Model, Floating and Vertical Alignment, Styling Lists, Positioning appropriately.
6. Create a HTML document with HTML & HTML5 table & Form tag with all form Elements and apply CSS for Styling Tables & Form elements.
7. PHP installation on Windows, configuration with IIS
8. Demonstration of array functions for single & multidimensional arrays, sorting
9. Printing of HTML form data on server
10. Use of global variables
11. Demonstration of session management with cookies, \$\_Session, hidden fields
12. Displaying file/Directory attributes
13. File & directory explorer
14. Creation of database in MYSQL from command prompt. Grant permissions on the database. Create table in database. Store, Update, Delete and Retrieve data from the table.
15. Design a database in MYSQL using PHP. Create table in database. Store, Update, Delete and Retrieve data from the table. Display the data from the table
16. Accessing MySql data from PHP script: Displaying tables and fields along with their types and constraints, Display table data in tabular format
17. Create and application for demonstrating Data parsing using JSON object in PHP



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**SEMESTER: IV**

**Paper: CA-401 System Analysis and Design**  
**60 + 40 Pattern: External Marks 60 +Internal Marks 40 =Maximum Total Marks:**  
**100**

**Required Lectures: 60 hours**

**UNIT-1 System Concept and Information**

**[L-10] [M-15]**

System Environment, The system concepts, Characteristics of system, Elements of System, General Business Knowledge, Problem Solving Skills

**UNIT-2 System Development Life Cycle**

**[L-14] [M-15]**

Recognition of Need, Problem Definition, Feasibility Study, Analysis, Design, Implementation, Post Implementation and Maintenance, Factors affecting the system, SDLC

Models –Waterfall, Spiral & RAD

**UNIT-3 System Planning and Initial Investigation**

**[L-22] [M-30]**

Strategies for Determining Information Requirement, Definition and Project Initiation Background Analysis, Fact Analysis, Review of Written Documents, Onsite observations, Interview and Questionnaires, Efficiency Analysis, Service Analysis, Tools for Structured Analysis, Data Flow Diagram (DFD), ERD, Data Dictionary, Decision Tree and Structured English, Decision Tables, Pros and cons of Each tool

**UNIT-4 Brief Introduction to Coding, Testing, Implementation & Maintenance [L-8] [M-15]**

Coding- Programming Environments, Generating codes, Testing-Unit, Integrated, System, Implementation, Maintenance.

**UNIT-5 Introduction to CASE tool [L-6] [M-15]**

History, Need, Drawbacks of CASE Tool.

**References**

1. Pressman, R. (1987). Software Engineering: A Practitioner's Approach, 2d ed. New York, NY: McGraw-Hill. ISBN 0-07-365578-3

2. STRUCTURED SYSTEM ANALYSIS AND DESIGN, ISRD Group  
ISBN:9780070612044



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**SEMESTER: IV**

**Paper: CA-402 Internet Computing - II**  
**60 + 40 Pattern: External Marks 60 +Internal Marks 40 =Maximum Total Marks:**  
**100**

**Required Lectures: 60 hours**

**Unit 1 Application and Page Frameworks**

[L-7][M-10]

application location options, The asp.net Page structure options- Inline Coding & Code-Behind Model, Asp .NET 4 Page directives, ASP.NET Page events, Global.asax, ASP .NET Application Folders.

**Unit 2 ASP.NET server Controls and Validation Server Controls**

[L-13][M-20]

ASP .NET server Controls-Types of server control, building with server control, working with server control Events, Applying Styles to server control, HTML server controls, Understanding Validation, Client Side vs Server Side Validation, ASP .NET Validation Server Controls, turning off client side validation.

**Unit 3 Working With Master Page, Themes and Skins**

[L-15 ][M-15]

Why do You need Master Pages?, The Basics of Master Pages, Coding a Master Page, Coding a Content Page, nesting Master Pages, ASP.NET Ajax and Master Pages, Using ASP .NET Themes, Creating Your own Themes, defining Multiple skin options, Themes, skins, and Custom Controls, Profiles ,User Roles Access rules and Authentication and Authorization using Login Controls in ASP.NET.

**Unit 4 Data Management with ADO .NET& Data Binding**

[L-15 ][M-15]

Basic ADO .NET features, ADO.NET architecture and objects(Data Reader, Data Set, Data Adaptor, Command and Data Table/ Data View, The datalist server Control, The listView server Control, Using Visual studio for ADO .NET Tasks, Data source Controls, Data Source Control Caching, Using Bound list Controls with data source Controls, other databound Controls- Treeview, AdRotator.

