

CMJ UNIVERSITY, SHILLONG

REGULATION FOR MCA

Duration – Three Years

Eligibility - Graduation in any stream

Scheme of Distribution of Marks

Sr. No.	First Year	Internal Assessment Marks	Term End Examination	Total Marks	Passing Marks
1	Digital Electronics	30	70	100	40
2	Programming In C++	30	70	100	40
3	Computer Architecture	30	70	100	40
4	Data Communication And Computer Networks	30	70	100	40
5	Relational Database Management System	30	70	100	40
6	Internet And Java Programming	30	70	100	40
Sr. No.	Second Year	Internal Assessment Marks	Term End Examination	Total Marks	Passing Marks
1	Software Engineering	30	70	100	40
2	Computer Graphics and Multimedia	30	70	100	40
3	Artificial Intelligence	30	70	100	40
4	Operating Systems	30	70	100	40
5	Visual Basic and Visual C++	30	70	100	40
6	Structure System Analysis and Designing	30	70	100	40

Sr. No.	Third Year	Internal Assessment Marks	Term End Examination	Total Marks	Passing Marks
1	Algorithm And Programming Fundamental	30	70	100	40
2	Embedded Systems	30	70	100	40
3	Ecommerce	30	70	100	40
4	Cyber Laws And Intellectual Property Rights	30	70	100	40
5	Software Testing And Quality Management	30	70	100	40
6	Data Warehousing And Mining	30	70	100	40

MASTER OF COMPUTER APPLICATIONS(First year)

DIGITAL ELECTRONICS

MCA - 101

Unit-1

Number System

Digital electronics-Characteristics of any number system-Number system-Representation of number system-Decimal number-Binary number-Octal number-Hexadecimal number-Conversions-Conversion from any number system to decimal number-Binary to decimal conversion-Octal to decimal conversion-Hexadecimal to decimal -conversion- Conversion of a decimal integer number N to a base R system-Decimal to binary conversion-Decimal to octal conversion-Converting between binary and hexadecimal number-Converting between binary and octal number-Binary arithmetic

Codes

BCD number -Definition-Encoding a BCD number-Unpacked BCD-Packed BCD-Packing a two-byte BCD-Invalid BCD number-Converting between decimal and BCD-From decimal to unpacked BCD-From decimal to packed BCD-From BCD to decimal-Converting between binary and BCD-From binary to unpacked BCD-From two-byte unpacked BCD to binary-BCD Arithmetic -BCD addition-BCD subtraction-Unpacked BCD multiplication-Unpacked BCD division-Gray code-Excess 3 gray code-Excess 3 code-Table of binary code for decimal digit-ASCII code-EBCDIC code

Real Numbers

Floating point representation- IEEE Representation - Floating point representation

Unit 2

Error Correction And Detection

Basic error detection- Parity method for error detection- Error correction and the hamming code- Cyclic redundancy check (CRC) code

Boolean Algebra

Definition- Purpose- Laws and theorems- Boolean algebraic theorem

Simplification of Boolean Function

K Map-Standard representation for logical function-Grouping 2,4,8 adjacent zeros-
Minimization of logical function specified in minterm/maxterm or truth table- Minimization of
SOP- Minimization of POS-Minimization of logical function not specified in
minterm/maxterm- Circuit manipulation using NAND and NOR gate- Combination circuit
minimization- Don't care condition-BCD to excess-3-7-segment display

Combinational Logic

Combinational logic design-Adder -Adder and Subtractor- BCD adder-Combinations

Unit 3

MSI

Multiplexer-De-multiplexer- Decoder-Encoder -Flip Flops- Types of Flip Flops- Uses

Registers And Counter Registers

Shift registers-Synchronous Counters-Asynchronous Counters-Up/down Counter

Unit4

Basic of Semiconductor Physics

-Crystalline Structure of the Solids-Crystal Lattice-Band Theory of Solids-Conductor, -
Insulator, and Semiconductor-Intrinsic and Extrinsic Semiconductor-**Semiconductor
Devices**-Formation of PN Junction-Formation of Depletion Layer-Biasing of PN Junction-
Characteristics of PN Junction-PN Junction as a Amplifier

Unit 5

Junction Transistor

Formation of Junction Transistor-Modes of Study of Junction Transistors- Various Junction
Transistor Configurations - Transistors as an Amplifier - Various gains of Junction Transistor

-D/A and A/D Converters

Digital and Analog Signals- Various Type of Converters- D/A Converters and their
Application-A/D Converters and their Application

PROGRAMMING IN C++

MCA - 102

Unit1

Introduction to OOPS

Programming language-Object-oriented programming paradigm-Object-Oriented Programming-Object-Oriented Languages-Object-based programming languages-Object-oriented programming languages.-Basic concept of oops-Objects-Classes-Encapsulation-Data Abstraction-Inheritance-Polymorphism-Dynamic Binding-Message Passing-Fits of OOP-Application of OOPS-Brief History of C++

Data Types & Variables

Structure of a C++ program.-Comments-Variables-Identifiers-Data types. -Declaration of variables-Initialization of variables-Scope of variables-Constants

Operator and control structures

Types of Operators.-Priority of Operators.-Communication through console.-Output-input-Control Structures.-Conditional structure-Repetitive structures or loops-Bifurcation of control and jumps-The selective Structure: switch

Unit2

Array and pointer

Arrays.-Initializing arrays-Access to the values of an Array-Multidimensional Arrays-Arrays as parameters-Strings-1Initialization of strings-Assigning values to strings-Converting strings to other types-Functions to manipulate strings-Pointers.-Pointers and arrays - Dynamic Memory.

Structures and union

Structures.-Pointers to structures-Nesting structures -User defined data types.-Typedef-Union-Num

Functions

Functions . -Default values in arguments-Void Functions -Call by value and reference-Passing Reference to Functions.-Returning References from Functions-Inline function-Recursive function-Prototyping function

Unit3

classes and objects

Introduction to class.-Class Definition-Classes and Objects-Access specifiers -Private, Public and Protected.-Member functions of the class.-Passing and returning objects.-Pointers to objects.-Array of objects.-The special 'this' pointer

Constructor and destructor

Constructors-Syntax rules for writing constructor functions-Different ways of calling constructor-Overloading Constructors-Destructor

Function Overloading

Function overloading-Precautions to be taken while overloading functions.-Static Class Members-Static Member Functions-Friend Functions-Friend for Overloading -Operators-Granting friendship to another class-Granting friendship to a member function of another class

Unit4

Operator Overloading

Introduction to Operator Overloading. -Operator Overloading Fundamentals.-Implementing the operator functions.-Rules for overloading the operators.-Pointer oddities (assignment) and Operator Overloading.-Overloading the Extraction and Insertion Operators-Conversion functions.-Conversion from basic to user-defined variable.-Conversion from User-Defined to Basic data type-Conversion Between Objects of Different Classes-Conversion function in the Destination Class-Table for Type Conversions

Inheritance

Reusability.-Inheritance concept- single inheritance.-Private derivation-Public derivation-The Protected Access-Summary of derivation-Table of derivation and access specifiers-Using the derived class-Constructor and destructor in derived class.-Object initialization and conversion.-Nested classes (Container classes).-Multilevel inheritance.-Multiple inheritance.-Hybrid Inheritance.-Virtual base class.

Abstract and virtual function

Abstract class. -Virtual function.-Pure virtual function

Unit-5

Templates and exception handling

Templates.-Function template-Class templates-Template specialization-Parameter values for templates-Templates and multiple -file project -Exception handling-Exception not caught-Standard exception-Advanced class type-casting. -Reinterpretcast-Static cast-Dynamic cast-Tonst_cast-Typeid-Preprocessor directives.

File Input OutputInput/Output with files. -Open a file-Closing a file-Methods of Input and Output Classes-Text mode files-State flags-Binary files-Buffers and Synchronization-I/O Manipulation

COMPUTER ARCHITECTURE

MCA - 103

Unit 1 :

Introduction to Computers

Computer: An Introduction -Introduction -What Is Computer-Von Neumann -Architecture-Generation Of Computer-Mechanical Computers (1623-1945)-Pascaline-Difference Engine-Analytical Engine-Harvard Mark I And The Bug-First Generation -Computers (1937-1953)-Second Generation Computers (1954-1962)-Third Generation Computers (1963-1972)-Fourth Generation Computers (1972-1984)-Fifth Generation Computers (1984-1990)-Later Generations(1990 -)-Classification Of Computers-Micro Computer-Mini Computer-Mainframe Computer-Super Computer

Register Transfer and Micro operations

Register transfer-Bus and Memory Transfers-tree-state bus buffers-Memory transfer-Micro-Operations -Register transfer Micro-Operations-Arithmetic Micro-Operations-Logic Micro-Operations-Shift Micro-Operations

Unit 2:

Programming elements

Computer Arithmetic-Addition and subtraction with signed-magnitude-Multiplication -algorithm-Booth multiplication algorithm-Array multiplier-Division algorithm-Hardware algorithm- Divide Overflow-Floating-point Arithmetic operations-Basic considerations-Register configuration-Addition and subtraction- Decimal Arithmetic operations-BCD adder-BCD subtraction

Programming the Basic Computer

Machine language-Assembly language-Assembler-First pass-Second pass-Programming Arithmetic and Logic operations-Multiplication Program-Double-Precision Addition-Logic operations-Shift operations

Unit 3 :

Central Processing Unit (CPU)

Stack organization-Register stack-Memory stack-Reverse polish notation-Instruction Formats-Three- address Instructions-Two – address instructions-One- address instructions-Zero-address instructions-RISC Instructions-Addressing Modes-Reduced Instruction Set Computer-CISC characteristics-RISC characteristics

Input-Output Organization

Modes of transfer-Programmed I/O-Interrupt-Initiated I/O- Priority interrupt-Daisy-chaining priority-Parallel priority interrupt-Interrupt cycle- DMA-DMA Controller-DMA Transfer- Input-Output Processor (IOP)-CPU-IOP Communication-Serial Communication-Character-Oriented Protocol-Bit-Oriented Protocol-Modes of transfer

Unit-4 :

Memory Organization

Memory hierarchy-Main memory-RAM and ROM chips -Memory Address Map-Auxiliary memory-Magnetic disks-Magnetic Tape-Cache memory-Direct Mapping-Associative Mapping-Set- associative Mapping-Virtual memory-Associative memory Page table-Page Replacement

Introduction to Parallel Processing

Pipelining -Parallel processing-Pipelining general consideration-Arithmetic pipeline-Instruction pipeline

Unit 5 :

Vector Processing

Vector operations-Matrix multiplication-Memory interleaving

Multiprocess

Characteristics of multiprocessors-Interconnection structure-Time-shared common -bus-Multi-port memory-Crossbar switch-Multistage switching network-Hypercube interconnection-Inter processor arbitration-Cache coherence-Instruction Ex

DATA COMMUNICATION AND COMPUTER NETWORKS

MCA - 104

UNIT -I

Fundamentals of Data Communication

Introduction-Data Communication Model- Data Communications System Tasks- Communication Network and Services- Data Communications Networking- Wide-Area Networks- Local Area Networks-Protocols and Protocol Architectures- The OSI model-The TCP/IP model

Data Transmission

Concepts and Terminology- Time-Domain Concepts- Frequency Domain Concepts-Why digital communication?-Bandwidth, Data rate and Channel Capacity- Nyquist sampling rate-Shannon Channel Capacity- Line Coding- Modems and Digital Modulation - Transmission Media- Guided Transmission Media- Wireless (Radio) Transmission-Multiplexing- Frequency-Division Multiplexing (FDM)- Time Division Multiplexing TDM-Wavelength Division Multiplexing-Circuit Switching- Space-Division Switches- Time-Division Switches

UNIT 2

Data Link Control

Introduction-Error Detection- Single Parity Check- Cyclic Redundancy Check (CRC)-Error Control mechanisms - Stop-and-Wait ARQ- Go-Back-N ARQ- Selective Repeat ARQ-Flow Control-High-Level Data Link Control (HDLC)- Basic Characteristics of HDLC - HDLC Frame Structure- HDLC Operation

UNIT 3

Local Area Networks and MAC Protocols

Introduction-LAN Architecture-LAN Topologies- Bus and Tree Topologies- Ring Topology-Star Topology- Medium Access Control-Round Robin- Reservation- Contention-MAC Frame Format-Logical Link Control-LAN Systems-Ethernet and Fast Ethernet (CSMA/CD)- Token Ring-IEEE 802.5 Medium Access Control- FDDI-Interconnection of LANs - Bridges

UNIT 4

INTRODUCTION TO COMPUTER NETWORK

Introduction to Computer Network-What is Computer Network -Key Issues For Computer Network-Classification of Computer Network-LAN-MAN-WAN-What is Internet?-Some Terminologies-LAN Topologies-Bus-Ring-Star-Tree-Introduction of OSI Reference Architecture

OSI PROTOCOL ARCHITECTURE

Protocols and Protocol Architecture-The OSI Protocol Architecture-Layered - Architecture-Peer-to-Peer Processes-Interfaces between Layers-Layer Organisation-Layers in the OSI Model-The TCP/IP Protocol Architecture-General Comparison between OSI and TCP/IP-Who's who in Standards?

PHYSICAL LAYER

Introduction -Coding Data in Signals-Communication Modes-Simplex -Half-duplex -Duplex or full-duplex -Transmission Modes-Bit synchronization-Byte synchronization-Frame synchronization-Transmission Media-Guided-Twisted Pair-UTP and STP-Coaxial Cable-Fiber Optics -Unguided -Microwave Transmission Satellites Transmission-Signal Propagation vs. Transmission Delay

DATA LINK LAYER

The Introduction of Ethernet-History of Ethernet-Ethernet Technologies-Types of Ethernet-Ethernet cabling-Manchester encoding-Switched Ethernet-Fast Ethernet-Gigabit Ethernet-IEEE 802.2 logical link control-Data Link Layer Design Issues-Framing-Error control-Flow control-Error detection and correction-Error-correcting codes-Error-detecting-deleting codes-Data link protocol-HDLC

NETWORK LAYER

Introduction-Addressing in TCP/IP -Internet Protocol-Internet (IP) Addressing -Routing of IP packets -IP Datagram-IP Datagram header -Checksum calculation -Fragmentation-ARP - Address Resolution Protocol -ARP Overview -ARP Packet format-RARP - Reverse Address Resolution Protocol-ICMP -Internet Control Message -Protocol-Types of ICMP messages-ICMP message format-Error reporting messages-Query Messages

UNIT 5

TRANSPORT LAYER

Introduction-UDP - User Datagram Protocol-Process-to-Process Communication-Port Numbers-Socket Addresses-UDP Datagram-UDP Checksum Computation-UDP Operation-Use of UDP-TCP - Transmission Control Protocol-Services offered by TCP-TCP Segment-Connection in TCP-Flow Control mechanism in TCP-Error Control -mechanism in TCP-TCP operation

APPLICATION LAYER

Introduction-Client Server Model-Client-Server-Concurrency-Connectionless Iterative Server-Connection-Oriented Concurrent Server-Processes-FTP (File Transfer Protocol) - An example network application.-Control Connection-Data Connection-Communication-Command Processing-File Transfer

RELATIONAL DATABASE MANAGEMENT SYSTEM

MCA - 105

UNIT 1

INTRODUCTION OF DATABASE SYSTEMS

Basics of database systems-Traditional file oriented approach-Motivation for database approach-The evolution of database systems -Database basics-Three views of data-The three level architecture of DBMS-Relational database systems -Data models-Database languages-Client-server and multi-tier architectures-Multimedia data-Information integration-Data-definition language commands-Overview of query processing-Storage and buffer management -Transaction processing-The query processor

THE ENTITY-RELATIONSHIP DATA MODEL

Introduction of entity Relationship model -Elements of the E/R Model -Relationship-Requirements-Entity-Relationship Diagrams -Multiplicity of Binary E/R Relationships -Design Principles -Avoiding Redundancy -Simplicity Counts-Extended ER Models

UNIT 2

REPRESENTING DATA ELEMENTS

Data Elements and Fields -Representing Relational Database Elements -Records -Representing Block and Record Addresses -Client-Server Systems -Logical and Structured Addresses -Record Modifications -Index Structures -Indexes on Sequential Files -Secondary Indexes -B-Trees -Hash Tables

THE RELATIONAL DATA MODEL

Basics of the Relational Model -Relation Instances -Functional Dependencies -Rules About Functional Dependencies -Design of Relational Database Schemas -Normalization-First Normal form-Second Normal Form-Third Normal Form-BoyceCodd Normal Form-Multi-valued dependency-Fifth Normal Form

UNIT 3

RELATIONAL ALGEBRA

Basics of Relational Algebra -Set Operations on Relations -Extended Operators of Relational Algebra -Constraints on Relations -Modification of the Database-Views-Relational Calculus-Tuple Relational Calculus-Domain Relational Calculus

SQL Introduction and Usage Of SQL-DDL Statements-DML Statements-View Definitions -Constraints and Triggers -Keys and Foreign Keys -Constraints on Attributes and Tuples -Modification of Constraints -Cursors-Dynamic SQL

UNIT 4

NORMAL FORMS

First Normal Form-Second Normal Form-Third Normal Form-BCNF-Fourth Normal Form-Fifth Normal Form-Difference between 4NF and 5NF

QUERY EXECUTION

Introduction to Physical-Query-Plan Operators -One-Pass Algorithms for Database Operations -Nested-Loop Joins -Two-Pass Algorithms Based on Sorting -Two-Pass Algorithms Based on Hashing -Index-Based Algorithms -Buffer Management -Parallel Algorithms for Relational Operations -Using Heuristics in Query Optimization-Basic Algorithms for Executing Query Operations

THE QUERY COMPILER

Parsing -Algebraic Laws for Improving Query Plans -From Parse Trees to Logical Query Plans -Estimating the Cost of Operations -Introduction to Cost-Based Plan Selection -Completing the Physical-Query-Plan -Coping With System Failures -Issues and Models for Resilient Operation -Redo Logging -Undo/Redo Logging -Protecting Against Media Failures

UNIT 5

CONCURRENCY CONTROL

Serial and Serializable Schedules -Conflict-Serializability -Enforcing Serializability by Locks - Locking Systems With Several Lock Modes -Architecture for a Locking Scheduler -Managing Hierarchies of Database Elements -Concurrency Control by Timestamps -Concurrency Control by Validation

MORE ABOUT TRANSACTION MANAGEMENT

Introduction of Transaction management-Serializability and Recoverability -View Serializability -Resolving Deadlocks -Distributed Databases -Distributed Commit Distributed Locking

DATABASE SYSTEM ARCHITECTURES

Centralized And Client-Server Architectures-Server System Architectures-Parallel Systems-Distributed Systems-Network Types

DISTRIBUTED DATABASE

Homogeneous And Heterogeneous Database-Distributed Data Storage-Distributed Transaction-Commit Protocols-Concurrency Control In Distributed Databases-Availability

INTERNET AND JAVA PROGRAMMING

MCA – 106

Unit 1

INTERNET FUNDAMENTALS

History of Internet-Hardware and software requirements -ISP and Internet accounts-Web-Home Page-URL-Browser-Security on Web, Plugins and helpers -Searching Tools and Search Engine -Resources of Internet

Unit 2

WEB AUTHORING USING HTML

Creating a Web Page-Method of linking-Publishing-HTML-Text Formatting & Alignment- - Font Control -Arranging Text in Lists -Images in Web Pages -Background Images & Colors – Frames

Unit 3

JAVA SCRIPT

What is Java Script?-What is the difference between Java and JavaScript?-Adding JavaScript to Your Document-Embedding JavaScript-Adding a JavaScript Block in the <HEAD>-Linking JavaScript

JAVA PROGRAMMING

Who developed Java and When-Introduction to Java-Java History-Java features-Difference between Java and HTML?-Java and World Wide Web-Hardware and Software Requirements-Java Environment-Java Program structure-Java Tokens-Java virtual Machines -Constants, Variables, Data Operators and Expressions-Decisions Making and Lopping Classes and Methods -Interfaces and Packages-Managing Errors and Exceptions

Unit 4

APPLET PROGRAMMING

Applet fundamentals-Code and Code Base Tags-Local and Remote Applets and Applications-Applet Life Cycle -Creating an Executable Applet -Passing Parameters to Applies -Exception Handling

JAVA BEANS, JDBC

Java Beans -JDBC

Unit 5

CORBA,RMI,ODBC

OVERVIEW OF CGI PROGRAMMING - Concept of CGI-Program in CGI And PERL-Structure of CGI

MCA (Second year)

Software Engineering

MCA 201

UNIT –1

INTRODUCTION TO SOFTWARE ENGINEERING

Introduction of software-The evolving role of software-Software characteristic-Types of software-Software application-What is software engineering-Software engineering concepts -What does software engineering involve-Importance of software engineering-Principles of software engineering

SOFTWARE ENGINEERING APPROACHES, PROBLEMS, CRISIS AND MYTHS

Software engineering approach-Software engineering problem-Causes of the problem-Software crisis-Software myths-Management Myths-Customer Myths-Practitioner's Myths-Bringing formality to the software development process

UNIT-2

THE PROCESS, DESIGN CONCEPTS AND MODELS

Software process-Characteristics of software process-Software process, projects & products-Design concept and modeling-Concepts-Design Objectives-Design Principles-Software engineering process models-Waterfall Model -It's Advantages and Limitations-Prototype Model-It's Advantages and Limitations-Prototype's effect on software development cost-Iterative Enhancement Model-Spiral Model-COCOMO Model

UNIT 3

PROJECT SCHEDULING AND TRACING

Software project planning-Estimation of a project-Cost estimation-Building cost estimation – models-Process-based estimation-Project scheduling and tracing-Design tools and techniques-Structure charts-Gantt charts -Activity networks -Structured design methodology-Identify the input and output data elements

RISK ANALYSIS

Software project planning-Introduction to risk analysis-Risk assessment-Risk evaluation-Risk management

SOFTWARE METRICS

Project management concept-Software project metrics-Software metrics-Software metrics type-Software metrics steps-Software metrics rules-Software metrics objective

UNIT –4

SOFTWARE QUALITY

Introduction of software quality-Factors of software quality-Software quality assurance-Activities-Formal technical review -Phases of ftr-Software configuration management

COUPLING AND COHESION

Introduction to Coupling-Definition-Factors affecting coupling-Introduction to Cohesion-Levels of cohesion-Coincidental-Logical cohesion-Temporal cohesion-Procedural cohesion-Communicational cohesion-Sequential cohesion-Functional cohesion

CODING

Introduction-Programming practice -Top-down and bottom-up-Structured programming-Hiding information-Verification & validation-Good coding style

UNIT-5

SOFTWARE TESTING STRATEGIES

Strategic approach to software testing-Unit testing-Integration testing-Validation testing-System testing-The art of debugging

MAINTENANCE

Introduction-Categories of maintenance-Corrective maintenance-Adaptive maintenance-Perfective maintenance-Maintenance characteristic -Structured versus unstructured -maintenance-Maintenance tasks-A maintenance organization-Flow of events-Maintenance side effects-Coding side effects-Data side effects-Documentation side effects-Maintaining "alien code"

Computer Graphics and Multimedia

MCA 202

Unit 1

Introduction to Computer Graphics

Development of Computer Graphics-Basic Graphics System and Standards-Continual - Refresh and Storage Displays-Random Scan and Raster Scan Graphics-Color CRT Monitors-Display Processors and Character Generators

2-D Graphics

Introduction -Two-dimensional Viewing-Basic Transformations

Unit 2

Interactive Graphics

Interactive Graphics Devices-Interactive Picture Construction Techniques

3-D Graphics-I

Three Dimensional Concepts-3-D Representation- 3-D Transformations-3-D Viewing

Unit 3

3-D Graphics-II

3-D Volumes Spline Curve and Surfaces- Fractals- Quadtree and Octree Data Structures- Hidden Surfaces and Surface Rendering-Animation

UNIT 4

Multimedia technology

Introduction to Multimedia Technology-Computers-Communications-Entertainment-Framework for Multimedia Systems-Multimedia Devices, Presentation Devices, and the User Interface-Multimedia Presentation and Authoring-Digital Representations of Sound-Transmission of Digital Sound-Brief Survey of Speech Recognition and Generation-Digital Video and Image Compression-The JPEG Image -Compression Standard-Digital Audio Signal Processing-Digital Music-Making-The MPEG -Motion Video Compression Standard-DVI Technology

UNIT 5

Time-Based Media Representation and Delivery-Multimedia Software Environment-Limitations of Workstations Operating System-M/M System Service-OS Support for Continuous Media Applications-Media Stream Protocol

Artificial Intelligence

MCA 203

UNIT 1

Introduction to AI-

What is Artificial Intelligence?-Is AI Possible-Some AI Tasks-What we can do with AI?-AI Techniques-Knowledge Representation-Search-The Underlying Assumption

Knowledge Representation

What to Represent?- Application of Knowledge in AI- Properties for Knowledge - Representation Systems-Approaches to Knowledge Representation -Simple Relational Knowledge- Inheritable Knowledge-Inferential Knowledge-Procedural Vs. Declarative Knowledge-Issues in Knowledge Representation-The Frame Problem-Forward Vs Backward Reasoning

UNIT 2

First Order Predicate Logic

Logic-Introduction to Propositional Logic- Predicate Logic- Introduction to Predicate Logic- Predicate Logic: Semantics-Quantification-Well-Formed Formula For First Order Predicate Logic-From Wff to Proposition-Transcribing English to Predicate Logic Wffs-Properties of Statements-Inference Rules-Resolution- Conversion to Clausal Form-Unification

UNIT 3

Structured Knowledge Representation

Semantic Network-Conceptual Graph-Frame Structures- Conceptual Dependency-Scripts

Problem, Problem Space and Search-Search and Control Strategies-Preliminary Concepts-Water Container Problem- Production System-Problem Characteristics- Means-end analysis- Problem Reduction- Uninformed or Blind Search- Breadth-First Search- Depth-First Search-Informed Search- Hill Climbing Methods- Best First Search-A* Algorithm

UNIT 4

Learning

What is Learning?-Types of Learning-Rote Learning-Learning by Taking Advice- Learning by Problem Solving-Inductive Learning-Explanation Based Learning

Expert System

What is Expert System?- Expert System Application Area-Expert System Structure-Expert System Characteristics-Conventional Vs Expert Systems-Participants in Expert Systems Development-Tools For Development of Expert System-MYSIN

UNIT 5

Matching and Reasoning

Fuzzy Logic-What is Fuzziness?-Current Application of Fuzzy Logic- Overview of Fuzzy Logic-Fuzzy Sets- Hedges-Fuzzy Set Operations-Fuzzy Inference-Memory Organisation-Neural Networks and Parallel Computation-Neural Network Architectures-Genetic Algorithm-Matching- Variable Matching

Operating Systems

MCA 204

UNIT 1

Introduction to operating systems

Introduction of Operating System-Quality of Operation system-Feature of operating system-Architecture of operating systems-Operations of OS

Classification of Operating Systems

Evolution of operating System-Serial Processing -Batch Processing-Multiprogramming-Types of Operating System-Single-user, single tasking -Single-user, multi-tasking -Multi-user, multi-tasking -Real-Time operating System-Batch -Timesharing-Personal computing

Process Management

Introduction-Definition of a Process-Process concepts-Process State -Process Scheduling-Types of Scheduler-Long term -Short term-Medium term-Scheduling and performance -Criteria-Scheduling Algorithms-FIFO-SJF-Round Robin-Multilevel Queue Scheduling-Priority Based Scheduling-Multilevel feedback Queue Scheduling-Multiple-Processor Scheduling-Multiple-Processor Scheduling-Real-Time Scheduling

UNIT 2

Introduction to virtual memory

Introduction-Basic of Virtual Memory-Objective-Paging-Demand Paging-Basic Concept -Process Creation-Page Replacement-Allocation of Frames-Thrashing

Paging

Pre paging-Page sizing-Inverted Page Table

Interprocess communication and synchronization

Process synchronization-Introduction-Mutual Exclusion-Semaphore-Properties of semaphore-Synchronization tool -Classic Problems of Synchronization

UNIT 3

Deadlock

Introduction Of deadlock-System Model -Deadlock Characterization-Deadlock Prevention -Deadlock Avoidance -Methods for Handling

Memory management

Address Binding-Logical – Versus Physical – Address Space-Dynamic Loading-Dynamic Linking and Shared Libraries-Swapping-Contiguous Memory allocation-Memory Protection-Memory allocation-Fragmentation-Paging-Basic Method-Hardware Support-Segmentation-Basic Method-Hardware-Implementation of Segment Tables-Segmentation with paging – MULTICS-OS/2 32-Bit Version

UNIT 4

File system interface

File Concept-File Attribute-File operations-Access Methods-Sequential Access-Direct Access-Other Access Methods-Directory Structure-Single level directory-Two level directories-Tree-Structured directory-Acyclic-Graph Directories-File-System Mounting-File Sharing-Multiple Users-Remote File Systems-Protection

Security

The Security Problem -User Authentication -Program Threats-System Threats -Securing Systems and Facilities -Intrusion Detection -Cryptography -Computer-Security-Classifications-Computer-security

UNIT 5

Unix

A Sample Login Session -Logging On-Using the On-line Man Pages -Using man and more - Logging Off- Directory and File Structure-File Names -Directories -The df Program -Your Login Directory -Subdirectories -Specifying Files -Protecting Files and Directories -The Unix Shell Syntax -Creating Files -Text Editors -Files as Output and Log Files -Logging Your Actions to a File -Comparing Files -Searching Through Files - The System and Dealing with Multiple Users -Information about Your Processes -Information about Other People's Processes - Sending Messages and Files to Other Users - /usr/ucb/mail - PINE - Write - Talk -Addressing Remote Nodes - shortcuts -Aliases -Wildcards -Directory Specifications - Environment Variables -History -The .login and .cshrc Files - Job Control -The fg and bg Commands -Starting Jobs in the Background - Some Common and Useful Unix Commands For Files

Visual Basic and Visual C++

MCA 205

Unit: I

Welcome to VB: What is Visual Basic - Features of Visual Basic - Visual Basic Editions - The Visual Basic Philosophy - Developing an Application? Creating an Application: Objectives- The Tool Box -Project Explorer - The Properties Window - The Form Window - What does Visual Basic 6 have for you to create Applications.2nd Look at IDE, Forms and controls: Objectives - The Form - The Working with a Control - Opening the Code Window. Variables in Visual Basic: Objectives - What is a Variable.

Writing Code in VB: Objectives - The Code Window - The Anatomy of Procedure- Editor Features - The For.. Next Statement - The Decision Maker... If..Loop - The While loop - Selective Case... End Select. Working with Files: Objectives - Visual Basic File System Controls - Types of Files - Working with Files.

Menus: Objectives - Building the User Interface. The first step - All about Menus. MDI Applications: Why MDI Forms - Features of an MDI Form- Loading MDI Forms and Child Forms - The Active Form property. Debugging Tips: Objectives - The Debugging Methods. The Common Dialog control: Working with the Common Dialog Control - The file open Dialog Box - Saving a file - Changing the color. Introduction to Databases: Why databases - What is a Database - Which Database. Working with the Data Control : The Data Control - The Bound Controls - Caution - Coding.

Unit-II

DOA: The Jet Database Engine - Functions of the Jet Database Engine - SQL - The DAO Object Model. Additional Controls Available in VB 6.0 - Objectives - SSTab Control. Active X data Objects - Objectives Why ADO - Establishing a Reference.

Crystal And Data Reports: Crystal Reports - Data Report. Distributing your application: Objectives - Working with the Packaging and Deployment Wizard. Active X: Objectives - What is ActiveX - Why ActiveX. ActiveX and Web pages: Objectives - ActiveX and Internet. ActiveX Documents: The Application Form Document . Sample Application in VB Like Inventory Control.

UNIT III

VISUAL C++

Introduction to Visual C++-Getting started with Visual C++-Reading Keystrokes from the Keyboard-Handling mouse in VC++

UNIT IV

Creating Menus-Toolbar Buttons-Status Bar Prompts-Dialog Boxes: Using Buttons and Text Boxes-Creating Check boxes and Radio Buttons-LIST Boxes-Combo Boxes and Sliders-File Handling

UNIT V

Multiple Documents and Multiple Views-Creating Internet programs - including a web browser-Creating ActiveX controls

Structure System Analysis and Designing

MCA 206

Unit 1

What is a System?-Characteristics of a System-Organization-Interaction-Interdependence-Integration-Central Objective-Elements of a System-Outputs and Inputs-Processor(s)-Control-Feedback-Environment-Boundaries and interface-Contemporary Systems-Information System-Formal Information System-Categories of Information-Informal Information System-Computer-Based Information System-Transaction Processing System-Management Information System-Decision Support System-Expert Systems-Characteristic Features of Expert System -System Development Life Cycle

UNIT -2

Problem Definition -Tools For Structured Analysis -Data Flow Diagrams-Data Dictionary-Importance Of Data Dictionary-Process Organization and Interaction-Process Descriptions-Decision Tables and Decision Trees-Data Collection

Unit 3

System Planning -Planning Alternatives-Feasibility and Proposal-Design Consideration-User and Management Involvement-Project Selection-System Feasibility -Preliminary Investigation of Project Selection-Selection of a System Plan-The Systems Proposal-System Cost and Benefits-Costs and Benefits Identification-Comparative Cost Analysis-Data Processing Cost

Unit 4

Structured Design -Top-down Designing-Bottom-up Designing-Data Administration - Auditable System -Need and Objectives-Computer Audit Program-Hardware Audit-Software Audit-Procedure Audit-Financial Audit-Audit Trail-Audit Approach and Methods-Auditing with the Computer-Logical Designing Requirements of a System-Designing the Physical Data Base-Design of Input-Objectives of Input Design-Forms Requirements Design-Classification of Forms-Form Control-Input Stages-Input Media-Avoiding Errors in Data-CRT Screen Design-Program Specification -Specification Principles-Development Completion Schedule-Structured Walk troughs

Unit 5

Project Management and Control-Project Management & Development Standards-Project Control-Cost Estimation-Single Variable Model-COCOMO Model-Organizing the Project Team-Project Tools (Gantt Charts, PERT & CPM)-System Conversion and Implementation-Conversion Methods-Parallel Systems-Direct Conversion-Pilot System-Phase-in Method - Conversion and Operation Plans-System Follow-ups-Correcting Design Errors-Correcting Coding Errors-Updating Documentation and Test Data-Adding, Modifying or Redeveloping the Code-Quality Assurance-Quality Assurance Goals In the Systems Life Cycle-Quality Factors Specifications-Software Design Specifications-Software Testing and Implementation-Maintenance and Support-Levels of Quality Assurance

MCA Third year

ALGORITHM AND PROGRAMMING FUNDAMENTAL MCA 301

UNIT 1

Basic of Algorithms

Algorithm-Abstract Data Type-The Running Times Of a Program-Good Programming Practice

Basic Data Type

The data type "list"-Static and Dynamic Memory Allocation-Pointers-Implementation of lists-Linear Linked List-Array implementation of list-Pointer implementation of list-Doubly-link lists-Stack-Queues-Mapping

Basic Operations and Sets

Sets-An ADT with union, intersection and difference-Bit vector implementation of sets-Link-list -implementation of sets-The data dictionary

Algorithms Analysis Techniques

Efficiency of algorithms-Analysis of recursive programs-Solving recurrence equation

Algorithms Design Technique

Divide and conquer algorithms-Dynamic programming-Greedy algorithm-Minimum-cost spanning -trees-Minimum Spanning Tree-Prim's Algorithm-Kruskal's Algorithm-Shortest Paths-Dijkstra's Algorithm-Backtracking

UNIT 2

Trees and Sorting

Basic terminology-Implementation of tree-An Array Representation of Trees-Representation of Trees by -List of Children-Binary trees-The internal sorting model-Bubble sort-Insertion sort-Selection sort

Heap sort-Divide and conquer -Merge sort -Quick sort -Binary search

Algorithms for External Storage

A Model of External Computation-External sorting-Characteristics of External Sorting-Criteria for Developing an External Sorting Algorithm-Important Uses of External Sorting-Merge Sort--A Digression-Top-Down Strategy-Bottom-Up Strategy-Storing Information in Files-Hashed Files-Indexed Files

Memory Management

The Issues in Memory-Garbage Collection Algorithms For Equal-Sized Block-Collection in Place

Buddy system-Distribution of blocks-Allocation blocks-Returning blocks to available storage-Storage compaction and Compaction problem

NP Complete Problem

Introduction-Polynomial-time-Abstract Problems-Encoding-NP-Completeness and Reducibility-NP-Completeness-Circuit Satisfiability-NP-Complete Problems-The Vertex-cover Problem-The Subset-sum Problem-The Hamiltonian-cycle Problem-The Traveling-salesman Problem

Unit 3

Introduction to Computer Problem Solving

Problem Specifications-Problems, Specifications and Solutions-Requirements for solving problems by computer-The Problem Solving Aspect-Problem Definition Phase-Getting started on a problem-Use of specific examples-Similarities among problems-Working backwards from the solution-General problem-solving strategies-Top Down Design-Breaking a problem into sub problems

Program Verification-Computer model for program execution- Input and output assertions

Solution Designing Using Flowcharts

Introduction-Objectives-Meaning Of A Flowchart-Guidelines For Drawing A Flowchart-Advantages Of Using Flowcharts-Limitations Of Using Flowcharts-Few Examples On Flowcharting

Unit 4

Programming Fundamentals

Analyzing Algorithms And Problems-Correctness-Amount of Work Done-Space Usage-Simplicity-Optimality-Operator Precedence and Associativity-Special Cases-Expressions and Operators -Lvalues-Primary Operators-Binary Operators-Assignment Operators-Comma Operator (,)-Unary Operators-Program Verification-Implications and symbolic execution-Verification of program segments with branches-Verification of program segments with loops-Verification of program segments that employ arrays

Basic Algorithms

Exchanging Variables-Fibonacci Numbers-Generating Fibonacci Sequence

Unit 5

Complexity of Algorithms

Growth of Functions-Simplicity-Optimality

Elementary Mathematics

Introduction-Mathematical Induction-Probability Theory-Axioms of probability-Discrete probability distribution-Continuous uniform probability distribution-Conditional probability and independence-Permutation and Combinations-Permutation-Notations for Permutations-Principle of Counting (Principle of Multiplication)-Addition Principle-Combinations-Factorial representation-Restricted Combination-Numbers-Prime Numbers-Congruence's-Logarithms

Sequence & Series

Sequence-Real sequence-Arithmetic Sequence-Geometric Sequence-Series-Progression-Arithmetic Progression-Geometric Progression

EMBEDDED SYSTEMS

MCA 302

UNIT-I

Introduction to Embedded systems

Introduction, Embedded Systems and their Characteristic, Real Time Systems, Classification and Requirements of Embedded Systems, