

Department of Computer Science & Applications

A

New Syllabus of

MCA Course I Year (1st and 2nd Semester)



Session 2016-2017 and onwards

(Effective from July 2016)

DR. HARISINGH GOUR VISHWAVIDYALAYA, SAGAR (M.P.)

(A Central University)

Sagar: 470003(M.P.)

(Approved by BOS meeting dated 05-05-2016)

DShukla

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R.K. Kataria

External Expert

(Prof. R.K. Kataria)

Professor in Computer Science
A.P.S. University, Rewa

DEPARTMENT OF COMPUTER SCIENCE AND APPLICATIONS
DR. H. S. GOUR (CENTRAL) UNIVERSITY, SAGAR (M.P.)

Semester-I

Course Code	Course Title	L	T	P	Credit	Sessional	End Sem.	TOTAL
CSA-C-121	Information Technology	3	1	0	4	40	60	100
CSA-C-122	Digital System Design	3	1	0	4	40	60	100
CSA-C-123	Programming and Problem Solving using C	3	0	0	4	40	60	100
CSA-C-124	Professional Communication	3	0	0	3	40	60	100
CSA-C-125	Discrete Mathematics	3	1	0	4	40	60	100
CSA-C-126	Software laboratory (based C Language)	0	0	4	2	-	100	100
CSA-C-127	Software laboratory (Basics + ms-office)	0	0	4	2	-	-	100
TOTAL		15	3	8	23			700

Semester-II

Course Code	Course Title	L	T	P	Credit	Sessional	End Sem.	TOTAL
CSA-C-221	Computer Architecture	3	1	0	4	40	60	100
CSA-C-222	Data Structure.	3	1	0	4	40	60	100
CSA-C-223	Object Oriented Programming using C++	3	1	0	4	40	60	100
CSA-C-224	Operating System	3	1	0	4	40	60	100
CSA-C-225	Organization Behaviour	3	0	0	3	40	60	100
CSA-C-226	Software laboratory (based on C++ Language)	0	0	4	2	-	100	100
CSA-C-227	Software Laboratory (Based on JS)	0	0	4	2	-	-	100
Total		15	4	8	23	-	-	700

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R. K. Kataria

External Expert
(Prof. R. K. Kataria)
Professor in Computer Science
APS University, Rewa

MCA -I SEMESTER

CSA C 121	Information Technology	3	1	0	4	Max. Marks : 100
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UNIT - I Computer Fundamentals: Block structure of a computer, characteristics of computers, problem solving with computers, generations of computers, classification of computers on the basis of capacity, purpose, generation, Introduction to Number System.

UNIT-II Computer languages: Machine language, assembly language, higher level language. **Software** - system software, application software. **Operating system:** Batch, multi-programming, time sharing, network operating system, on-line and real time operating system, Distributed operating system, multi-processor, Multi-tasking.

Assembler: Elements of assembly language programming, a simple assembly scheme, pass structure of assembler, design of two pass assemblers, a single pass assemblers, Macro definition & Call.

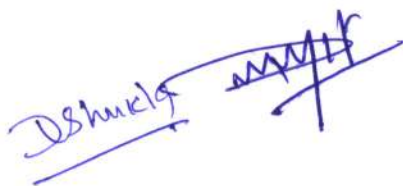
UNIT-III Compilers & Interpreters: aspects of compilation, memory allocation, interpreters, Linker & Loaders. **Software Tools:** Software tools for program development, editors, debug monitors, programming environment, user interfaces.

Computer Network and Communication: Network types, network topologies, network communication devices, physical communication media. **Internet and its Applications:** E-mail, TELNET, FTP, World Wide Web, Internet chatting. **Introduction to E-Commerce:** Meaning, its advantages & limitations, Types of E-Commerce Applications.

Books Recommended:

1. Rajaraman, "Fundamentals of Computers" (2nd Edi), PHI, New Delhi, 1996.
2. Petrick Norton, Fundamentals of Computers.
3. Dhamdhere M. "System Programming & O.S." (2nd Ed), TMH.
4. Jain Satish, "Information Technology", BPB 1999.
5. Ram B., "Computer Fundamentals", Wiley, 1997.

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R. K. Kataria

MCA -I SEMESTER

CSA C 122	Digital System Design	3	1	0	4	Max. Marks : 100
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UNIT-I **Introduction to Digital Computer:** Number System, 1's and 2's complement. BCD, EBCDIC, ASCII, De-Morgan's Theorem, Gray code, Duality Theorem, Boolean Algebra, K-Map, Logic Circuits, NOT, AND, OR, NAND, NOR, XOR, XNOR.

UNIT -II **Combinational Circuits:** Half Adder, Full Adder, Binary Adder and Subtracted. Decoder / Encoder, Multiplexer / De-multiplexer,

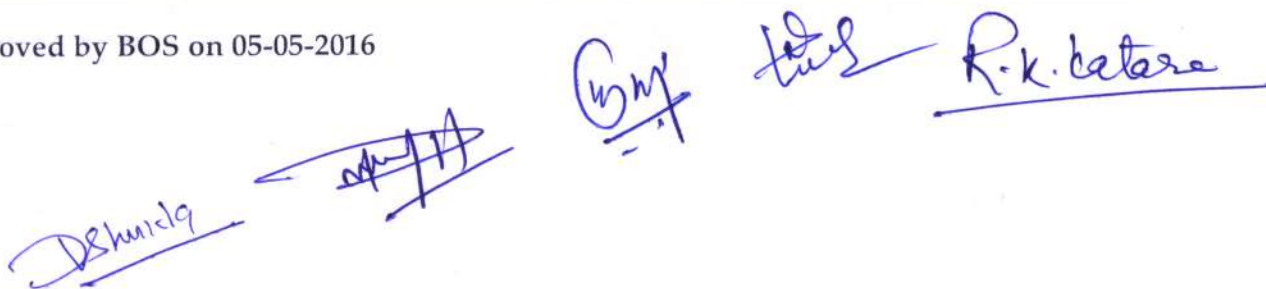
Sequential Circuits, Flip Flops - SR, D, JK, Master - Slave, Edge Triggered, Shift Registers (Any one type), Introduction to Counters: Synchronous as well as Asynchronous Counter (one example of Each)

UNIT -III **Memory System:** Memory Hierarchy, Primary Memory - DRAM, SDRAM, DDR, DRAM. ROM, PROM, EPROM, EEPROM, Concepts of Auxiliary, Associative, Cache and Virtual Memory, DMA.

Books Recommended:

1. Digital Computer Electronics by Morris Mano " Pearson Publication"

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MCA -I SEMESTER

CSA C 123	Programming and Problem Solving using C	3	1	0	4	Max. Marks : 100
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UNIT - I A Simple C program, basic data types operators like arithmetic, relational , logical , increment ,decrement , conditional , bit-wise , assignment etc.. Expressions, type conversions, conditional expressions

UNIT -II Input-output statements, statements and blocks, if and switch statements, loops- while, do-while and for statements, break, continue, goto and labels, Functions, basics, parameter passing (Call by Value ,Call by Reference) storage classes- extern, auto, register, static,

Recursive functions, header files, Arrays- concepts, arrays and functions, two-dimensional and multi-dimensional arrays, applications of arrays, address calculation in array. Pointers - concepts ,initialization of pointer variables, pointers and function arguments, address arithmetic, Character pointers and functions, pointers to pointers.

UNIT - III File Handling in C, command line arguments. Structure, Union, Enumeration & type def Declaration and Initializing Structure, Accessing Structure members, Structure Assignments, Arrays of Structure, Passing Structure to function, C Pre-processor Directive, Macro Substitution, File Inclusion directive, Conditional Compilation.

Books Recommended:

- 1.Yashwant Kantikar ,Let Us C by BPB publication
2. E. Balaguruswami, Programming with C.

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R. K. Kataria

MCA -I SEMESTER

CSA- C- 124	Professional Communication	3	0	0	3	Max.Marks:100
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- UNIT-I** 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, 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,
- UNIT-II** 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,
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
- UNIT-III** 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,

Books Recommended:

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".

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MCA -I SEMESTER

CSA C 125	Discrete Mathematics	3	1	0	4	Max. Marks : 100
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UNIT-I Sets, Subsets, Power sets, Complement, Union and Intersection, Demorgan's law Cartesian products, Relations, relational matrices, properties of relations, equivalence relation, functions , Mathematical induction.

UNIT- II Poset, Hasse Diagrams, Lattice, Boolean algebra, Application to switching circuits. Formal grammars, Chomsky Hierarchy, Finite state Machines: Moore and Mealey. Permutation, Combination, Recurrence Relations, Generating Functions, Principle of Inclusion and Exclusion.

Basic Concepts of Graphs and Trees, Adjacency and Incidence Matrices, Spanning Tree, Transitive Closure, Shortest Path, Planar Graphs, Graph coloring, Applications of Graph Theoretic concepts to Computer Science.

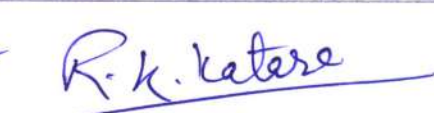
UNIT-III Introduction to Mathematical Logic. : Proposition & prepositional functions, Logical connections Truth-values and Truth Table, the algebra of prepositional functions-the algebra of truth values-Applications (switching circuits, Basic Computer Components).

Books Recommended:

1. K.H. Rosen, Discrete Mathematics and Its Applications, Tat McGraw Hill
 2. J.P.Trembley & R.P.Manohar, Discrete Mathematical Structure with Appl to Computer Science.
 3. Kenneth H. Rosen-203 Discrete Math & its Applications, 5th Ed.
 3. Ross K.A. and Wriht C.R.B , Discrete Mathematics.
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MCA -I SEMESTER

CSA C 126	Software laboratory (based C Language)	0	0	2	1	Max. Marks : 100
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List of programs based C language will be provided by the concerned faculty.

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MCA -I SEMESTER

CSA C 127	Software laboratory (Basics + MS- Office)	0	0	4	2	Max. Marks : 100
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List o. tasks based on MS-Office will be provided by the concerned faculty.

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MCA II Semester

CSA- C- 221	Computer Architecture	3	1	0	4	Max. Marks : 100
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UNIT -I Introduction: The VON NEUMANN model, the system Bus model, A Typical computer system. Data Representation: Binary numbers, binary codes, fixed point representation, floating point representation, error detection codes. Computer Arithmetic: Introduction, addition and subtraction, multiplication algorithms, division algorithms, floating point arithmetic operation, decimal arithmetic unit, and decimal arithmetic operations. Register Transfer and Micro operation: Register transfer language, register transfer, bus and memory transfer, arithmetic micro operations, logic micro operations, shift micro operations.

UNIT- II Basic Computer Organization and Design: Instruction codes, computer registers, computer instructions, timing & control, instruction cycle, memory reference instructions, input- output and interrupts ,design of basic computer, design of accumulator logic. Micro programmed Control Unit: Control memory, address sequencing. Central Processing Unit: Introduction, general registers organization, stack organization, instruction formats, and addressing modes.

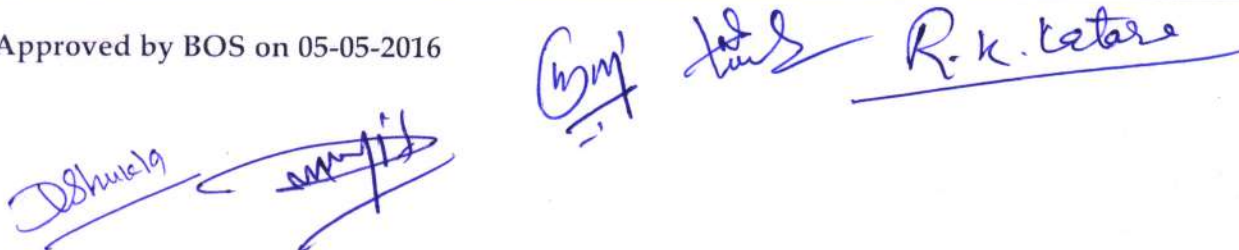
Input – Output Organization: Peripheral devices, input – Output interface, asynchronous data transfer, modes of data transfer, priority interrupt, direct memory access, input – output processor.

UNIT- III Memory Organization: Memory hierarchy, main memory, auxiliary memory, associative memory, cache memory, virtual memory, memory management hardware.

Books Recommended:

1. Mano ,M "Computer System and Architecture", Pearson Education
2. Hayes.J.P, "Computer Architecture and Organization", McGraw Hill

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MCA II Semester

CSA- C- 222	Data Structure	3	1	0	4	Max. Marks : 100
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- UNIT -I** Abstract Data Types (ADT), Asymptotic Notations, Time and space complexity of algorithms. Elementary data structures and their applications, Abstract Data Types, Elementary data structures and their applications. Array Definition, Single and Multidimensional Arrays, application of arrays, String Operation. Ordered List, Sparse Matrices, Lower and Upper Triangular matrices,
- UNIT -II** Singly Linked Lists – Circular Linked Lists – Doubly Linked Lists – linked List in Array, Polynomial representation and addition. Array Representation and Implementation of stack, Operations on Stacks: Push & Pop, Linked Representation of Stack, Operations Associated with Stacks, Applications of stack: Conversion of Infix to Prefix and Postfix Expressions, Evaluation of postfix expression using stack.
Array and linked representation and implementation of queues, Operations on Queue: Create, Add, Delete, Full and Empty. Circular queue, Deque and Priority Queue. Trees – Binary Trees – Binary Tree Traversals – Binary Tree Representations – Binary Search Trees – Threaded binary Trees – Application of Trees (Sets) – Binary Search Tree (BST), Insertion and Deletion in BST, AVL Trees
- UNIT-III** Graph: Introduction, Graph Representation, Adjacency Matrix, Adjacency List, Graph Traversals, Depth First Search, Breadth First Search, Applications of Graph. Linear & Binary search, Hash table and Hashing. Sorting: Bubble sort, Insertion sort, Selection sort, Quick sort, Shell sort, Merge sort

Books Recommended:

1. Data Structure using C by Tanebaum , Pearson Publication
 2. Data structure and program design in C by R.L.Krus, PHI New Delhi
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MCA II Semester

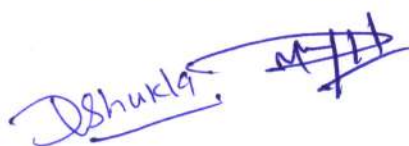
CSA-C- 223	Object Oriented Programming using C++	3	1	0	4	Max. Marks : 100
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- UNIT -I** Object-Oriented Programming Concepts: Introduction, comparison between procedural programming paradigm and object-oriented programming paradigm, basic concepts of object-oriented programming—Concept of streams, hierarchy of console stream classes, input/output. Function and different types of function.
- UNIT -II** Classes and Objects: Specifying a class, creating class objects, accessing class members, access specifiers and static members, use of const keyword, friends of a class, empty classes, nested classes, local classes, abstract classes, container classes, bit fields and classes. Declaring and initializing pointers, accessing data through pointers, pointer arithmetic, memory allocation (static and dynamic), dynamic memory management using new and delete operators, pointer to an object, this pointer, pointer related problems - dangling/wild pointers, null pointer assignment, memory leak and allocation failures Constructors and Destructors
- UNIT -III** Overloading operators, rules for overloading operators, overloading of various operators, type conversion.. Introduction inheritance, defining derived classes, forms of inheritance, ambiguity in multiple and multipath inheritance, virtual base class, object slicing, overriding member functions, order of execution of constructors and destructors. Concept of binding - early binding and late binding, virtual functions, pure virtual functions, abstract classes, virtual destructors.
Basics of exception handling, exception handling mechanism, throwing mechanism, catching mechanism, rethrowing an exception, specifying exceptions Template concepts, Function templates, class templates,

Books Recommended:

1. Herbert Schildt, "The Complete Reference Java™ 2", Tata McGraw-Hill
2. Deital "Java How to Program", Pearson Education.
3. Steve Holzner, "Java 2 Black Book", Paraglyph Press

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MCA II Semester

CSA-C- 224	Operating System	3	1	0	4	Max. Marks : 100
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UNIT-I **Introduction to Operating System:** Operating System: Introduction, Objectives and functions. Evolution of Operating System, **Process Description and control:** process definition, process states, two state & five state process model, process creation & termination, **CPU Scheduling :** Types of scheduling, scheduling and performance criteria, scheduling algorithm.

UNIT-II **Memory Management:** Memory partitioning, paging, segmentation, virtual memory. **Concurrency and Synchronization:** Interprocess communication and synchronization. Principles of concurrency, Mutual exclusion: Software approaches, hardware support, semaphores.

Deadlock & starvation: Principles of deadlock, deadlock prevention, deadlock avoidance, deadlock detection and recovery, starvation.

Input/Output Management: Principles of I/O hardware: I/O devices, I/O modules, I/O communication Techniques. Principles of I/O software: Goals, Interrupt handlers, device drivers.

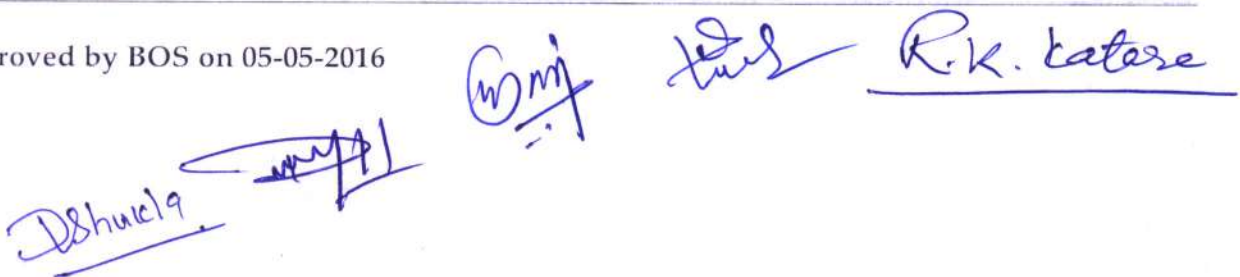
UNIT- III **File Management:** File system, file organization, file directories, file sharing, Record blocking, Error handling.

Distributed operating system: Motivation, Types of distributed system, Network structure, Network topology, and Distributed file system: Naming and transparency, Remote file access, Stateful versus stateless service.

Books Recommended:

1. William Stallings: "Operating System", PHI
2. Silberschatz and Galvin: "Operating System Concept", Addison Wesley
3. Tanenbaum, A.S., "Modern Operating Systems", Prentice Hall of India Pvt. Ltd.

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MCA II Semester

CSA-C- 225	Organization Behaviour	3	0	0	3	Max. Marks : 100
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UNIT- I Introduction to organizational behavior: The challenges facing management approach to organizational behavior. Management -functions of a management, Management Roles, Management Skills. Foundation of Individual Behavior- Ability, Biographical characteristics and Learning.

UNIT- II Organization: Organization structure, Common organizational design, New design options, authority and responsibility, centralization and decentralization, work design and technology – requisite task attribute theory, Job characteristic model, social information process model.

Conflict– source and types of conflicts in organization, conflict management. Negotiation– Bargaining policies, Negotiation process.

Motivation : primary and secondary motives, Maslow's theory of motivation, Hertzberg's two factor theory, Adam's equality theory, McGregor's theory X and theory Y. McClelland's theory, leadership– it's theories and skills, Contemporary issues in leadership, trust and leaders.

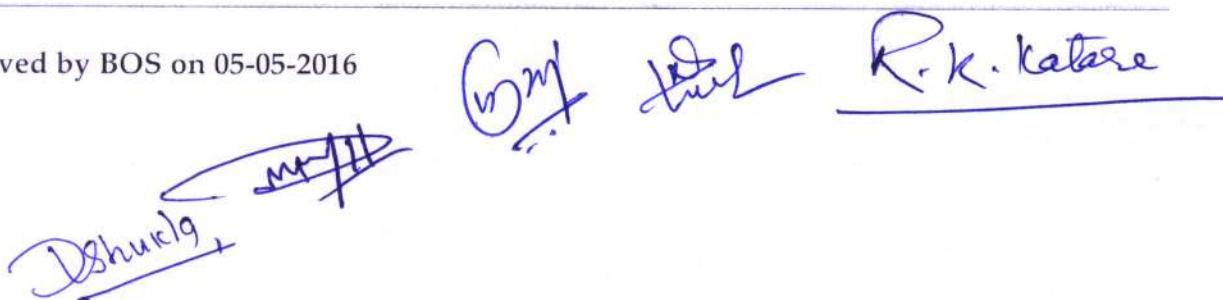
Job satisfaction: Measuring job satisfaction, outcome of job satisfaction, with respect to productivity, turnover, absenteeism, etc.

UNIT- III Job Enrichment: Job rotation, MBO techniques, Human resource policies and practices – Training and development programme, Types of training & Training methods. Introduction of Communication Process and it's benefits, It's significance in an organization.

Books Recommended:

1. Robbins Stephen P., 'Organizational Behavior' 10th Edition, Mc Graw Hill.
2. Luthans Fred, 'Organizational Behavior',
3. Weihrich Koont, 'Principal of Management' Mc Graw Hill.
4. Franklin Terry, 'Principal of Management', AITBS, New Delhi.

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MCA II Semester

CSA C 226	Software laboratory (based C++ Language)	0	0	2	1	Max. Marks : 100
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List of programs based on C++ Language will be provided by the concerned faculty.

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MCA II Semester

CSA C 227	Software laboratory (Based on DS)	0	0	4	2	Max. Marks : 100
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List of programs based on ~~Data Structure~~ will be provided by the concerned faculty.

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R.K. Kataria

Computer Science & Applications

A

Revised Syllabus of

MCA (3rd, 4th, 5th & 6th Semesters)



Session 2016-2017 and onwards

(Effective from July 2016)

DR. HARISINGH GOUR VISHWAVIDYALAYA, SAGAR (M.P)

(A Central University)

Sagar: 470003(M.P.)

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R.K. Katore

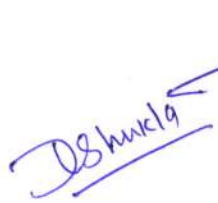
External Expert
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A.P.S. University, Rewa

Second Year (Semester - III)

Code	Title	L	T	P	Credit
CSA-C-321	Management Information System	3	-	-	03
CSA-C-322	Computer Networking and Internet	3	-	-	03
CSA-C-323	Computer Graphics And Animation	3	-	-	03
CSA-C-324	OOP's using C++	3	-	-	03
CSA-C-325	Probability , Combinatorics & Statistics	3	-	-	03
CSA-C-326	Software Laboratory- III (a)	-	3	3	02
CSA-C-327	Software Laboratory- III (b)	-	-	3	01
		15	3	06	18

Second Year (Semester - IV)

Code	Title	L	T	P	Credit
CSA-C-421	Operation Research-Quantitative Techniques	3	-	-	03
CSA-C-422	Software Engineering	3	-	-	03
CSA-C-423	Decision Support System	3	-	-	03
	Elective I (any one of following)	3	-	-	03
CSA-E-424	Parallel Computing				
CSA-E-425	Compiler Design				
	Elective II (any one of following)	3	-	-	03
CSA-E-426	Image processing				
CSA-E-427	Data Ware House				
CSA-E-428	Simulation and Modeling				
	Practicals				
CSA-C-429	Software Laboratory- IV (a)	-	3	3	02
CSA-C-430	Software Laboratory- IV (b)	-	-	3	01
		15	3	06	18





R. K. Katore
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 Prof. R. K. Katore
 Professor in Computer Science
 A. P. S. University, Rewa

MCA - III SEMESTER

CSA-C- 321	Management Information System	3	0	0	3	Max. Marks : 100
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UNIT - I Management Information System : The General Management System, Control systems, MIS Planning, MIS Design and Development, Components of MIS, Open Systems v/s Closed Systems, Open Loop Control System v/s Closed Loop Control System, Information and Decision, MIS v/s EDP Systems, Role and Importance of MIS, MIS Organization, Stages of Growth of MIS, Management Control Systems.

UNIT -II Definition of Office Automation, Need for Office Automation, Office Functions Needed to be Automated Office Automation Systems, Document Management Systems, Advantage of Office Automation, Disadvantages of Office Automation.

Information Resource Management, Business Processes v/s Information Systems, Information Systems for Management, Transaction Processing System, Management Report System, Office Information System, Operational Control and Research Systems, Decision Support Systems, Knowledge Based Systems,

UNIT- III Information System as a System, software Development Life Cycle (SDLC) Systems Analyst, Case Scenario, Feasibility Study, Systems Analysis (Requirement Analysis), Data Flow Diagram, Data Dictionary, Process Description, Software Requirement Specifications (SRS),

Books Recommended:

1. Ashok Arora, Akshaya Bhatia, "Information Systems for Managers", 1st Edi. Excel Books.
2. Kenneth C. Handan, Java P Landan, "Management Information System", 8 Edi. Prentice Hall.
3. Murdick R. G., Ross J. E. & Claggiest J. R., "Information System for Modern Management" PHI, 1997.
4. James A. O. Brien, "Management Information System" Golgotha, Publication, 1999.
5. Locus, "Analysis, Design and Implementation of information System", 3rd Edi. McGraw Hill.
6. Anderson Lavid, "Management Information System", Tata McGraw Hill, 1999.

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MCA - III SEMESTER

CSA-C- 322	Computer Networking and Internet	3	0	0	3	Max. Marks : 100
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UNIT - I Network Fundamentals : Introduction and Applications of Computer Network, Structure of the communication network, Network topologies, Transmission media, LAN, WAN, MAN, IEEE LAN Standards, Digital and Analog transmission, Switching techniques.

UNIT- II Communication among the computers; Traffic Control and Accountability, Connection-Oriented and connection less Networks, Classification of Communication protocols. Pooling / Selection system, Selective and group Polling, Stop and Wait Polling/ Selection, Continuous ARQ (Sliding Windows).

Introduction to standards Organization and the Open System Interconnection model (OSI), Transmission Control Protocol/ Internet Protocol (TCP/IP), TCP/IP Internetworking, TCP/IP Operations, Introduction of user data gram protocol (UDP) .

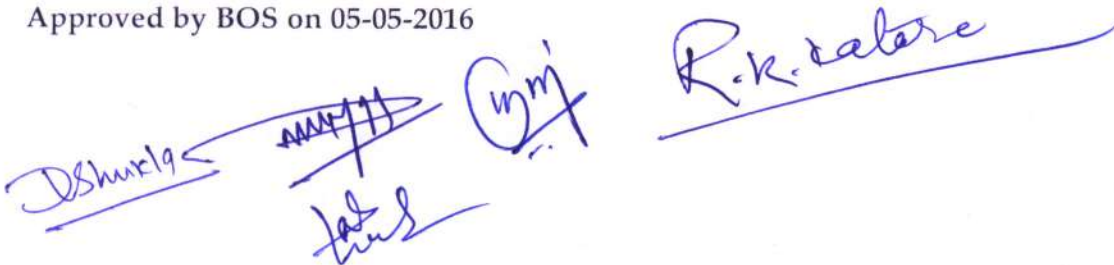
UNIT -III Digital Networks - Introduction and Advantage of Digital System, Signal Conversion, digital carrier systems, Analog to Digital Techniques, Digital Switching, Integrated Service, Digital network (ISDN).

Network Security- Cryptography, Electronic mail and World Wide Web (WWW) Introduction to mobile computing and Ad-hoc Networks.

Books Recommended:

1. U. Black, "Computer Networks Protocols, Standards and Interfaces" -IIInd Edition PHI.
2. A. S. Tanenbaum: "Computer Networks- Protocol, Standards & Interfaces" PHI.
3. W. Stallings: "Data and Computer Communications" (4thed) PHI.
4. Douglas E. Comer "Computer Networks & Internets" Low Price Edition, Pearson Edu. Asia P. Ltd.

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MCA - III SEMESTER

CSA-C- 323	Computer Graphics and Animation	3	0	0	3	Max. Marks : 100
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UNIT - I Introduction to Computer Graphics, Types of refresh graphics displays, Interactive devices, CRT. Raster scan graphics : Video basics, Scan conversion. Line drawing algorithms: Digital Differential Analyzer, Bresenham's algorithm. Polygon filling, edge fill algorithm, seed fill algorithm.

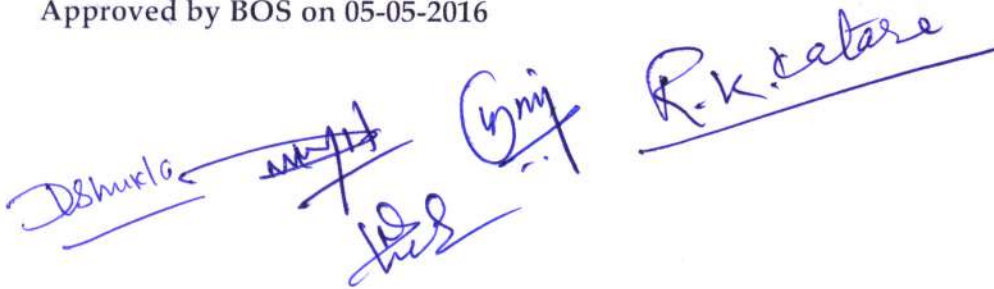
UNIT- II Introduction to clipping: 2D clipping : line clipping algorithms - Cohen-Sutherland, Line sub-division algorithm, Mid point sub-division, Cyrus-Beck algorithm. 2D-Parametric clipping. Introduction to 3D Clipping.
Hidden line & Hidden surfaces: Floating Horizon algorithms: Upper Horizon and Lower Horizon, Roberts algorithm, Warnock algorithm, Weiler- Atherton algorithm, Z-buffer algorithm.

UNIT -III Rendering Illumination model: Surface normal, Reflection vector, Effect of Ambient Object, Specular Reflection, Halfway vector. Shading, Ray tracing, color.

Books Recommended:

1. Rogers, D. F. "Procedural Elements for computer graphics" . McGraw Hill, 2008
 2. Hearon, D. and Baker, M. "Computer Graphics" PHI, 2008.
 3. Asthana, R. G. S. and Sinha, N. K. "Computer Graphics", New Age international , 2005.
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Approved by BOS on 05-05-2016



MCA - III SEMESTER

CSA-C- 324	OOP's using C++	3	0	0	3	Max. Marks : 100
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UNIT-I Introduction to OOP- Overview of C++ - Classes - Structures - Unions - Friend Functions - Friend Classes - Inline functions - Constructors - Destructors - Static Members - Scope Resolution Operator - Passing objects to functions - Function returning objects.

UNIT -II Arrays - Pointers - The this pointer - References - Dynamic Allocation Operators - Function Overloading - Default function arguments - Overloading Constructors

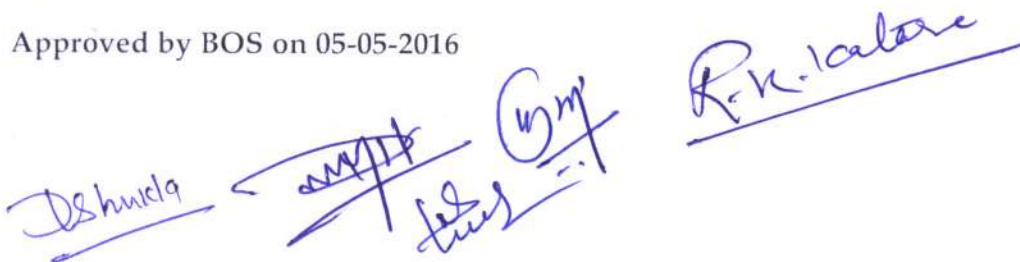
Operator Overloading - Member Operator Function - Friend Operator Function - Overloading some special operators - Overloading [], (), —> and comma operator - Inheritance - Types of Inheritance - Protected members - Virtual Base Class Polymorphism - Virtual Functions - Pure virtual functions..

UNIT -III Class templates and generic classes - Function templates and generic functions- Overloading a function template - power of templates - Exception Handling - Derived class exception - Exception handling options - terminate() and unexpected() - `uncaught_exception()` function.

Books Recommended:

1. Herbert Schildt, "The Complete Reference Java™ 2", Tata McGraw-Hill
2. Deital "Java How to Program", Pearson Education.
3. Steve Holzner, "Java 2 Black Book", Paraglyph Press

Approved by BOS on 05-05-2016

The block contains four handwritten signatures in blue ink. From left to right: 1. A signature that appears to be 'D. Shukla'. 2. A signature that appears to be 'Anand'. 3. A signature that appears to be 'G. M. Singh'. 4. A signature that appears to be 'R. K. Kalare'.

MCA - III SEMESTER

CSA-C- 325	Probability Combinatorics & Statistics	3	0	0	3	Max. Marks : 100
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UNIT - I Sample Space, Events, probability axioms, Law of addition of Probability, Law of Multiplication of Probability. Joint probability, conditional probability, Bayes rule. Random Variables: Discrete and Continuous, Probability Mass function, Probability Density Functions, Expectation.

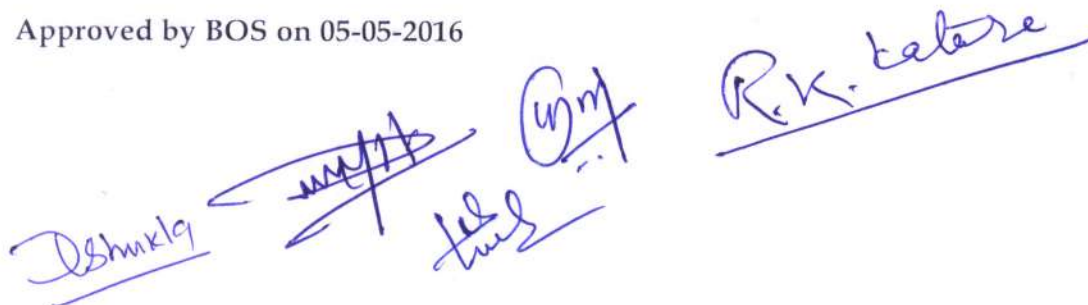
UNIT -II **Basic Statistics** :_Measure of central tendencies, measures of dispersion . Theory of least square and Line fitting, correlation Coefficient, Rank Correlation and its coefficient, Linear Regression.

UNIT -III **Permutation and Combination:** Distinct & non-distinct object, Generating functions for combinations. Enumerators for permutations, Distribution of distinct objects.

Books Recommended:

1. Ross, S., "A first course in probability", Collier Macmillan, New Your, 1976.
 2. Lili, C. L., "Introduction to combinatorial Mathematics", McGraw Hill, 1996.
 3. Hogg, R. V. Et., Al., "Introduction to Mathematical statistics", American Pub., N York
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Approved by BOS on 05-05-2016

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MCA - III SEMESTER

CSA-C- 326	Software Laboratory III (a)	0	3	3	1	Max. Marks : 100
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Lab based on syllabus of the subject OOPS using C++.

Approved by BOS on 05-05-2016

D. Shinde [Signature] [Signature] R. K. Patil

MCA - III SEMESTER

CSA-C- 326	Software Laboratory III(b)	0	0	3	1	Max. Marks : 100
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NETWORKING (WIRELESS AND CABLED)

1. Study the physical media of connectivity.
2. Study the pin-structure of cross-over cable.
3. Study the different LAN Technologies.
4. Study the functioning of a Switch.
5. Study the Functioning of a Router.
6. Establishing LAN (Star topology) for your LAB using Hubs
7. Study and install the media converting using optical fiber.
8. Install and configure the LAN card.
9. Install and configure window NT (2000 & 2003) Server.
10. Study and implement the virtual network.

Approved by BOS on 05-05-2016

Dshukla [Signature] [Signature] R.K. Kataria

MCA - IV SEMESTER

CSA-C- 421	Operation Research-Quantitative Techniques	3	0	0	3	Max. Marks : 100
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UNIT - I **Introduction :** characteristics of O. R., Main Phases of O. R., Scope of O. R., Formulation of LPP, Graphical solution of two variable LP problems, Simplex method.

Duality in LP: Formulation of dual problems, Dual simplex method, Transportation Problem and its solution, Assignment problem and its solution by Hungarian method.

UNIT -II **Game theory:** Solution of Two person-Zero-sum games, Solution of mixed strategy games.

Inventory theory: Types of inventory, Inventory costs, single item deterministic models –Economic lot size models with and without shortages.

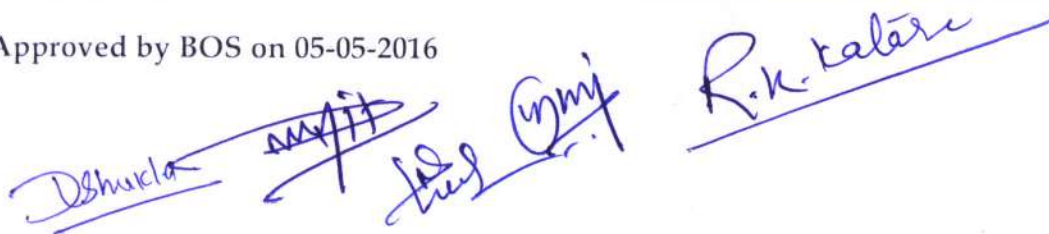
UNIT -III **Queuing theory:** Characteristics of queuing system, Steady state M/ M/ 1 and M/ M/ C queuing models.

Replacement theory: Replacement of items that deteriorate of items that fail group replacement and individual replacement

Books Recommended:

1. Kalavati S., "Operation Research" Vikas publishing house Pvt. Ltd.
 2. Taha H. A. "Operation Research – An Introduction" McMillan Publishing Co., New York.
 3. H. S. Kasana and K. D. Kumar, "Introductory Operation Research" Springer International edition, Berlin (Germany) Ist Edi. 2004.
 4. K.Swarup, P.K. Gupta & M. Mohan, Operations Research, S. Chand & Sons, 2003.
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MCA - IV SEMESTER

CSA-C- 422	Software Engineering	3	0	0	3	Max. Marks : 100
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UNIT -I Introduction to software engineering- Characteristics, Applications, crisis, problem and causes, software engineering paradigms, definitions, classic life cycles, models: prototyping, spiral, Linear sequential, RAD models, fourth generation techniques. Analysis concepts and principles: Communication techniques, analysis principals, software prototyping specifications, specification review.

UNIT-II Analysis modeling: The elements of analysis model, data modeling, functional modeling and information flow. Behavioral modeling, mechanics of structured analysis, data dictionary. Design concepts and Principles: Software design and engineering, design process, design principles, design concepts, effective modular design, design heuristics, design model.

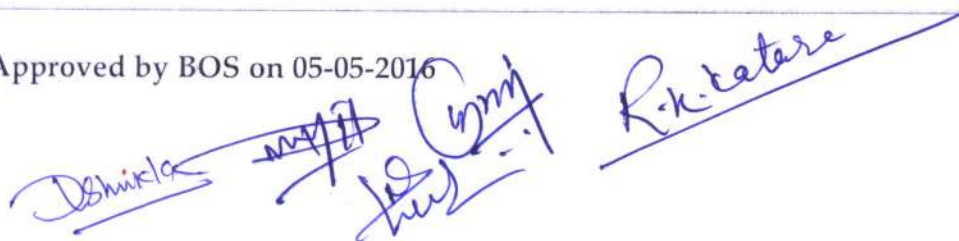
Design methods: data design, architectural design, architectural design process, transform mapping, transaction mapping, design post processing, architectural design optimization, interface design, procedure design. Software testing: testing fundamentals, test case design, white box testing, basis path testing, control structure testing, black box testing.

UNIT-III Strategic Approach to Testing: Unit Testing, Integration Testing, Validation Testing, System Testing, Debugging. Software Maintenance- Definition, Maintenance Characteristic, Maintainability, Maintenance Task, Maintenance side effects, Reverse Engineering and Re-Engineering.

Books Recommended:

1. Roger S. Pressman, "Software engineering - a practitioner's approach", MGH
2. Shoomar, "Software Engineering", PHI
3. Award, "System analysis and design", TMH
4. Beizerr, B. "Software Testing Techniques", Van Nostrill and Reinhold.
5. Pressman, R. S., "Software Engineering - A practitioners Approach" McGraw Hill.
6. Jalote, P., "An Integrated Approach / to Soft. Engineering" Narosa 1991.

Approved by BOS on 05-05-2016

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MCA - IV SEMESTER

CSA-C- 423	Decision Support System	3	0	0	3	Max. Marks : 100
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UNIT - I Introduction to the concept of Decision Support System: Definition Need for Computerized DSS and support technology characteristics and capabilities of DSS. Components of DSS: Data management subsystem, Model Management Sub system knowledge management subsystem, User interface subsystem classification of DSS.

UNIT -II **DSS development Strategies:** Development process, DSS technology levels & tools Algeria's. & Hemistich: Tube search, genetic Algeria's simulation. Introduction to artificial neural network, (NLP) Natural Language Processing and its applications.

UNIT -III **Introduction to data warehousing & Data mining:** Data visualization & multi dimensionality. An overview of GDSS (Group Decision Support System) and Decision Conferencing.

Introduction to Expert System and its Applications in Management. Introduction to GIS & Concept of virtual reality. Executive Information System (EIS), Expert System: Basic Concept structure and working.

Books Recommended:

1. Bennis, J.L.: "Building Decision Support System" Addison Wesley Pub., Comp, 1983.
2. Sprague, R.H, & Watson, HJ (Edu.): "Decision Support System, Putting Theory and Practices" Prentice Hall, New Jersey, 1986.
3. Keen, P.G.W. & Morton, M, S, S.; "Decision Support System: An organizational Perspective |, Addison Wesley Pub.
4. David: "Applied Decision Support System", PHI., 1989.

Approved by BOS on 05-05-2016

Dshurda *hish* *Gmy* *R.K. Lalani*

MCA - IV SEMESTER

(Elective - I)

CSA-E- 424	Parallel Computing	3	0	0	3	Max. Marks : 100
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UNIT - **Parallel Computer:** Concept, need and requirement, various concepts in pipelining, issues involved in complex pipelining, configuring a parallel computer, Parallel Architecture: Vector processor, message passing and shared memory multiprocessors.

UNIT -II **Parallel Programming:** Using sequential computing elements, data flow approach. Elementary Algorithms: Matrix manipulation, Graph connectivity and traversal, Tree traversal, Sorting and searching on PRAM.

Complexity of Parallel algorithms: Various processor interconnection schemes mesh, hypercube, perfect shuffle etc., High Performance.

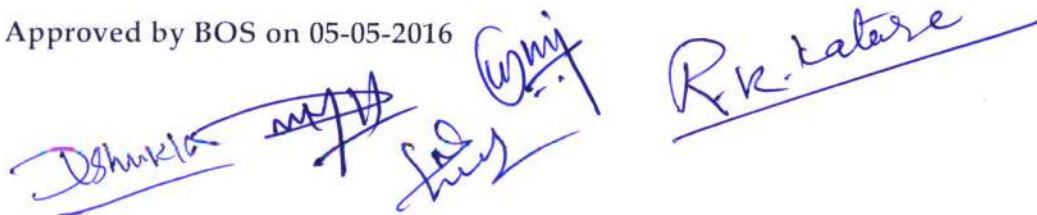
UNIT -III **Computing approach for complex problems:** problems in Computational Geometry, Permutations and Combinations, Fourier transforms, traversing combinational spaces, Decision and Optimization.

Task Scheduling: DAG, Priority of task, Homogenous and heterogeneous scheduling, different scheduling algorithms.

Books Recommended:

1. Ratan Ghosh, Rajat Moona, Phalguni Gupta, "Foundation of Parallel Processing" NAROSA.
2. V. Rajaraman "Elements of Parallel Computing" PHI.
3. Selim Akl, "The Design and Analysis of Parallel Algorithms", PHI.

Approved by BOS on 05-05-2016



MCA - IV SEMESTER

(Elective - I)

CSA-E- 425	Compiler Design	3	0	0	3	Max. Marks : 100
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UNIT - I Compiler Designing Phases: Analysis of a source program, Lexical Analysis, Syntax Analysis, Semantic analysis, Context free grammars ,software tools : LEX,YACC(Yet another compiler), parse tree, code generation and code optimization.

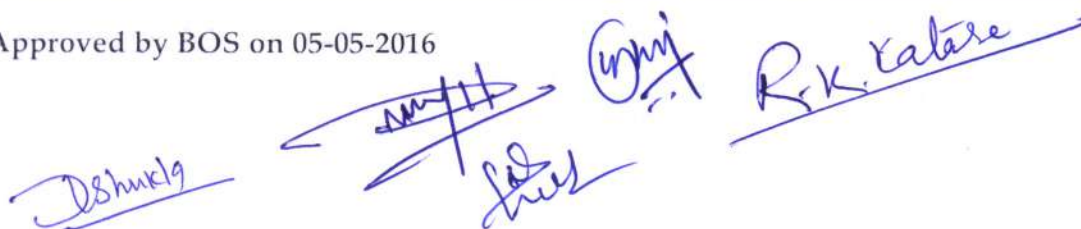
UNIT- II Assembly language fundamentals(8085 based assembly language programming). Assembler -2 pass and single pass. Loading, linking, relocation, program delectability. Linkage editing.
Text editor ,programming environment, debugger and program generators.
Cross compiler, bootstrap compilers, top down and bottom up parses. Parallel virtual machine and message passing interface (MPI).

UNIT -III Linker and Loader, Editor, Macros and Microprocessors, Intermediate code generation - intermediate languages - declarations - assignment statements - Boolean expressions - procedure calls .

Books Recommended:

1. A.V. Aho, R. Sethi and J. D. Ullman, "Compilers: Principles, Techniques, and Tools" (US edition), Addison Wesley, 1986.
 2. A. Holub, "Compiler Design in C", Prentice-Hall of India, 2006.
 3. R. Mak, "Writing Compilers and Interpreters" (2nd ed.), John Wiley & Sons, 1996.
 4. D. Galles, "Modern Compiler Design", Pearson Education, 2007.
 5. S. Chattopadhyay, "Compiler Design", Prentice-Hall of India, 2005.
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Approved by BOS on 05-05-2016

The image shows four handwritten signatures in blue ink. From left to right: the first signature is 'D. Shukla', the second is 'S. K. Singh', the third is 'R. K. Kataria', and the fourth is 'R. K. Kataria' with a long horizontal line extending from the end.

MCA - IV SEMESTER

(Elective - II)

CSA-E- 426	Image Processing	3	0	0	3	Max. Marks : 100
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UNIT -I Fundamental Steps in Image Processing: Element of visual perception, a simple image model, sampling and quantization, some basic relationships between pixel, image geometry in 2D, image enhancement in the spatial domain.

UNIT -II Introduction to spatial and frequency methods: Basic gray level transformations, histogram equalization, local enhancement, image subtraction, image averaging, basic spatial, filtering, smoothing spatial filters, sharpening spatial filters.

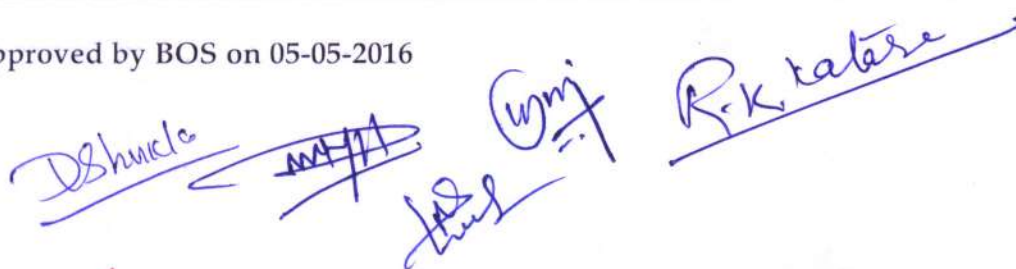
Introduction to the fourier transformation: Discrete fourier transformation, fast fourier transformation, filtering in the frequency domain, correspondence between filtering in the spatial and frequency domain smoothing frequency-domain filters, sharpening frequency-domain filters, homomorphic filtering, dilation and erosion, opening and closing, hit-or-miss transformation.

UNIT- III Some basic morphological algorithms: Line detection, edge detection, gradient operator, edge linking and boundary detection, thresholding, region-oriented segmentation, representation schemes like chain codes, polygonal approximations, boundary segments, skeleton of a region, recognition and interpretation patterns and pattern classes, decision-theoretic methods, introduction to neural network.

Books Recommended:

1. Rafael C. Gonzalez and Richard E. Woods, Digital Image Processing, PHI, 2002
 2. William K. Pratt, Digital Image Processing: PIKS Inside (3rd) John Wiley & Sons, Inc., 2001
 3. Bernd Jahne Digital Image Processing, (5th revised and extended edition), Springer, 2002
 4. S. Annadurai and R. Shanmugalakshmi, Fundamentals of Digital Image Processing, PHI, 2007
 5. M.A. Joshi, Digital Image Processing: An Algorithmic Approach, PHI, 2006
 6. B. Chanda and D.D. Majumder, Digital Image Processing and Analysis, PHI., 2007
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Approved by BOS on 05-05-2016

The block contains four handwritten signatures in blue ink. From left to right, they are: 'DShukla', a signature that appears to be 'M. P. P.', 'G. N. J.', and 'R. K. Kataria'.

MCA - IV SEMESTER

(Elective - II)

CSA-E- 427	Data Warehouse	3	0	0	3	Max. Marks : 100
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UNIT -I Introduction And Data Warehousing : Introduction, Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Implementation, Further Development, Data Warehousing to Data Mining.

UNIT -II Data Preprocessing, Language, Architectures, Concept Description: Why Preprocessing, Cleaning, Integration, Transformation, Reduction, Discretization, Concept Hierarchy Generation, Data Mining Primitives, Query Language, Graphical User Interfaces, Architectures, Concept Description, Data Generalization, Characterizations, Class Comparisons, Descriptive Statistical Measures.

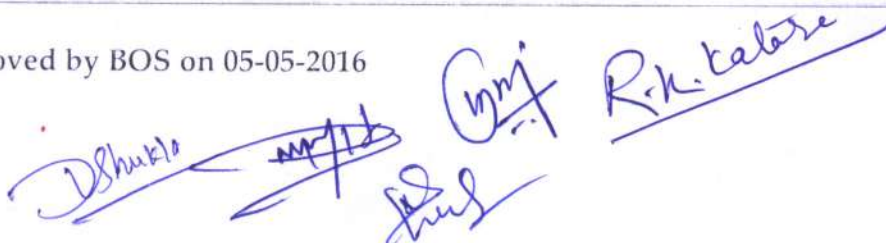
Association Rules: Association Rule Mining, Single-Dimensional Boolean Association Rules from Transactional Databases, Multi-Level Association Rules from Transaction Databases.

UNIT- III Classification And Clustering : Classification and Prediction, Issues, Decision Tree Induction, Bayesian Classification, Association Rule Based, Other Classification Methods, Prediction, Classifier Accuracy, Cluster Analysis, Types of data, Categorisation of methods, Partitioning methods, Outlier Analysis.

Books Recommended:

1. J. Han, M. Kamber, "Data Mining: Concepts and Techniques", Harcourt India / Morgan Kauffman, 2001.
2. Margaret H. Dunham, "Data Mining: Introductory and Advanced Topics", PHI, 2004.
3. Sam Anahory, Dennis Murry, "Data Warehousing in the real world", PHI, 2003.
4. David Hand, Heikki Manila, Padhraic Symth, "Principles of Data Mining", PHI 2004.
5. W.H. Inmon, "Building the Data Warehouse", 3rd Edition, Wiley, 2003.
6. Alex Bizon, Stephen J. Smith, "Data Warehousing, Data Mining", McGraw-Hill, 2001.
7. Paulraj Ponniah, "Data Warehousing Fundamentals", Wiley-Interscience Publication, 2003.

Approved by BOS on 05-05-2016

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MCA - IV SEMESTER
(Elective - II)

CSA-E- 428	Simulation and Modelling	3	0	0	3	Max. Marks : 100
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UNIT -I System Models - Continuous and discrete models - Static and Dynamic Models
- Principles used in modeling - system studies - system analysis - design and
postulation. System simulation: Types of Models, Techniques of simulation -
Monte Carlo Method - Comparison of analysis and simulation - Types of
system - Simulation Numerical

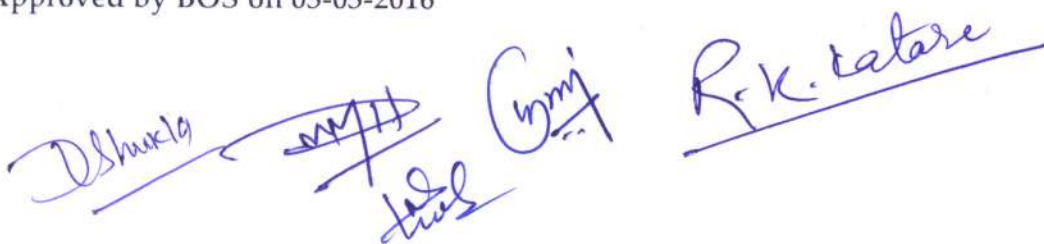
UNIT -II Computation for simulation - Applications of digital analog and hybrid
computers in continuous system simulation - Real time simulation. Exponential
growth models, exponential decay models - Logistic curves -Generation of
growth models - system models- system dynamic diagrams

UNIT -III Discrete system Simulation : Discrete events - Generation of arrival patterns -
Simulation of telephone systems - Simulation languages - GPSS programming
General description - simscript programs, simscript system concept.

Books Recommended:

1. Banks, J, Carson S and Nilson B L, "Discrete Event System Simulation " PHI
 2. Deo N "System simulation with digital computers" PHI
 3. Law A M and Kelton W D "Simulation Modeling and analysis" Mc Graw Hill
 4. Geoffrey Gordon., System simulation -, Prentice Hall of India Pvt. Ltd.1999.
 5. Maryanski F., Digital Computer Simulation , CBS Distributors.
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Approved by BOS on 05-05-2016



MCA - IV SEMESTER

CSA-C- 429	Software Laboratory IV (a)	0	3	3	2	Max. Marks : 100
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It will be decided by the teacher concern based on papers taught in the semester.

Approved by BOS on 05-05-2016

D Shukla

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MCA - IV SEMESTER

CSA-C- 430	Software Laboratory IV (b)	-	-	3	1	Max. Marks : 100
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It will be decided by the teacher concern based on papers taught in the semester.

Approved by BOS on 05-05-2016

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Third Year (Semester - V)*

Code	Title	L	T	P	Credit
CSA-C-521	Systems Programming	3	-	-	03
CSA-C-522	Object Oriented Programming And Design with UML	3	-	-	03
CSA-C-523	UNIX and Shell Programming	3	-	-	03
	Elective I (any one of following)	3	-	-	03
CSA-E-524	Distributed Systems				
CSA-E-525	AI and Expert System				
CSA-E-526	Multimedia and Web Technology				
	Elective II (any one of following)	3	-	-	03
CSA-E-527	Bio-Informatics				
CSA-E-528	Data Mining				
CSA-E-529	Mobile Computing				
	Practicals				
CSA-C-530	Software Laboratory V (a)	-	3	3	02
CSA-C-531	Software Laboratory V (b)	-	-	3	01
		15	3	06	18

Third Year (Semester - VI)*

Major Project based on curriculum at Industry

Code	Title	L	T	P	Credit
CSA-C-621	Major Project (External) based on Industrial Training	-	-	-	06
CSA-C-622	Comprehensive Viva-Voce based on project	-	-	-	15
CSA-C-623	Seminar on project topic/others	-	-	-	06
	TOTAL	-	-	-	27
	GRAND TOTAL	-	-	-	117

*- Approved by BOS meeting dated 05-05-2016.

DSK *my* *R.K. kabere*

MCA - V SEMESTER

CSA-C- 521	System Programming	3	0	0	3	Max. Marks : 100
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UNIT- I **Systems Programming** – What is systems programming, Difference between systems programming and application programming. System software and machine architecture. Traditional (CISC) machines- VAX architecture, Pentium Pro architecture, RIC machine – ultra SPARK, Power PC, Cray architecture.

UNIT - II **Assemblers**–Basic assembler functions–machine dependent assembler features– machine independent assembler features – assembler design options – one pass assembler, multi pass assembler – assembler implementation – MASM, SPARC assemblers, Loaders and Linkers basic loader functions, machine dependent loader features, machine independent loader featured, loader design options-linkage editors, dynamic linkage editors, dynamic linking, bootstrap loaders, examples-DOS linker

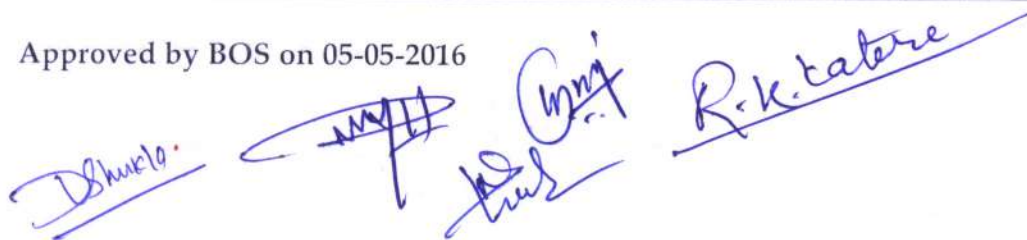
UNIT- III **Macro processors** – basic macro processor functions – machine dependent and machine independent macro processor architectures – design options – implementation examples – MASM, ANSI C macro processor.

Compiler – Basic compiler functions – Grammar Lexical Analysis, symmetric Analysis, code generation machine dependent and independent compiler features – intermediate form of the programme, machine dependent code optimization, structured variables, machine independent code optimization, storage allocation, block structured languages, compiler design options.

Books Recommended:

1. Leland L. Beck, "System Software – An Introduction to system programming", Addison Wesley.
2. John J. Donovan., "Systems Programming", TMH 1995.
3. Dhamdhare, D. M., "Operation Systems and Systems Programming", TMH.

Approved by BOS on 05-05-2016



MCA - V SEMESTER

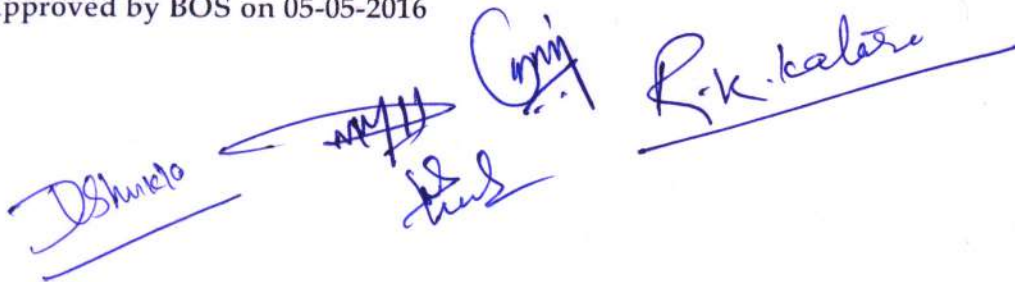
CSA-C- 522	Object Oriented Programming and Design with UML	3	0	0	3	Max. Marks : 100
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- UNIT-I** **Introduction:** Two views of software Development: SSAD and OOAD, Why Object - Orientation? , Benefits of OO Modeling.
The Object Paradigm: Object and Classes, Abstraction and Encapsulation, Method and Message, Interface and Polymorphism, Access Control.
- UNIT- II** **The Object Modeling:** Links and Associations, Generalization and Specialization, Aggregation and Composition, Association, Cardinality, Navigability Icons, Relationship and adornments.
- UNIT-III** **Introduction to UML:** Overview, Conceptual Model of the UML, Architecture, Software Development Life Cycle.
Structural Diagrams: Class, Object, Component, Deployment, Package.
Behavioral Diagrams: Use Case, Sequence, Activity, State Transaction.
Implementation OO Language: Introduction, Abbreviated ATM Model, Implementing Structure, Implementing Functionality.

Books Recommended:

1. Grady Booch, Benjamin / Cummings, "Object Oriented Analysis and Design with Applications", Pearson Education.
 2. J. Rumbaugh, M Blaha, W. Premerlani, "Object Oriented Modeling and Design" PHI.
 3. Grade Booch, James Rumbaugh, Ivar Jacobson, "The Unified Modeling Language User Guide". Pearson Education.
 4. Grade Booch, James Rumbaugh, Ivar Jacobson, "The Unified Modeling Language Reference Guide", Pearson Education.
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Approved by BOS on 05-05-2016

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MCA - V SEMESTER

CSA-C- 523	UNIX and Shell Programming	3	0	0	3	Max. Marks : 100
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UNIT - I Unix Operating System – Features of Unix, kernel structure: kernel, shell and file system, Files and directories structure, shell, directories and file names, file permissions, basic commands of Unix, Introduction of Unix Editors.

UNIT - II Advance command handling : mail , lp ur, tr, crypt, cut, split, paste, cmp, comm, diff, head, tail, chmod, chown, sort, kill, etc., command line structures, creating new commands, I/O redirection Pipes and Filters, grep family, stream editor(sed), pattern scanning and processing language awk.

UNIT- III Shell Programming- Shell scripts, The Bourne, Korn and C shell, Shell variables and shell scripts, meta characters and environment variables, arguments and parameters, Conditional statements and loops of both shells.

Introduction of UNIX system calls: Types of systems calls, Input output, processes, signals and interrupts. Device management etc. related system calls and their uses.

Books Recommended:

1. R Morgan & McGilton, "Introducing Unix systems-v", McGraw Hill International.
2. M. G. Venkateshmurthy, "Unix and shell programming", Pearson Education.
3. Y. Kanitker, "Unix Shell Programming", BPB.
4. Maurice Bach, "The design of the Unix Operating System", PHI

Approved by BOS on 05-05-2016



MCA - V SEMESTER
(Elective -I)

CSA-E- 524	Distributed Systems	3	0	0	3	Max. Marks : 100
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UNIT -I **Introduction to Distributed Systems :** Goals of Distributed Systems, Hardware and Software concepts, the client server model, Remote procedure call, remote object invocation, message and stream oriented communications.

UNIT-II **Process and synchronization in Distributed Systems:** Threads, clients, servers, code migration, clock synchronization, mutual exclusion, Bully and Ring Algorithm, Distributed transactions.

Consistency, Replication, fault tolerance and security : Object replication, Data centric consistency model, client-centric consistency models, Introduction to fault tolerance, process resilience, recovery, distributed security architecture, security management, KERBEROS, secure socket layer, cryptography.

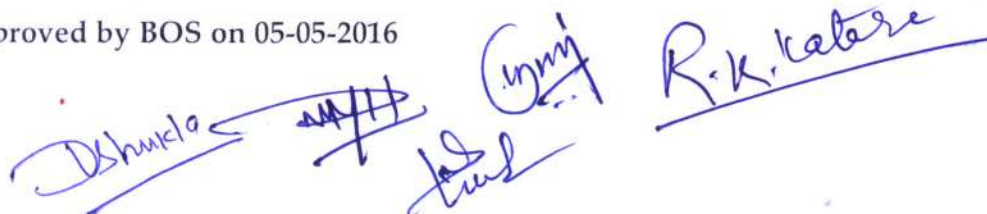
UNIT-III **Distributed Object Based and File Systems:** CORBA, Distributed COM, Goals and Design Issues of Distributed file system, types of distributed file system, sun network file system.

Distributed shared memory: DSM servers, shared memory consistency model, distributed document based systems: the world wide web, distributed co-ordination based systems: JINI

Books Recommended:

1. Andrew S. Tanenbaum, Marten Van Steen, "Distributed Systems Principles and Paradigms", Pearson Education.
2. George Coulios, "Distribute System: Design and Concepts", Pearson Education.
3. Harry Singh, "Progressing to Distribute Multiprocessing", PHI.
4. B.W. Lampson, "Distributed Systems Architecture Design & Implementation", Springer.
5. Parker Y. Verjies J. P., "Distributed Computing Systems Synchronization Control & Communications", PHI.
6. Robert J. & Thieranf, "Distributed Processing Systems", PHI.

Approved by BOS on 05-05-2016

The block contains several handwritten signatures in blue ink. From left to right, there is a signature that appears to be 'D. Shukla', followed by a signature that looks like 'S. K. Singh', then a signature that looks like 'G. Singh', and finally a signature that looks like 'R. K. Kataria'.

MCA - V SEMESTER
(Elective -I)

CSA-E- 525	AI and Expert System	3	0	0	3	Max. Marks : 100
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UNIT-I **General Issues and Overview of AI:** The AI problems, what is an AI technique, Characteristics of AI applications. Introduction to LISP programming: Syntax and numeric functions, Basic list manipulation functions, predicates and conditionals, input output and local variables, iteration and recursion, property lists and arrays.

UNIT-II **Problem Solving, Search and Control Strategies:** General problem solving, production systems, control strategies forward and backward chaining, exhaustive searches depth first breadth first search.

Heuristic Search Techniques: Hill climbing, branch and bound technique, best first search & A* algorithm, problem reduction & AO* algorithm, constraint satisfaction problems.

Knowledge Representations: First order predicate calculus, resolution principle & unification **Planning:** Overview an example domain the block word, component of planning systems, goal stacks planning.

UNIT-III **Expert Systems:** Introduction to expert system and application of expert systems, various expert system shells, knowledge acquisition, case studies, MYCIN. **Learning:** Rote learning, learning by induction, explanation based learning.

Books Recommended:

1. Elaine Rich and Kevin Knight, "Artificial Intelligence", TMH.
2. Eugene Charnick, "Artificial Intelligence", Pearson.
3. Dan. W. Patterson, "Introduction to Artificial Intelligence and Expert Systems", PHI.
4. Nils J. Nilson, "Principles of Artificial Intelligence", Narosa Pub.
5. Clocksin & C. S. Melish, "Programming in PROLOG", Narosa Pub.
6. M. Sasikumar, S. Ramani etc., "Rule based Expert System", Narosa Pub.

Approved by BOS on 05-05-2016

(Signatures)
D. Shinde, [Signature], [Signature], R. K. Kataria

MCA - V SEMESTER
(Elective -I)

CSA-E- 526	Multimedia and web Technology	3	0	0	3	Max. Marks : 100
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UNIT -I Internet, Growth of Internet, Owners of internet, Anatomy of Internet. APRANET and Internet history of World Wide Web. Evolution of WWW, Basic features, WWW Browser, WWW Servers, HTTP, Universal Resource Locator, Search Engines and their Categories, Searching Criterion, WWW and Hypertext. Basics of Browsers, Electronic Mail, FTP, Telnet, and Internet Relay chat.

UNIT-II Internet Technology and Protocols; Internet protocols, TCP/IP and its format TCP/IP based packages SLIP, PPP Network and Network Devices: Network Architecture, Ethernet, FDDI and ATM. Addressing in Internet: DNS, Domain Name and their Organization, Understanding the Internet protocol Address. Client Server concepts, their architecture and application. Getting Connected - Items needed to connect.

Web Publishing: Overview, web hosting, Document interchange Standards, Component of web publishing, Document Management, Web Page Design Consideration and Principles, How to register a web page on search engine, Publishing Tools.

HTML: Anatomy of HTML document, versions of html, elements of html syntax, head & body sections, building html documents insertion texts, images, hyperlinks, backgrounds and color controls , different, html tags, table: table layout and presentation , use of font size & attributes, list types and its tags.

UNIT- III JavaScript overview, JavaScript and the www, JavaScript vs. VB script, JavaScript vs. java, JavaScript versions, script element, inline JavaScript, including JavaScript. Functions: functions introduction, calling functions. Java script comments: comments overview, when to comment, types of comments Variables: variables overview, declaring variables, types of variables, casting variables, alert box. Expressions: arithmetic operators, assignment operators, logical operators, expressions and precedence. Statements: if statement, for statement, while statement, break/continue.

Books Recommended:

1. Alexix Leon and Mathews Leon, "Internet for everyone", Vikas Pub.
 2. Mansoor Alam, "Internet and Web design", Pragya Pub.
 3. V.K. Jain, "O-Level module - M 1.2 Internet & web page designing", BPB Pub.
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Approved by BOS on 05-05-2016



MCA - V SEMESTER
(Elective -II)

CSA-E- 527	Bio-Informatics	3	0	0	3	Max. Marks : 100
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UNIT-I **Bio-informatics an overview:** Introduction, Objectives of bio-informatics, Kind of data used, information molecules, basic structure of nucleic acids, DNA, RNA, DNA sequencing and polymerase chain reaction (PCR) protein structure functions, protein folding and characterization

UNIT-II **Biological databases:** Introduction, types of databases, nucleotide and protein sequence databases. Major bio-informatics databases, introduction to bio-statistics, data integration date analysis, operating system (LINUX, UNIX) HTML, XML, CML. BSML

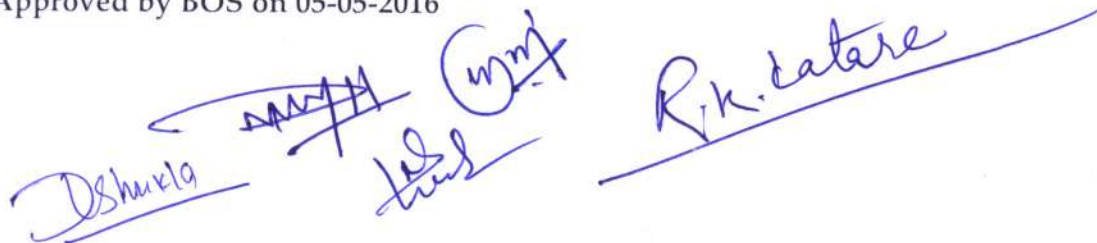
Sequence analysis, models for sequence analysis, methods for alignments (dot matrices) methods for optical alignment (gap penalties and scoring matrices tools for sequence alignment- Fasta, BLAST, PSI- BLAST, Mukltiple sequence alignment (MSA) - tools and applications, Phylogenetic analysis, phylogentic trees, distance matrix, (MD) and character based method, methods of phylogenetic evaluation, gene prediction methods, gene prediction tools, gene mapping tools, gene mapping, DNA sequencing algorithm for alignment of sequencing fragments, DNA micro arrays.

UNIT-III **Proteomics:** Proteome analysis, tools for proteome analysis, different structural proteins, protein classification, methods of structure prediction (known folds and unknown folds). Protein function prediction, metabolic pathways, gene networks their properties and analysis.

Books Recommended:

1. Attwood, "Introduction to Bio-informatics", Pearson Education.
 2. David W Mount, "Bioinformatics - sequence and Genome analysis".
 3. S. C. Rastoge, "Bioinformatics - concepts skills and applications", PHI.
 4. Irfan K Khan, "Recent advances in Bioinformatics".
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Approved by BOS on 05-05-2016

The block contains four handwritten signatures in blue ink. From left to right, they are: 'D. Shukla', a signature that appears to be 'S. C. Rastoge' with a large 'X' over it, 'Irfan K Khan' (partially obscured), and 'R. K. Satare'.

MCA - V SEMESTER
(Elective -II)

CSA-E- 528	Data Mining	3	0	0	3	Max. Marks : 100
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UNIT - I **Introduction :** Data mining introduction, Data mining verses query tools, Data mining in marketing, Practical applications of data mining, Architectures of data mining system, Designing Graphical user interface based on a data mining query language.

Measuring Data Mining effectiveness: Accuracy, speed and cost, Embedding data mining into your business process.

UNIT - II **Mining Spatial Database:** Spatial Data Cube Construction and Spatial OLAP, Spatial Association Analysis, spatial Clustering Methods, spatial Classification and Trend Analysis, Mining Raster Databases.

Mining Multimedia Databases: Similarity search in Multimedia Data, Multidimensional Analysis of multimedia Data, classification and prediction Analysis of multimedia Data, Mining associations in multimedia data.

Mining Time-series and sequence Data: Trend Analysis, Similarity search in time series analysis, Sequential pattern mining, periodicity analysis.

Mining Text Database: Text data analysis and information retrieval, text mining : Keyword – based Association and document classification.

Mining the world wide web: Mining the web link structure, Automatic Classification of web documents, construction of a multilayered web Information Base, Web Usage Mining.

UNIT - III **Decision Trees:** Definition, Where to use decision trees, The General Idea, How the Decision Tree work, Strengths and weakness.

Neural Networks: Definition, Where to use Neural Networks, The general Idea, how the Neural Networks Works, strengths and weaknesses.

Books Recommended:

1. Jiawei Han and Micheline Kamber, "Data mining: Concept and Techniques", Elsevier.
 2. Alex Berson and Stephen J. Smith, "Data warehousing, data mining & OLAP", TMH.
 3. Pieter Adriaan's and Dolf Zantinge, "Data mining", Pearson Education.
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Approved by BOS on 05-05-2016



MCA - V SEMESTER
(Elective -II)

CSA-E- 529	Mobile Computing	3	0	0	3	Max. Marks : 100
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UNIT- I Overview of OSI Model : Significance of layered Model , PDUs, SDUs, IDUs, Higher layer Protocols. Switching and Components. Introduction, Applications, history, of wired & wireless Communication systems. Radio Transmission: frequencies ,signal propagation, antenna , types of modulation, FHSS, DSSS. Multiple Access technology for Wireless Communication: FDMA, TDMA, CDMA. **Cellular System:** Introduction, types.

UNIT-II Mobile Data Communication: Cellular Telephony, Structure, Fading, Small scale fading, Multi-path Fading, Speech Coding, Error Coding and Correction, Hand off Management, Switching and authentication, MTSO interconnections, frequency hopping, frequency reuse. Circuit Switched Data Services & Packet Switched Data Services on Cellular Networks, Personal Communication Systems (PCS) Architecture, Digital Enhanced Cordless Telecommunications (DECT,) Personal Access Comm. System (PACS).

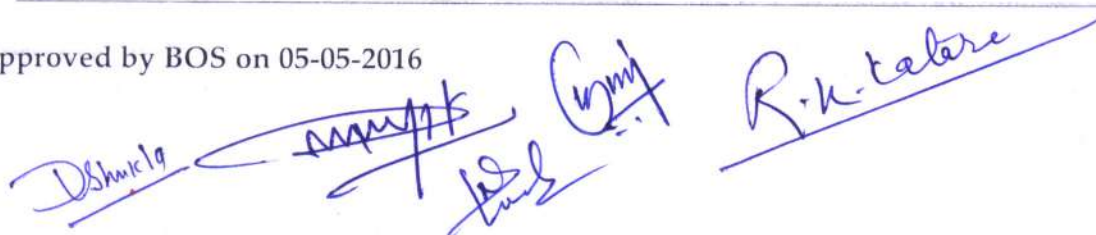
Digital Cellular Systems and Standards: GSM System overview, Architecture, GSM Protocol Model, GSM Mobility Management, SMS security aspects. Broadcast System overview. General Packet Service (GRPS) Architecture, GRPS Network, Interfaces and Procedures (2.5G), 3G
Mobile Services: UMTS and International Mobile Tele-communications (IMT-2000), W-C DMA and CDMA 2000, Quality of service in 3G .

UNIT- III WLAN : Components and working of Wireless LAN, Transmission Media for WLAN, Infrastructure & types of WLAN, IEEE 802.11 Standards , Protocols for WLAN, MACA, MACAW, Infrared technology. Wireless Application Protocol (WAP) model, architecture, Gateway, WAP protocols and WML. Introduction to Bluetooth technology. Wireless in Local Loop (WLL) architecture, products. Satellite as a switch, Components of VSAT system, VSAT topologies, access schemes.

Books Recommended:

1. Jochen Schiller, "Mobile Communication", Pearson Education.
2. Yi -Bing Lin and Imrich Chlamtac, "Wireless and Mobile Network Architectures", Wiley India.
3. Raj Pandaya, "Mobile and Personal Communication System & Services".
4. Uwe Hansmann, Lothar Merk, "Principles of Mobile Computing", Wiley India.

Approved by BOS on 05-05-2016



MCA - V SEMESTER

CSA-C- 530	Software Laboratory V (a)	0	3	3	2	Max. Marks : 100
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Practical based on Elective - I

(A) DISTRIBUTED SYSTEM:

1. How many ways to server are connect to a client?
2. Explain the Bully and Ring Algorithm.
3. Write the procedure of recovery and security.
4. What is the distributed file system and explain its type?
5. Describe the following:
 - (a) CORBA
 - (b) COM
 - (c) DSM Servers

(B) AI AND EXPERT SYSTEM:

1. What is knowledge? With the help of block diagram, explain the different components of knowledge based system?
2. What is AI technique? Explain different AI techniques.
3. Explain the difference between data knowledge belief and hypothesis?
4. Explain the characteristics of AI problem with example?
5. Discuss and compare hill climbing and best first search technique?
6. Write and explain AO* algorithm?
7. Consider 8-puzzle problem. Construct state space for above mentioned problem. Draw state space diagram. Write some rules for performing. Search in defined state space.
8. Explain A* algorithm?
9. What is learning? Draw and explain the block diagram of general learning model?
10. With the help of block diagram explain the components of a typical expert system.

(C) MULTIMEDIA AND WEB TECHNOLOGY:

1. Create Web Page and apply some block level tags, text level tags
2. Create Web Page and apply background color, text color, horizontal rules and special characters.
3. Create Web Page and include ordered list, unordered list, definite list and Nested list.
4. Create Web Page and include links to
 - a. Local page in same folder.
 - b. Page in different folder
 - c. Page on the Web
 - d. Specific location within document
5. Create Web Page and include images with different alignment and wrapped text
6. Create tables and format tables using basic table tags and different attributes.
7. Create a frameset that divides browser window into horizontal and vertical framesets.
8. Create Web Page and apply style rules.
9. Create Web Page including control structures using JavaScript.
10. Programs based on Event Handling.

Approved by BOS on 05-05-2016

(Signatures)
D. Shukla, *(Signature)*, *(Signature)*, R. K. Kabre

MCA - V SEMESTER

CSA-C- 531	Software Laboratory V (b)	0	0	3	1	Max. Marks : 100
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Practical based on Elective - II

(A) MOBILE COMPUTING:

- Q.1 What are the basic differences between wireless WANS and WLANS and what are the common features?
Consider mode of operation, administration, frequencies, capabilities of nodes, services, national /International regulations.
- Q.2 Name reasons for the development of wireless ATM and find the Institutions, companies, and organizations behind the standardization efforts. What is one of the main differences to internet technologies from this point of view?
- Q.3 What type of support for mobility and wireless access is needed in the fixed network? Show the influences of mobility support on the user and control plane respectively?
- Q.4 Name the requirements for a mobile IP and justify them. Does mobile IP fulfill them all?
- Q.5 Compare the different types of transmission errors that can occur in wireless and wired networks. What additional role does mobility play?

(B) DATA MINING:

- Q.1 An E-mail database is a database that stores a large number of electronic mail (e-mail) messages. It can be viewed as a semi structured database consisting mainly of text data. Discuss the following:-
- How can such as e-mail database be structured so as to facilitate multidimensional search, such as by sender, by receiver, by subject, by time, and so on?
 - What can be mined from such an e-mail database?
 - Suppose you have roughly classified a set of your previous e-mail messages as junk, unimportant, normal, or important. Describe how a data mining system may take this as the training set to automatically classify new e-mail messages or unclassified ones?
- Q.2 An object cube can be constructed by generalization of an object oriented database into relatively structured data prior to performing multidimensional generalization. Discuss how to handle set - oriented data in an object cube?
- Q.3 Write note on Data mining (300 words)?
- Q.4 Give detail description for measuring Accuracy explanation & Integration?
- Q.5 Explain the architectures of Data mining?

(C) BIO INFORMATICS:

- Q.1 What is the scope of bio-informatics? Why is it a multi disciplinary field?
- Q.2 What are the various types of protein databases? Which are the most important examples of these types?
- Q.3 PSI-BLAST is a popular program for exploring protein family relationship. Discuss the areas of application of this program.
- Q.4 DNA microchips are being used for gene expression analysis. Explain in your own words. What are DNA arrays? What are oligonucleotide arrays and what are the pros and cons of these relative to each other. Include in your answer how each would perform for expression sample isolated from other species. Assume you are starting from some cells that you want to do a gene expression analysis on.
- Q.5 Gene duplication occurs within the Tryptophan Synthesis pathway.
Give the names of at least two homologous enzymes within the Tryptophan Synthesis pathway

Approved by BOS on 05-05-2016

Dhruv *[Signature]* *Gymj* *R.K. Dalase*

MCA - VI Semester

Code	Title	L	T	P	Credit	Sessional	Semester	Total
CSA-C-621	Major Project (External) based on Industrial Training	-	-	-	06	-	-	300

Every student shall be spending 4 to 6 months for Industrial Training preferably on a live project. The report in hard bound copy (with attached CD and attached coding) should contain the system design, analysis, feasibility, methodology, screen shots, output etc.

The report should contain the original certificate obtained from the Industry / Company about the originality of the work done there. The certificate must indicate the work has been done by the candidate concerned in the industrial environment. The coding must be attached at the end of project report alongwith CD.

Every report should attached a declaration certificate of the candidate that his/ her contribution in project report is original and performed by himself/herself. Each student will submit a project separately on a distinct topic.

Code	Title	L	T	P	Credit	Sessional	Semester	Total
CSA-C-622	Comprehensive Viva Voce based on project	-	-	-	15	-	-	200

It will be based on the content of the project report submitted by the student.

Code	Title	L	T	P	Credit	Sessional	Semester	Total
CSA-C-623	Seminar on project topic/others	-	-	-	06	-	-	200
TOTAL		-	-	-	27	-	-	700

It will be based on the live demonstration of the project completed by student. The student will have to make a power point presentation regarding live demonstration of the output.

Approved by BOS on 05-05-2016

[Handwritten signatures and initials]



DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

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