**Unit 5 Introduction to Angular.js**

[L-10 ][M-10]

What is Angular.Js, players, organize the code, Modules in Angular.Js, Controllers in Angular.Js, Using the code-Built in Directives in Angular. Understanding and implementing Services

## References

1. Professional ASP.NET 4 in C# and VB by Bill Evjen, Scott Hanselman, Devin Rader, Wrox  
**ISBN: 978-0-470-50220-4**
2. Beginning ASP.NET 4.5.1 in C# & VB by Imar Spanjaars, Wrox ISBN: 978-1-118-84677-3
3. ng-book by Ari Learner, Full Stack **ISBN-10: 099134460X; ISBN-13: 978-0991344604**



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**SEMESTER: IV**

**Paper: CA-403 Network Programing**

**60 + 40 Pattern: External Marks 60 +Internal Marks 40 =Maximum Total Marks:  
100**

**Required Lectures: 60 hours**

**UNIT – 1 Internet Basics: [6][10]**

What Is Internet, What Special About Internet? Dial Up Connection/Direct Connection; Slip Or PPPWWW: The Client Site, Server Site, Web Pages in HTML, CGI Programming Overview, Environment Variables, Difference between HTML and DHTML, ECOM And Portals.

**UNIT – 2 Internet Internals: [6][10]**

Transmission Control Protocol/Internet Protocol (TCP/IP), FTP, HTTP, WAIS (Wide Area Information Service) TELNET, Domain Name System: Name for Machine, Flat Name Space, Hierarchical Names Internet Domain Names, Domain Name Resolution.

**UNIT – 3 Network Addressing: [7][10]**

IP address, Physical address, Port address, Concepts & examples. IP Address, Electronic Mail Address, URL, E-Mail Basic, SMTP IPv4 , IPv6 addressing Concepts & examples, Differences ARP, RARP, BOOTP, DHCP

**UNIT – 4 Client Server Software Issues: [8][15]**

The Client Server Model and Software design, Socket Interface, Concurrent Processing in Client-Server Software, Program Interface to Protocol, Algorithms and Issues in Client Software design, example Client Software,

**UNIT – 5 Server Programming: [8][10]**

Algorithms & Issues in Server Software Design, Iterative Connectionless Server, Iterative Connection Oriented Server, Single Process Concurrent Server , Concurrent Connection Oriented Server, Multiprotocol Server, Multi-Service Server, Super Server, Chat Server.

**UNIT – 6 Remote Procedure Call: [8][10]**

External Data Representation, Remote Procedure Call concept, RPCgen concept, Network File System (NFS).

**UNIT – 7 Basics of Socket Programming in JAVA: [7][10]**

Creating Socket, Sending & Receiving Data through a Socket, using Socket for Client Server, TCP Server, UDP Server.

## References

1. Douglas E. Corner, David Stevens , Intranetworking with TCP/IP volume III Client Server Programming and Applications, ISBN-81-7808-488-0 PHI.
2. Douglas E. Corner, David Stevens ,Internetworking with TCP/IP volume I, Principles protocols & Architecture, (3rd edition), ISBN - 81-203-1053-5, PHI.
3. Internetworking with TCP/IP volume II Design Implementation, and internals, (3rd edition), Douglas E. Corner, David Stevens ISBN -81-203-0927-8, PHI.
4. Scringer LaSalle, Parihar Gupta TCP/IP Bible. (1st edition), Hungry Minds IDG Looks India (P) Ltd **ISBN-81-203-0927-8**
5. TCP/IP Tutorial and Technical Overview, Lydia Parziale,David T. Britt, Chuck Davis, IBM Redbooks, 8th edition December 2006 **ISBN 9780130676108**
6. TCP/IP Sockets in Java: Practical Guide for Programmers, Kenneth L. Calvert and Michael J. Donahoo The Morgan Kaufmann Practical Guides Series **ISBN-10: 1558606858; ISBN-13: 978-1558606852**



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**SEMESTER: IV**

**Paper: CA-404 Computer Graphics**  
**60 + 40 Pattern: External Marks 60 +Internal Marks 40 =Maximum Total Marks:**  
**100**

**Required Lectures: 60 hours**

**UNIT – 1 Introduction to Computer Graphics: [L-8][M-10]**

Overview of Computer Graphics, Computer Graphics Application and Software, Description of some graphics devices, Input Devices for Operator Interaction, Active and Passive Graphics Devices, Display Technologies, Storage Tube Graphics Displays, Calligraphic Refresh Graphics Displays, Raster Refresh (Raster-Scan) Graphics Displays, Cathode Ray Tube Basics, Color CRT Raster Scan Basics, Video Basics, The Video Controller, Random-Scan Display Processor, LCD displays.

**UNIT – 2 Scan Conversion: [L-12][M-20]**

Scan Converting Lines, Mid-point criteria, Problems of Aliasing, end-point ordering and clipping lines, Scan Converting Circles, Scan Converting Ellipses, Filling Polygons, edge data structure, Clipping Lines algorithms– Cyrus-Beck, Cohen-Sutherland and Liang-Barsky, Clipping Polygons, problem with multiple components.

**UNIT – 3 Two-Dimensional Transformations: [L-8][M-15]**

Transformations and Matrices, Transformation Conventions, 2D Transformations, Homogeneous Coordinates and Matrix Representation of 2D Transformations, Translations and Homogeneous Coordinates, Rotation, Reflection, Scaling, Combined Transformation, Transformation of Points, Transformation of The Unit Square, Rotation About an Arbitrary Point, Reflection through an Arbitrary Line, A Geometric Interpretation of Homogeneous Coordinates, The Window-to-Viewport Transformations.

**UNIT – 4 Three-Dimensional Transformations: [L-8][M-10]**

Introduction, Three-Dimensional Scaling, Three-Dimensional Shearing, Three-Dimensional Rotation, Three-Dimensional Reflection, Three-Dimensional Translation, Multiple Transformation, Rotation about an Arbitrary Axis in Space, Reflection through an Arbitrary Plane, Matrix Representation of 3D Transformations, Composition of 3D Transformations, Affine and Perspective Geometry, Perspective Transformations, Techniques for Generating Perspective Views, Vanishing Points, the Perspective Geometry and camera models, Orthographic Projections, Axonometric Projections, Oblique Projections, View volumes for projections.

**UNIT – 5 Viewing in 3D: [L-6][M-10]**

Stages in 3D viewing, Canonical View Volume (CVV), Specifying an Arbitrary 3D View, Examples of 3D Viewing, The Mathematics of Planar Geometric Projections, Combined transformation matrices for projections and viewing, Coordinate Systems and matrices, camera model and viewing pyramid.

**UNIT – 6 Visible-Surface Determination:****[L-6][M-5]**

Techniques for efficient Visible-Surface Algorithms, Categories of algorithms, Back faceremoval, The z-Buffer Algorithm, Scan-line method, Painter"s algorithms (depth sorting),Area sub-division method.

**UNIT – 7 Illumination and Shading:****[L-6][M-10]**

Illumination and Shading Models for Polygons, Reflectance properties of surfaces, Ambient,Specular and Diffuse reflections, Atmospheric attenuation, Phong"s model, Gouraud shading, some examples.

**UNIT – 8 Plane Curves and Surfaces:****[L-6][M-10]**

Curve Representation, Cubic Splines, , Bezier Curves, Bspline Curves, polynomial B-spline Curve , Bezier curves, polynomial Bezier Curve, Bezier Curve Mid point Subdivision algorithm.

**References**

1. J. D. Foley, A. Van Dam, S. K. Feiner and J. F. Hughes, Computer Graphics - Principles and Practice, Second Edition in C, Pearson Education. **ISBN 0-201-54700-7**
2. D. Hearn and M. Pauline Baker, Computer Graphics (C Version), Pearson Education, 2nd Edition. **ISBN: 9788177587654**
3. D. F. Rogers and J. A. Adams, Mathematical Elements for Computer Graphics, 2nd Edition, McGraw-Hill International Edition **ISBN-10: 0070535302; ISBN-13: 978-0070535305**





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SEMESTER: IV

Paper: CA-405 Optimization Algorithm  
60 + 40 Pattern: External Marks 60 + Internal Marks 40 = Maximum Total Marks:  
100  
Required Lectures: 60 hours

**UNIT - 1 Overview of operations Research:** [L-2][M-10]  
OR models – OR Techniques

**UNIT - 2 Linear Programming:** [L-20][M-20]  
Introduction – Graphical solution; Graphical sensitivity analysis– The standard form of linear programming problems – Basic feasible solutions -unrestricted variables – simplex algorithm– artificial variables – Big M and two phase method – Degeneracy - alternative optima –unbounded solutions – infeasible solutions.

**UNIT - 3 Dual problems:** [L-8][M-15]  
Relation between primal and dual problems – Dual simplex method

**UNIT - 4 Transportation model:** [L-10][M-15]  
Starting solutions. North West corner Rule - lowest cost method–Vogels approximation method Optimal solutions techniques : MODI, Stepping stone method – Assignment problem

**UNIT - 5 Network Models :** [L-10][M-20]  
Definitions – CPM and PERT – Their Algorithms, Critical path computation: Construction of time schedule, crashing of project duration.

**UNIT - 6 Game theory:** [L-10][M-10]  
Two person Zero Sum Games – Mixed strategy games and their algorithms.

### References

1. L.C. Jhamb, Quantitative Techniques, Everest Publishing house. ISBN : 4567162447, 1234567162444
2. Handy A Taha, Operations Research – An Introduction, Pearson Education ISBN 0-13-1889234
3. PanneerSelvan, Operations Research, Prentice Hall of India ISBN 10: 8120329287 ISBN13: 9788120329287



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Paper: CA-406 Lab on Computer Graphics & Internet Computing -II  
60 + 40 Pattern: External Marks 60 +Internal Marks 40 =Maximum Total Marks:  
100

----- Lab on Computer Graphics -----

Implement following algorithms:

**1. Line drawing algorithm**

- a. DDA Line algorithm
- b. Bresenham's Line algorithm

**2. Circle drawing algorithm**

- a. DDA Circle algorithm
- b. Bresenham's Circle algorithm
- c. Mid Point Circle algorithm

**3. Ellipse drawing algorithm**

**4. Polygon filling algorithm**

- a. Seed Fill algorithms
- b. Scan Line Fill algorithm

**5. Windowing and clipping algorithm**

- a. Point clipping algorithm
- b. Line clipping algorithms
- c. Polygon clipping algorithm
- d. Window to Viewport Transformation.

**6. Composite 2-D transformation**

- a. 2-D Translation
- b. 2-D Rotation
- c. 2-D Scaling
- d. 2-D Reflection
- e. 2-D Shearing

**7. 3-D geometric transformation**

- a. 3-D Translation
- b. 3-D Rotation
- c. 3-D Scaling
- d. 3-D Reflection

**8. 3-D Curve and surface representation i.e. B-spline curves and Surfaces, polynomial curves and surfaces, Bezier curves and Surfaces.**

- a. Bezier curve using periodic cubic polynomial function
- b. Bezier curve using Midpoint / Sub division method.
- c. Curve using B-Spline basis function (use open uniform knot vector)

**9. Determination of visible surfaces and lines. (Any one algorithm)**

## **Lab on Internet Computing –II**

1. Create an ASP .NET application using Web server controls apply appropriate validation to it.
2. Create an ASP .NET application using Master Pages and Themes and Skins
3. Create an ASP .NET application to demonstrate binding of GridView, DataList, Repeater, DropDownList, RadioButtonList, CheckBoxList Control using ADO .NET
4. Create an ASP .NET application to demonstrate LINQ to XML, LINQ to Objects, LINQ to SQL
5. Create an ASP .NET application to demonstrate Navigation controls
6. Create an ASP .NET application to demonstrate User controls
7. Create an ASP .NET application to demonstrate Web parts
8. Create an ASP .NET application to demonstrate various type of Caching (Data Caching, Output Caching, and SQL Server Cache Dependency).
9. Create an ASP .NET application using Ajax
10. Create an ASP .NET application using Web Service.
11. Create an Asp .Net application to print Hello World with Angularjs.
12. Create an ASP .NET application to demonstrate one way & two way data binding in angularJS.



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**SEMESTER: IV**

**Paper: CA-407Lab on Socket Programming using Linux**  
**60 + 40 Pattern: External Marks 60 +Internal Marks 40 =Maximum Total Marks:**  
**100**

Note.

- i. All assignments are to be implemented using C language in Linux.
  - ii. Install Ubuntu /Fedora/ Red hat Linux
  - iii. Encourage students to demonstrate the experiments using networking between two Separate machines for Client-Server programs.
  - iv. Encourage students to do at least one simple assignment using JAVA on Linux.
- 
1. Implement TCP and UDP Client-Server programs for following services:
    - a. Echo Service
    - b. Day Time Service
    - c. Chargen Service
    - d. Mathematical Operation on numbers
    - e. Checking number for prime, palindrome etc.
    - f. Calculating factorial
    - g. Calculating Fibonacci series
    - h. Case conversion in given string
  2. Implement Client-Server programs for demonstrating working of Concurrent Connection Oriented Servers using single process.
  3. Implement Client-Server programs for demonstrating working of Concurrent Connection Oriented Servers using multiple processes.
  4. Implement Telnet Server program for providing different types of Telnet Services.
  5. Demonstrate and implement the file transfer using FTP.
  6. Demonstrate and implement Multiprotocol server.
  7. Demonstrate and implement multiservice server.
  8. Develop the Chat server program. The Server should be concurrent such as to provide Intercommunication between multiple clients with following feature
    - i) Minimum 2 clients communicate with each other through chat server
    - ii) Each client makes registration, sending its name to server
    - iii) Client sends "Who" message to server to receive list of Active Clients.
    - iv) Sends "Hello to Client\_Name", from the active client list to initiate the chatting.
    - v) Both clients communicate with each other.
    - vi) Terminates chat with "good bye" message.



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**SEMESTER: V**

**Paper: CA-501 Compiler Construction**  
**60 + 40 Pattern: External Marks 60 + Internal Marks 40 = Maximum Total Marks:**  
**100**  
**Required Lectures: 60 hours**

**UNIT – 1 Introduction to Compilation: [5][10]**

Compiler Basics, Issues in Compilation, Phases of Compilation: the Analysis – Synthesis Model, Compiler Construction Tools.

**UNIT – 2 Designing a Lexical Analyzer Relations: [10][15]**

Role of Lexical Analysis, Input Buffering, Specification of Tokens, Recognition of Tokens, Finite automata, Conversion from regular expression to NFA, Deterministic finite automata, Conversion from NFA to DFA, Minimization of DFA.

**UNIT – 3 Designing Syntax Analyzer: [25][35]**

Role of Syntax Analyzer, Classification of parsers, Top-Down Parsing: Introduction, Problems in top-down parsing, Recursive Parsing, Problems in Recursive Procedures, Predictive Parsing, Error Handling in Predictive Parsers, Bottom Up Parsing: Shift Reduce Parser, Actions of shift reduce parser, Construction of parse tree, Operator Precedence Parsing, Components of operator precedence parsers, Parsing action, Construction of operator precedence parsers, Advantages and disadvantages of operator precedence Parsing. LR Parsing: Simple LR parser, LR(1) parser, LALR parser.

