MASTER OF COMPUTER APPLICATION (MCA)
(AS PER CREDIT SYSTEM EFFECTIVE FROM JUNE 2009)

0.576 "A candidate seeking admission to Master of Computer Application (MCA) should have passed Bachelor's Degree examination of any faculty with atleast 50% of marks, of Dr. Babasaheb Ambedkar Marathwada University or any other degree equivalent thereto and have Mathematics/Statistics as one of the subject at Degree level or HSC. level. However in case of students belonging to Backward Classes, a relaxation of 5% shall be available for admission."

O.577 The Master of Computer Application (MCA) shall be conferred on a candidate who has passed a regular course of study consisting of three years(Six Semesters) in the relevant subjects as prescribed and has appeared at and passed in all the examinations prescribed for Master of Computer Applications.

R-794. The maximum number of students admitted for a theory calss shall be as approved by Govt. and University, AICTE and the number of students in a batch of practicals will depend upon the facilities available at the Centre. The student computer ratio for practical should be 1:1.

R- 795 The course of study for the Master of Computer Application will be of three Years duration (six semester).

R-796- The following shall be the scheme of examination

MASTER OF COMPUTER APPLICATION (MCA)

FIRST SEMESTER

Paper No	Title	Weekly Th	Weekly Pr	Credit Th	Credit Pr	Marks Theory	Marks Sessional or Practical S	Marks Pr	Total Marks	Duration Theory Exam
I	ICT Tools	3	4	3	2	60		40	100	2 Hrs
II	Computer Organisation & Architecture	5	-	5	-	60	40	-	100	2 Hrs
III	C Programming	3	4	3	2	60	-	40	100	2 Hrs
IV	Operating Systems	3	4	3	2	60	-	40	100	2 Hrs
V	Soft Skills Development	5	-	5	-	60	40	-	100	2 Hrs
	Total	19	12	19 + 6 = **25**		300	80	120	500	--

SECOND SEMESTER

Paper No	Title	Weekly Th	Weekly Pr	Credit Th	Credit Pr	Marks Theory	Marks Sessional or Practical S	Marks Pr	Total Marks	Duration Theory Exam
VI	OOPS using C++	3	4	3	2	60	-	40	100	2 Hrs
VII	Management Process & OB	5	-	5	-	60	40	-	100	2 Hrs
VIII	Data Structure using Java	3	4	3	2	60	-	40	100	2 Hrs
IX	Database Management Systems	3	4	3	2	60	-	40	100	2 Hrs
X	Mathematical Foundation	5	-	5	-	60	40	-	100	2 Hrs
	Total	19	12	19 + 6 = **25**		300	80	120	500	--

THIRD SEMESTER

Paper No	Title	Weekly Th Pr	Credit Th Pr	Marks Theory	Marks Sessional or Practical S Pr	Total Marks	Duration Theory Exam
XI	Visual Programming	3 4	3 2	60	40	100	2 Hrs
XII	Computer Communication Networks	5 -	5 -	60	40 -	100	2 Hrs
XIII	Accounting & Management Control	3 4	3 2	60	- 40	100	2 Hrs
XIV	I T Elective I	3 4	3 2	60	- 40	100	2 Hrs
XV	Resource Management Techniques	5 -	5 -	60	40 -	100	2 Hrs
	Total	19 12	19 + 6 = **25**	300	80 120	500	--

FOURTH SEMESTER

Paper No	Title	Weekly Th Pr	Credit Th Pr	Marks Theory	Marks Sessional or Practical S Pr	Total Marks	Duration Theory Exam
XVI	Artificial Intelligence	3 4	3 2		- 40	100	2 Hrs
XVII	Management Support System	5 -	5 -		40 -	100	2 Hrs
XVIII	Web Technologies & .net	3 4	3 2		- 40	100	2 Hrs
XIX	IT Elective II	3 4	3 2		- 40	100	2 Hrs
XX	Information System Analysis & Design	5 -	5 -		40 -	100	2 Hrs
	Total	19 12	19 + 6 = **25**		80 120	500	--

FIFTH SEMESTER

Paper No	Title	Weekly Th Pr	Credit Th Pr	Marks Theory	Marks Sessional or Practical S Pr	Total Marks	Duration Theory Exam
XXI	ERP Domain	3 4	3 2	60	40	100	2 Hrs
XXII	Software Engineering	5 -	5 -	60	40 -	100	2 Hrs
XXIII	Data Mining & Data Ware housing	3 4	3 2	60	- 40	100	2 Hrs
XXIV	IT Elective III	3 4	3 2	60	- 40	100	2 Hrs
XXV	Probability & Combination	5 -	5 -	60	40 -	100	2 Hrs
	Total	19 12	19 + 6 = **25**	300	80 120	500	--

SIXTH SEMESTER

The entire Sixth Semester is allotted to the Project. Every student is required to undertake a real life software project at any organisation and submit the Project report at the end of the semester. It will have 200 marks and 15 credits.

Total Marks for MCA Degree – 2,700

Total Credit for MCA Degree - 140

List of IT Electives

Elective I

1. **Image Processing**
2. **Emerging Web Development Tools**
3.
4.

Elective II

1. **Advanced Network Programming**
2. **Parallel Programming**
3. **Web Engineering**
4.

Elective III

1. **Software Quality Domain**
2. **Information system Audit & Governance**
3. **E-Business Process Domain**
4.

R –797. There will be 5 lectures for theory subject and three lectures for practical based subject. The practical hours are 12 per week. There shall be 5 credit for each paper. The total credit for the MCA Degree shall be 140.

R- 798. In order to pass the examination of Master of Computer Application (MCA) a candidate must score atleast 40% marks in each sessional and project work and 50% in aggregate os all semester's marks.

R – 799 To clear a semester a student must have secured atleast 40% marks in each papers of theory and each sessional and project work.

R – 800 **a)** The sessional work shall be assessed by Institute/ College and marks will be forwarded to the university. The sessional work shall be assessed on the following basis:-

1. Two Home Assignment 10 marks each
2. Two Class Tests 5 marks each
3. One Seminar 10 marks

The sessional marks are subject to scaling down. The scale down will be in relation to performance in respective theory marks. A variation of ± 10% will be permitted.

b) The university will appoint external examiner for assessment of the project. The project will be assessed by the external examiner and the guide separately on the basis of the following criteria:-

1. Preparation of report 100 Marks
2. Presentation 50 Marks
3. Viva Voce 50 Marks

R – 801. A student who secures atleast 40% marks in each individual theory papers and project work and secures 50% or more marks but less than 60% of marks in aggregate of all semesters will be declared to have passed in Second Division. There shall be no pass class.

R – 802. A student who has secured 40% of marks in each theory paper and each sessional and project work and 60% or more marks in aggregate of all semesters shall be declared to have passed in First Division.

R – 803. A student who have failed to secure atleast 40% marks in any one or more papers will be declared to have failed in that/those papers and such students will have to reappear for such paper/papers and secure minimum passing marks.

R – 804. If a student who has secured minimum 40% of marks in each paper but has failed to secure minimum of 50% of marks in aggregate for one or more semesters may choose to reappear for any one or more papers to secure 50% of aggregate marks in that/those semesters.

"R-805 To be eligible for promotion to second year (Third Semester) of the MCA Course, a student must successfully clear atleast 75% papers offered during the first year (First & Second Semester) of the programme. For promotion to Third Year (Fifth Semester) a student must successfully clear 75% of the total papers offered upto fourth semester and must have cleared all the papers of First and Second Semester.

However for promotion to Second, Fourth and Sixth Semesters, a mere appearance at the respective preceding semester exams is sufficient for promotion."

R – 806. Re-admission:

a) If a student fails to complete has project work before the closure of semester to which it belongs he will have to take fresh admission to the course and pay Rs.1000/- per semester as fee.

b) If a student fails in one or more subjects and desires to take a repeat course by taking regular admission, he must do so. In such a case he will be charged Rs. 500/- per theory course and per sessional work per semester.

R – 807. The following shall be the syllabus for the examination.

PAPER I -- INFORMATION COMMUNICATION TECHNOLOGY(ICT) TOOLS

Theory	**60**
Sessional/ Practical	**40**
Credit	**5**

Unit I - ICT Fundamentals- Historical development – Computer Programming Languages Classification, machine code, assembly language, higher lever languages, Single user, multi-user, work station, client server systems, Computer networks, network protocols, LAN,WAN, Internet facilities through WWW, ISP, Internet Services, Mosiac,Gopher, URL, Browser etc.