**UNIT – 4 Intermediate Code Generation: [5][10]**

Need For Intermediate Code Generation, Intermediate Forms: Polish Notation, Quadruples, Triples, Indirect Triples & Blocks.1

**UNIT – 5 Code Optimization: [10][10]**

Introduction, need for code optimization, Classification of code optimization techniques: Optimization techniques that work on machine code, Optimization techniques that work on intermediate forms of source code i.e. Optimization with in Basic Blocks: Folding, Redundant operation elimination, Optimization with in Loop: Strength Reduction, Dead code elimination, Moving operation within block out of block.

**UNIT – 6 Symbol Table Organization: [5][10]**

Introduction, Methods of organizing a symbol table: Unsorted, sorted symbol tables, binary search, hashing, its advantages, disadvantages, Collision, collision resolution techniques: Rehashing, Chaining.

## References

1. Aho A.V., R. Sethi and J.D. Ullman ,Compiler Principle, Techniques and Tools, Addison Wesley **ISBN 10:** 0201101947
2. Barret, Couch, Compiler Construction Theory and Practice, Computer Science series, Asian Student Edition **ISBN-10:** 057421335X
3. Dhamdhare D.M Compiler Construction Principle and Practice, McMillan India. **ISBN:** 0333904060
4. Gres D., Wiley ,Compiler Construction for Digital Computer **ISBN:**3540219056
5. David Galles ,Modern **ISBN13:** 9781576761052; **ISBN:** 1576761053



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**SEMESTER: V**

**Paper: CA-502 Drupal Framework (Website development framework )**  
**60 + 40 Pattern: External Marks 60 +Internal Marks 40 =Maximum Total Marks:**  
**100**  
**Required Lectures: 60 hours**

**Unit-I Introducing and Installing Drupal:**

**[L-8][M-15]**

History of Drupal, The Drupal community, Professional support , The Drupal association, Installing a single Drupal website, Installation Profiles, Installing Drupal in Different Languages, Core Files ,Sites Folder, What's in a Site's Folder, Inheritance and Overrides.

**Unit-II Your First Drupal Website:**

**[L-12][M-20]**

Adding Content ,Differences between Articles and Pages ,Content Summaries , Modifying the Defaults, Modifying your Menus, Adding Blocks to your website, Getting in contact, Adding the Contact Form to Your Main Menu, Summing Up the Contact Form ,Exploring your site's permissions, Creating a members-only site, Exploring Roles, Wrapping up Users and Permissions.

**Unit-III Administration-Configuration, Modules and Reporting:**

**[L-16][M-25]**

Configuration, System Site Information, System Actions, Regional and Language Settings, Media File System, Temporary Directory, PHP File Size Limitations, Media Image Toolkit, Web Services, Web Services RSS Publishing, Web Services Feed Aggregator, Content Authoring Text Formats, Explore the filtered html text format, Choosing Roles and the Importance of the Order.

**Unit-IV Administration--Blocks, Menus, Themes And Content:**

**[L-12][M-15]**

Blocks, Block Visibility, Block Visibility Using PHP, Menus, Adding a Menu Link Directly on Content, Menu Settings, URL aliases aka custom paths, Themes, Theme Global Settings, Content, Nodes, Creating Custom Content types, Submission Form Settings, Publishing Options, Display Settings, Comment Settings, Menu Settings, Adding an Image Upload Field, Multiple Fields for Multiple Images, Permissions, Digging Deeper into Fields, Content Construction Kit (CCK),Views, Content Moderation, Comments, Permissions.

**Unit-V User Management:**

**[L-12][M-15]**

Creating User Accounts, Creating Accounts, Canceling Accounts, Setting Up Account E-Mails, using OpenID, Creating Roles and Permissions, Creating Custom User Profiles, User Sessions.

## References

1. Beginning Drupal (Wrox Final), Jacob Redding, ISBN: 978-0-470-43852-7
2. Pro Drupal 7 Development Book by John VanDyk ISBN: 978-1-4302-2838-7; Edition Number: 3.
3. Drupal 8 for Absolute Beginners Book by James Barnett ISBN-13: 9781430264668





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**SEMESTER: V**

**Paper: CA-503 Python Programming**  
**60 + 40 Pattern: External Marks 60 + Internal Marks 40 = Maximum Total Marks:**  
**100**

**Required Lectures: 60 hours**

**Unit 1: Programming Basics and Strings**

**[L-5][M-6]**

The First Steps, Installing Python 3.1 on Non-Windows Systems, Using the Python Shell, Beginning to Use Python — Strings, What is a String?, Why the Quotes?, Why Three Types of Quotes?, Using the print() Function, Understanding Different Quotes, Putting Two Strings Together, Joining Strings with the Print() Function, Putting Strings Together in Different Ways

**Unit 2: Numbers and Operators**

**[L-3][M-4]**

Different Kinds of Numbers, Numbers in Python, Program Files, Using the Different Types, Basic Math, Some Surprises, Using Numbers, Order of Evaluation, Number Formats, Some Unusual Cases

**Unit 3: Variables — Names for Values**

**[L-4][M-6]**

Referring to Data — Using Names for Data, Changing Data Through Names, Copying Data, Names You Can't Use and Some Rules, Using More Built-in Types, Tuples — Unchanging Sequences of Data, Lists — Changeable Sequences of Data, Dictionaries — Groupings of Data Indexed by Name, Treating a String Like a List, Special Types, Other Common Sequence Properties, Referencing the Last Elements, Ranges of Sequences, Growing Lists by Appending Sequences, Using Lists to Temporarily Store Data

**Unit 4: Making Decisions**

**[L-3][M-4]**

Comparing Values, Doing the Opposite — Not Equal More Than or Equal, Less Than or Equal, Reversing True and False, Looking for the Results of More Than One Comparison, How to Get Decisions Made, Repetition, How to Do Something — Again and Again, Stopping the Repetition, Handling Errors, Trying Things Out

**Unit 5: Functions**

**[L-6][M-10]**

Putting Your Program into Its Own File, Functions: Grouping Code under a Name, Choosing a Name, Describing a Function in the Function, The Same Name in Two Different Places, Making Notes to Yourself, Asking a Function to Use a Value You Provide, Checking Your Parameters, Setting a Default Value for a Parameter—Just in Case, Calling Functions from within Other Functions, Functions Inside of Functions, Flagging an Error on Your Own Terms, Layers of Functions, How to Read Deeper Errors

**Unit 6: Classes and Objects**

**[L-3][M-5]**

Thinking About Programming, What is an Object?, Objects You Already Know, Looking Ahead: How You Want to Use Objects, Defining a Class, How Code Can Be Made into an Object, Objects and Their Scope

**Unit 7: Organizing Programs**

**[L-3][M-4]**

Modules, Importing a Module So That You Can Use It, Making a Module from Pre-existing Code, Using Modules — Starting with the Command Line, Changing How Import Works

— Bringing in More, Packages, Modules and Packages, Bringing Everything into the Current Scope, Re-importing Modules and Packages

### **Unit 8: Files and Directories**

[L-4][M-6]

File Objects, Writing Text Files, Appending Text to a File, Reading Text Files, File Exceptions, Paths and Directories, Exceptions in os, Paths, Directory Contents, Obtaining Information about Files, Renaming, Moving, Copying, and Removing Files, Example: Rotating Files, Creating and Removing Directories, Globbing

### **Unit 9: Other Features of the Language**

[L-6][M-9]

Lambda and Filter: Short Anonymous Functions, Map: Short-Circuiting Loops, Decisions within Lists — List Comprehension, Generating Iterators for Loops, Special String Substitution Using Dictionaries, Featured Modules, Getopt — Getting Options from the Command Line, Using More Than One Process, Threads — Doing Many Things in the Same Process

### **Unit 10: Building a Module**

[L-4][M-6]

Exploring Modules, Importing Modules, Finding Modules, Digging through Modules, Creating Modules and Packages, Working with Classes, Defining Object-Oriented Programming, Creating Classes, Extending Existing Classes

### **Unit 11: Text Processing**

[L-4][M-6]

Why Text Processing Is So Useful, Searching for Files, Clipping Logs, Sifting through Mail, Navigating the File System with the OS Module, Working with Regular Expressions and the re Module

### **Unit 12: Writing a GUI with Python**

[L-6][M-9]

GUI Programming Toolkits for Python, Tkinter Introduction, Creating GUI Widgets with Tkinter, Resizing the Widget, Configuring Widget Options, Putting the Widgets to Work, Creating Layouts, Packing Order, Controlling Widget Appearances, Radio Buttons and Checkboxes, Dialog Boxes, Other Widget Types

### **Unit 13: Accessing Databases**

[L-4][M-6]

Working with DBM Persistent Dictionaries, Choosing a DBM Module, Creating Persistent Dictionaries, Accessing Persistent Dictionaries, Deciding When to Use DBM and When to Use a Relational Database, Working with Relational Databases, Writing SQL Statements, Defining Tables, Setting Up a Database, Using the Python Database APIs, Downloading Modules, Creating Connections, Working with Transactions and Committing the Results

### **Unit 14: Using Python for XML**

[L-5][M-9]

What Is XML?, A Hierarchical Markup Language, A Family of Standards, What Is a Schema/DTD?, What Are Document Models For?, Do You Need One?, Document Type Definitions, An Example DTD, DTDs Aren't Exactly XML, Limitations of DTDs, Schemas, An Example Schema, Schemas Are Pure XML, Schemas Are Hierarchical, Other Advantages of Schemas, XPath, HTML as a Subset of XML, The HTML DTDs, HTMLParser, XML Libraries Available for Python

## References

1. Allen Downey, "Think Python", Version 2.0.17 ISBN-13: 978-1449330729
2. T Hall and J-P Stacey, "Python 3 for Absolute Beginners", Apress 2010 Ed. ISBN-10: 1430216328. ISBN-13: **978-1430216322**
3. Peter C. Norton, Alex Samuel and others, "Beginning Python", Wrox Publication, 2005 ISBN 10: 0764596543 ISBN 13: 9780764596544
4. Luke Sneeringer, "Professional Python", Wrox Programmer to Programmer, 2015 ISBN-10: 1119070856
5. James Payne, "Beginning Python: Using Python 2.6 and Python 3.1", Wrox Programmer to Programmer, 2010 ISBN: **978-0-470-41463-7**.
6. Michael Urban and Joel Murach, "Murach's Python Programming", Murach Publication, 2016 ISBN-13: **9781890774974**



**North Maharashtra University, Jalgaon**  
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**FACULTY OF SCIENCE AND TECHNOLOGY**  
**New Syllabus: M.C.A. 2017-18**  
**SEMESTER: V**

**Paper: CA-504 Mobile Computing**  
**60 + 40 Pattern: External Marks 60 + Internal Marks 40 = Maximum Total Marks:**  
**100**  
**Required Lectures: 60 hours**

**Chapter 1: Introduction to Android**

**[L-12] [M-15]**

What is Android? , Setting up development environment , Dalvik Virtual Machine & .apk file extension Fundamentals: Basic Building blocks - Activities, Services, Broadcast Receivers & Content providers, UI Components - Views & notifications, Components for communication -Intents & Intent Filters Android API levels (versions & version names)

**Chapter 2: Application Structure**

**[L-8] [M-15]**

AndroidManifest.xml, uses-permission & uses-sdk, Resources & R.java, Assets, Layouts & Drawable Resources, Activities and Activity lifecycle, First sample Application

**Chapter 3: Emulator-Android Virtual Device**

**[L-10] [M-15]**

Launching emulator, Editing emulator settings, Emulator shortcuts, Logcat usage, Introduction to DDMS, Second App:- (switching between activities) , Develop an app for demonstrating the communication between Intents

**Chapter 4: Basic UI design**

**[L-8] [M-10]**

Form widgets, Text Fields, Layouts, [dip, dp, sip, sp] versus px

**Chapter 5: Menu**

**[L-10] [M-10]**

Option menu, Context menu, Sub menu, menu from xml, menu via code

**Chapter 6: UI design**

**[L-7] [M-15]**

Time and Date, Images and media, Composite, AlertDialogs & Toast, Popup

**Chapter 7: Content Providers**

**[L-5] [M-10]**

SQLite Programming, SQLiteOpenHelper ,SQLiteDatabase

## References

1. "Professional Android 4 Application Development" by Reto Meier ISBN: **978-1-118-10227-5**
2. "Programming Android Java Programming for the New Generation of Mobile Devices" by ZigurdMennieks , Laird Dornin , G. Blake Meike ,&Mausmi Nakamura. **ISBN** 1449316646
3. "Android Cookbook" by Ian F Darwin ISBN-10: 1449388418. ISBN-13: **978-1449388416**.
4. "Hello, Android Introducing Google's Mobile Development Platform" by Ed Burnette ISBN: **978-1-93435-656-2**
5. " Android Programming: Mastering Course for Beginners Quick Start to Develop Your Own App " by Mitchell Schuler **ISBN-10: 1540334139;ISBN-13: 978-1540334138**
6. Professional Android 4 Application Development,RetoMeier,WroxPublication **ISBN: 978-1-118-22385-**



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FACULTY OF SCIENCE AND TECHNOLOGY  
New Syllabus: M.C.A. 2017-18  
SEMESTER: V

Paper: CA-505 Natural Language Processing  
60 + 40 Pattern: External Marks 60 +Internal Marks 40 =Maximum Total Marks:  
100

Required Lectures: 60 hours

**Unit-1**

[06 L] [10 M]

Introduction to NLP: Brief History, Study of Language and Linguistic background, syntactical elements of language, grammar and sentence structure, NL tasks: Segmentation, Chunking, tagging, and Parsing. Concept of Ambiguity in language, need of Resolving ambiguity, Examples of Named Entity Recognition and Word sense disambiguation in English.

Revisiting the Concepts: Top –down and bottom up parsing, Context Free Grammar, Transition Networks: Finite State Machine, Recursive Transition Network.

**Unit-2**

[06 L] [10 M]

Application and Research Areas of NLP: Speech to Text conversion, Story understanding, Question Answer System, Machine Translation (Examples of English to Marathi or Hindi), Text summarization, text classification, Sentiment Analysis; Text Entailment; Cross Lingual Information Retrieval (CLIR).

**(Note : Students should be given group assignment and encouraged to read research papers and give presentations with internal evaluation on any one of above topics)**

**Unit-3**

[08 L] [15 M]

Mathematical Foundation: Elementary Probability Theory: Probability, conditional probability and independence, Bayes Theorem, Bayesian Statistics, Concepts: Maximum Likelihood estimation, Entropy, Noisy channel model.

**Unit-4**

[13 L] [20 M]

**Linguistic Essentials and Grammars**

**Part of Speech :** Word categorization, word forms and POS tagging , English Grammar and POS tags : noun, verb, adjective, determiners, adverbs, prepositions, particles, Phrases Structure: Noun Phrase, Verb Phrase, Prepositional Phrases, Phrase Structure: Penn tree bank, Tree, bracketed representations, ambiguity in phrase structure formation, Semantics & Pragmatics,

**Parsing :** Shallow Parsing; Named Entities; Parsing Algorithms: Top-Down, Bottom-up parsing, Comparison of both approaches, Chomsky Normal Form, CKY algorithm, The Earley Algorithm, dependency parsing;

**Unit 5**

[12 L] [15 M]

**Words and Morphology:** Fundamental terminology of English Morphology, Minimum Edit Distance, Morphological Diversity of Indian Languages; Morphology Paradigms: inflectional, derivational morphology, Cliticization, Human Brain in Morphology, Construction of Finite State Lexicons, Finite State Transducers and Morphological Parsing; Lexicon Free FST: Porter Stemmer, Sentence Segmentation,

**Unit-6****[8 L] [10 M]**

**N-Gram Models:** Word Counting, Simple N-Gram model, Training Corpus, Information Theory, Cross Entropy, Sequence Classifier: Machine learning using Markov Chain, Hidden Markov Model, Verterbi Algorithm, Forward-Backward Model, Maximum Entropy Models.

**Unit-7****[7 L] [10 M]**

**Semantics and Meaning:** Lexical Knowledge Networks, Thesaurus, Wordnet Theory; Indian Language Wordnets and Multilingual Dictionaries; Semantic Roles; Word Sense Disambiguation; Word Similarity: Distributional Method, Term Vector Similarity, Application: Information Retrieval.

**References**

Allen, James, Natural Language Understanding, Second Edition, Benjamin/Cumming, 1995 **ISBN:** 0-8053-0334-0

Charniack, Eugene, Statistical Language Learning, MIT Press, 1993 **ISBN:** 9780262531412

Jurafsky, Dan and Martin, James, Speech and Language Processing, Second Edition, Prentice Hall, 2008. **ISBN 10:** 0131873210 **ISBN 13:** **9780131873216**

Manning, Christopher and Heinrich, Schutze, Foundations of Statistical Natural Language Processing, MIT Press, 1999. **ISBN** 0-262-13360-1

Akshar Bharti, Vineet Chaitanya, Rajeev Sangal, Natural Language Processing: An Paninian perspective **ISBN 10:** 8120309219 **ISBN 13:** 9788120309210



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**SEMESTER: V**

**Paper: CA-506 Lab on Python Programming**  
**60 + 40 Pattern: External Marks 60 +Internal Marks 40 =Maximum Total Marks:**  
**100**

Using the Operating system (logging, creating – deleting folders, creating-deleting files, using editors etc.)

1. Installing python and setting up environment. Simple statements like printing the names, numbers, mathematical calculations, etc.
2. Simple programs containing variable declaration and arithmetic operations
3. Programs based on conditional constructs
4. Programs based on loops
5. Programs related to string manipulation
6. Programs related to Lists, Tuples
7. Programs related to dictionaries
8. Programs related to functions & modules
9. Programs to read & write file.
10. Program to demonstrate exception handling
11. Programs based on lists, conditional constructs, the for statement and the range function; interactively using the built-in functions len, sum, max, min
12. Programs related to string manipulation





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**SEMESTER: V**

**Paper: CA-507 Lab on Mobile Computing & Lab on Drupal**  
**60 + 40 Pattern: External Marks 60 +Internal Marks 40 =Maximum Total Marks:**  
**100**

**Lab on Mobile Computing**

1. Android Installation and setup Android Development Environment
2. Develop “Hello world” Android application.
3. Develop Android Application for drawing various graphical shapes.
4. Develop Android Application for demonstrating Android Activity Lifecycle
5. Develop Android Application to demonstrate various UI elements like List Box, Progress bar, Slider control, Popup List, buttons etc.
6. Develop menu based application in Android.
7. Develop form based application in Android.
8. Develop android application to demonstrate notifications.
9. Develop android application to demonstrate insert, update, delete using SQLite

**Lab on Drupal**

1. How to Create a Custom Block
2. How to Use PHP to Control Block Visibility
3. How to Add a New Link to the Main Menu
4. How to Create a Custom Path for the About Page
5. How to Adding an Image Field to your Gossip Content
6. How to Modify the Display Settings of Your Image Field
7. How to Add a CCK Field to Your Gossip Content Type
8. How to Enabling Comment Moderation
9. How to Import an RSS Feed
10. How to Enabling User Account Moderation
11. How to Unblocking New User Accounts
12. How to Customizing Your Welcome E-mail
13. How to Creating a New Role



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**New Syllabus: M.C.A. 2017-18**  
**SEMESTER: VI**  
**Paper: CA-601 Full Time Industrial Training**

The Sixth Semester is reserved for full time Industrial Training for providing Industrial work environment exposure through Software Development Project. It is desired that the project work should have coding part. The topic chosen should be unique to the possible extent and relevant to prevailing industry trends. Offline or Online demonstrations of Software would be appreciated. Students will have to submit a project report in the university prescribed format. Students will be evaluated for 300 Marks through Viva-voce University Examination.