Unit II - **Word:** Creating word documents, menu, office assistant working with files , editing text, saving, printing , undo, redo, spelling, formatting, ruler, selecting, cutting, copying, numbering, bullets, page, orientation, margins, tables in a document, formatting text in table, addition deletion of rows columns, record handling, sorting, label, & envelop, using forms, Recycle bin. Protection of documents, mail merge.

Unit III - **Excel:** Excel Sheet creation, entering data, layout and formatting of sheet preview & print, working with range, rows, columns, total, sorting using formatting toolbars, format cells, cell content moving & coping grouped & ungrouped worksheet alignment of text, border colors, page setup, chart, types of chart merging sizing printing chart objects, formatting charts, formula palette , functions & uses - Analysing data with excel.

4. **Power Point:** Creating a presentation, modifying visual elements, adding objects, applying transition, animation and linking, preparing layouts, presenting a slide show.

5. **Front Page & HTML**

Developing Web Page with Front Page using built in facilities for document creation, navigation and links, bookmarks.,

HTML- Basic Elements , frame, table, formatting web page in HTML.

Books:-

1. Courter Marquis - Office - 2000
2. Mansfield - MS- Office
3 Sanders - Computer Fundamentals
4. Sybex - HTML Complete
5. Monica & J D'Souza - Web Publishing

PAPER II - COMPUTER ORGANIZATION AND ARCHITECTURE.

Theory	**60**
Sessional/ Practical	**40**
Credit	**5**

Principles of Computer design – software, hardware interaction layers in computer architecture. Central processing unit. Machine language instructions, Addressing modes, instruction types, instruction set selection, Instruction cycle and execution cycle.

Control unit, Data path and control path design, Microprogramming Vs hardwired control RISC Vs CISC, Pipelining in CPU designee Superscalar processors.

Memory system, Storage technologics, Memory array organization, Memory hierarchy, interleaving, cache and virtual memories and architectural aids to implement these.

Input- Output devices and characteristics.

Input-output processing, bus interface, data transfer techniques, I/O interrupts, channels performance evaluation – SPEC marks, Transaction Processing benchmarks.

Books:-

Mano, M," Computer System and Architecture" (3rd edition) Prentice Hall of India, New Delhi, 1994

Pal Chauduri, p., " Computer Organisation and Design", Prentice Hall of India, New Delhi, 1994.

Rajraman V., and Radhakrishnan, T., " Introduction to Digital Computer Designee" (4th edition), Prentice Hall of India, New Delhi, 1997.

Stalling, W., "Computer Organization and Architecture. (2nd edition) Prentice Hall of India, New Delhi.

PAPER III - C PROGRAMMING

Theory	**60**
Sessional/ Practical	**40**
Credit	**5**

1. C Language – Character set Tokens of C - tokens-constant-keywords and identifiers - variables- data types- declaration and assignment of variables- defining symbolic constants.- Operators and Expressions:
   Types of Operators- Arithmetic, Relational and Logical Operators Assignment, increment and decrement of operators - conditional bitwise and special operators - arithmetic expression and its evaluation - hierarchy of arithmetic operations - evaluations, precedence and associatively - mathematical functions.
2. Control Branching and Decision-Making in C - If statement Switch statement - GOTO statement - The ? : Operators.-
3. Decision - Making and Looping nesting in a loop, statements in C WHILE DO, and FOR statements with variations.
4. Arrays in C Single Two - dimensional and Multi-dimensional arrays.
5. Handling of Character Set: Declaration & Initialization of string variables - reading from and writing to screen -Arithmetic operations - String handling functions.
6. Structures and Unions:
   Definitions initialization and assigning values to members arrays of structures and arrays within structures structure with in structure- unions - size of structures.
7. Pointers:
   Declaration and initialisation of pointers - pointer expression - pointer and arrays - pointer and character strings pointers and functions - pointers and structures pointer on pointers.
8. File Maintenance in "C" :
   Defining, Opening and closing a file - Input/Output operations on a file- random access to file - command line arguments.
9. User Defined Functions:
   Form of "C" functions- calling a function - nesting of functions - recursion - functions with arrays.

Books:

1. Programming in "C" E Balgurusamy Tata Cm Graw-Hill
2. The "C" Programming Language :Briain W. Kenigham & Dennis Ritchie
3. The Spirit of "C"- Henrry Mulish, Herbert L. Cooper.
4. Mastering "C" - Crain Bolon.

Paper IV - Operating Systems

Theory	**60**
Sessional/ Practical	**40**
Credit	**5**

Introduction
Evolution of operating systems. Types of operating systems. Different Views of the operating systems, operating system concepts and structure.

Processes
The Process concept, systems programmer's view of processes. The operating system services for process management, Scheduling algorithms. Performance evaluation.
Memory Management

Memory Management without swapping of paging, swapping, virtual memory page replacement algorithms, modeling paging algorithms, design issued for paging systems, segmentation.
Inter-process Communication and Synchronization.
The need for interprocess synchronization, natural exclusion., semaphores, hardware sport for mutual exclusion, queuing implementation of semaphores, classical problems in concern programming critical region and conditional critical region, monitors, messages deadlocks.

File Systems.
Field systems, directories, file systems implementation, security protection mechanism.

Input/Output

rinciples of I/O Hardware: I/O devices, devices controllers direct memory access. Principles of I/O Software: Goals, interrupt handlers, device drivers, device independent I/O software, User space I/O software.

Disks. Disk hardware, scheduling algorithms, Error handling, trac-at-a-time caching, RAM Disk.

Clocks: Clock hardware, memory mapped terminals, I/O software.
Terminals: Terminal hardware memory mapped terminals, I/O software.

Processes and Processors in Distributed Systems: Thready, system models, processor allocation scheduling.

Distributed File Systems: Design, implementation, and trends.
Performance Measurement, monitoring and evaluation

Introduction, important trends affecting performance issue, why performance monitoring and evaluation are needed, performance measures, evaluation techniques, bottlenecks and saturation, feedback loops.
Case Studies : MS DOS,MS WINDOWS, LINUX(UNIX) operating systems.

Books:

Deitel H.M., "An Introduction to Operating system". Addison Wesley Publishing Company 1984.
Milenkovic, M., "Operating Systems – concepts and Design", McGraw Hill International Edition Computer Science Series 1992.
Peterson, J.L. Abraham Silberschatz. " Operating System Concepts " Addison Wesley publishing Company 1989.
Tanenbaum, A.s. "Modern Operating System", Prentice Hall of India Pvt. Ltd. 1995.

PAPER V - SOFT SKILL DEVELOPMENT

Theory	**60**
Sessional/ Practical	**40**
Credit	**5**

1. Self Development and Assessment, Self-Assessment- Self-Awareness, Perception and Attitudes, Values and Belief System,

Personal Goal Setting, Career Planning, Self-Esteem, Building of Self-Confidence

2 Components of communication,

Principles of communication, barriers, listening skills, Verbal Communication, Includes Planning, Preparation, Delivery,

Feedback and Assessment of activities like Public speaking

Group Discussion, Oral Presentation skills, Perfect Interview

Listening and observation skills, Body language, Use of Presentation graphics, Use of Presentation aids, Study of communication.

3. Written Communication, Technical Writing–Technical Reports

Project Proposals, Brochures, Newsletters, Technical Articles

Technical Manuals, Official/Business Correspondence- Business letters, Memos, Progress report, Minutes of meeting, Event reporting,

Use of style,Grammar and Vocabulary for effective technical writing,

Use of: Tools, Guidelines for technical writing, Publishing Ethics and Etiquettes, Business Ethics, Etiquettes in social as well as

Office settings, Email etiquettes, Telephone Etiquettes, Engineering ethics and ethics as an IT professional, Civic Sense

4. Other Skills- Managing time, Meditation, Understanding roles of

Engineer and their Responsibility, Exposure to work environment And culture in today's job Places, Improving Personal Memory,

Study skills that include Rapid reading, Notes taking, Complex problem solving, creativity.

Books & Study Material:

1. You Can Win – Shiv Khera – Macmillan Books – 2003 Revised Edition

2. 7 Habits of Highly effective people – Stephen Covey

3. Business Communication? Asha Kaul

4. Business Communication - M. Balasubramanyam

5. John Collin, "Perfect Presentation", Video Arts MARSHAL

6. Jenny Rogers " Effective Interviews", Video Arts MARSHAL

7. Raman Sharma, " Technical Communications", OXFORD

8. Sharon Gerson, Steven Gerson "Technical writing process and product", Pearson Education Asia, LPE third edition.

9. R. Sharma, K. Mohan, Business correspondence and report writing", TAG McGraw Hill ISBN 0-07-044555-9

10. 6. Video for technical education catalog, National education and Information Films Ltd. Mumbai.

11. Management training and development catalog, National education and Information Films Ltd. Mumbai.

12. XEBEC, "Presentation Book 1,2,3", Tata McGraw-Hill, 2000,ISBN 0-40221-3

13. Tim Hindle, "Reducing Stress", Essential Manager series Dk Publishing

14. Sheila Cameron, "Business student Handbook", Pitman Publishing

15. Dr. R. L. Bhatia, " Managing time for competitive edge"

16. Lorayne Lucas "Memory Book"

17. Robert Heller, "Effective leadership", Essential Manager series Dk Publishing

18. Newstrom Keith Davis," Organizational Behavior", Tata McGraw-Hill, 0-07-.

Laboratory Work For First Semester

(Weekly 12 Hours and Total 6 Credits.)

Paper ICT Tools :-

Familiarizing with DOS commands, Windows Operating Systems.

Creating Documents in MSWORD

Creating worksheets in MSEXCEL

Developing Presentations with Power Point

Web Page development in FRONT PAGE

HTML Document creation and handling - Text formatting, graphics in web page.

Paper C Programming:-

Writing of Programs using C Programming language. Exercises to study various features of the languages. Emphasis should be on writing application oriented programs. Mini project covering well structured modular and readable programs with good documentation can be undertaken. Following are the sample applications:-

A bus passenger reservation systems.

An electricity billing system.

A fixed deposit accounting system for a Finance Company.

Hotel room booking.

Book issues and receipts in a library.

Insurance premium calculation and issuing reminders.

A hospital management system.

Paper Operating Systems:-

Working with MSDOS, WINDOWS, UNIX/ LINUX Operating Systems

Shell Programming exercises.

PAPER VI - OBJECT ORIENTED PROGRAMMING USING C++

Theory	**60**
Sessional/ Practical	**40**
Credit	**5**

Introduction of OOPS, Procedural Vs Object Oriented Programming

Classes, Object, Data Abstraction, Encapsulation, Inheritance, Polymorphism, Dynamic Binding, Message Passing, Object Oriented Languages, Basics of C++ - History of C & C++, V C++

C++ Program Structure, Application of C++ Structure & Class

Compiling & Linking- C++ Expression, C++ Tokens, Keywords, Identifiers & Constants, Basic Data Types, User-Defined Data Types,

Symbolic Constant, Type Compatibility, Reference Variables, Operator in C++, Scope Resolution Operator, Member De-referencing Operators, Memory Management Operators,

Manipulators, Type Cast Operator

Functions In C++, Main Function, Function Prototyping, Call by Reference, Call by Address, Call by Value, Return by Reference

Inline Function, Default Arguments, Const Arguments, Function Overloading, Friend Function

Classes & Object - C++ Program with class Defining Member Functions, Making an Outside Function Inline, Nesting of Member Functions, Private Member Functions

Arrays within a Class- Memory Allocation for Objects

Static Data Members, Static Member Functions, Arrays of Objects

Object as Function Arguments, Friendly Functions, Returning Objects, Const member functions, Pointer to Members, Local Classes

Constructor & Destructor- Parameterized Constructor Multiple Constructor in a Class, Constructors with Default Arguments, Dynamic Initialization of Objects, Copy Constructor, Dynamic Constructor, Const Object, Destructor

Operator Overloading & Type Conversion- Defining operator Overloading Overloading Unary Operator Overloading Binary Operator, Overloading Binary Operator Using Friends, Manipulating of String Using Operators, Type Conversion, Rules for Overloading Operators

Inheritance - Defining Derived Classes, Single Inheritance, Making a Private Member Inheritable, Multilevel Inheritance, Hierarchical Inheritance, Multiple Inheritance, Hybrid Inheritance, Virtual Base Classes, Abstract Classes, Constructor in Derived Classes, Nesting of Classes

Pointer, Virtual Function & Polymorphism, Introduction, Pointer to Object, Pointer to Derived Class, Virtual Function, Pure Virtual Function,

C++ I/O System Basics- C++ Streams, C++ Stream Classes, Unformatted I/O Operation, Formatted I/O Operation, Managing Output with Manipulators

Working with Files – Introduction, Classes for File Stream Operation

Opening & Closing Files, Detection of End of File, More about Open( ): File modes, File pointer & manipulator, Sequential Input & output Operation, Updating a File : Random Access, Command Line Arguments

Template- Generic Function, A function with Two Generic Data Types, Explicitly Overloading a Generic Function, Overloading a Function Template, Using Standard Parameter with Template

Functions, Generic Function Restriction, Applying Generic Function : Generic Sort, Generic Classes, An Example with Two Generic Data Types, Using Non-Type Arguments with Generic Class, Using Default Arguments With Template Classes, Explicit Class, Specification,

Exception handling - Exception Handling Fundamentals

The try Block, the catch Exception Handler The throw Statements

The try/throw/catch sequence Exception Specification Unexpected Exception Catch – All Exception Handlers Throwing an exception from handler Uncaught Exception

Introduction to Standard Template Library- STL Programming Model, Sequence, Container Adapter, Integrator, lgorithms, Predicates, Allocators

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Books:

1.C++: The Complete Reference Herbert Schildt

2.Let us C++ Yeshwant Kanetkar

3.Object Oriented Programming with C++ E. Balagurusamy

4.C++ Primer Stanley Lippman & Lajoi

5.C++ Programming Language Bjarne Stroustrup

6.C++ Programming Bible Al Stevens & Clayton Walnum

PAPER VII - MANAGEMENT PROCESS & ORGANISATIONAL BEHAVIOUR

Theory	**60**
Sessional/ Practical	**40**
Credit	**5**

Introduction of management , Evolution of management thought, Systems and contingency approach for understanding organizations, managerial processes, functions, skills and roles in an organization; Social Responsibility of Business; Understanding and Managing Individual behaviour- Personality, Perceptions, Values, Attitudes, Learning, Work motivation, Individual decision making and problem solving; Understanding and managing group processes-Interpersonal and group dynamics applications of emotional intelligence in organizations, communication, group decision making, Leadership and influence process; Understanding and Managing organizational system-Organizational design and structure, Work stress.

BOOKS:

1. Koonz, H. and Weachirch, H. *Management*. 10th ed., New York, McGraw Hill, 1995.
2. Luthans, F. *Organizational Behaviour*, 7th ed., New York, McGraw Hill, 1995.
3. Robbins, S.P. *Management*, 5th ed., New Jersey, Englewood Cliffs, Prentice Hall Inc., 1996.
4. Robbins, S.P. *Organizational Behaviour*, 7th ed., New Delhi, Prentice hall of India, 1996
5. Singh, Dalip *Emotional Intelligence at work, Response Books*, Sage Publications, Delhi, 2001.
6. Staw, B.M. *Psychological Dimensions of Organizational Behaviour*.2nd Ed., Englowed Cliffs, New Jersey, Prentice Hall Inc. 1995.
   Stoner, J. etc. *Management* 6th Ed., New Delhi, Prentice Hall of India, 1996.

PAPER VIII - DATA STRUCTURE USING JAVA

Theory	**60**
Sessional/ Practical	**40**
Credit	**5**

Introduction of Data Structures, Types and classification, Linear and Non Linear Structures,.

Arrays, Linear Linked List, Operations of Traversing, insertion and deletion of nodes.

Stack Traversing- PUSH and POP operations

Queue Structures – Traversal – Insertion and Deletion operations in a QUEUE

Non Linear Structures – Trees and Graph- Binary Tree Traversing, Binary Search Trees- AVL Trees - Path Cycle adjacency, Graph representation, Graph searching

Sorting and Searching operations in different structures.

JAVA Features, Data Types, Variables, Operators, Keywords, Branching, Control, Looping, Arrays, Classes, Object, Constructors, Overloading.

Java Packages, Applets, I/O Streams (in brief).

Algorithms for various operations of Data Structures are to be designed and implemented in JAVA.

Books:

Thomas A Standish – Data Structure in JAVA

Anastas Misev - Data Structure & Algorithm using JAVA

Arnold & J Gosling – The JAVA Programming Language

PAPER IX DATABASE MANAGEMENT SYSTEM

Theory	**60**
Sessional/ Practical	**40**
Credit	**5**

1. Database Management System- Basic concepts, Data base & Database users
   Characteristics of Database, Database systems, concepts and architecture
   Date Models, Schemas & Instances DBMS Architecture & data independence
   Data base languages & Interfaces, Data modeling using the entity-relationship approach

2. Relational Model, Languages & Systems, Relational data model & Relational Algebra
   Relational Model Concepts
   Relational Model Constraints
   Relational Algebra
   SQL – A Relational Data base language
   Date Definition in SQL
   View & queries in SQL
   Specifying constraints & indexes in SQL
   Specifying constraints & indexes in SQL
   A relational database management systems
   ORACLE

3. Conventional data models & systems
   Network Data model & IDMS systems
   Membership types and options in a set
   DML for network model
   Navigation within a network database
   Hierarchical Data model & IMS system
   Hierarchical Database structure
   HSAM, HISM, HDAM & HIDAM organization
   DML for Hierarchical model
   Overview of IMS

4. Relational database design
   Function Dependencies & normalization for relational Databases

   Function Dependencies
   Normal forms based on primary keys
   (1NF,2NF,3NF & BCNF)
   Lossless jooin & dependency preserving decomposition

5. Concurrency control & Recovery Techniques
   Concurrency control Techniques
   Locking Techniques
   Time stamp ordering
   Gravularity of data items
   Recovery Techniques
   Recovery concepts
   Database backup and recovery from catastrophic failures
6. Concepts of object oriented data base management systems

Books :

Date , C.J. “An introduction to database systems”, Narosa Publishing House, New Dehli

Desai, B. “An introduction to database concepts”, Galgotia publications, New Dehli
Elmsari and cavathe, “fundamental of database systems “, addison wesley, New York
Ullamn, J.D. “principles of database systems”, Galgotia publications, New Dehli

PAPER X - MATHEMATICAL FOUNDATIONS.

Theory	**60**
Sessional/ Practical	**40**
Credit	**5**

Mathematical Logic : Notation, Connectives, Normal forms, Theory of inference for statement calculus, Predicate calculus, Inference theory of the predicate calculus.

Relation and ordering Functions Recursion Algebraic Structures: Groups Application of Residue arithmetic to computers, Groups codes.

Graphy theory: Definition, Paths, reachability, connectedness, Matrix representation of graphs, Tree.

Storage representation and manipulation of graphs: Trees, List structures and graphs, Pert and related techniques.

Books:

Kolman, B., and Busby R. "Discrete Mathematical Structures for Computer Science". Prentice Hall 1987.
Sahni, S. " Concept in Discrete Mathematics", Camelot Publisher, U.S.A. 1981.
Tremblay, J.P. et.at. " Discrete Mathematical Structures with Applications of Computer Science" McGaw Hill 1987.

Laboratory Work For Second Semester

(Weekly 12 Hours and Total 6 Credits.)

Paper – Object Oriented Programming Using C++

OOPS Environment

Object oriented analysis using C ++

Writing of well structured programs using controls, functions, arrays, pointers, structures, unions etc. in C++

Paper Data Structure Using JAVA

Case studies of use of various data structures in applications such as sorting, searching , string manipulation and list manipulation. Implementation of algorithms of Traversing, Insertion, Deletion on different data structures using JAVA.

Paper Database Management Systems

Study of the features of a commercial RDBMS packages such as Oracle, MS. Access and Structured Query Language (SQL) use with the RDBMS . Laboratory exercises should include defining scheme for applications, creation of database, writing SQL queries to retrieve information from the database. Use of host language interface with embedded SQL. Use of forms and report writer packages available with the chosen RDBMS product. Some sample applications which may be programmed are given below:

Accounting for a shop
Database manager for a magazine agency or newspaper agency
Ticket booking for performances
Preparing greeting and birth day cards
Personal account - insurance, loans, mortgage payments etc.
Doctor's diary, billing
Personal bank account
Class marks management
Hotel accounting
Video tape library
History of cricket scores
Cable transmission Program manager
Personal library.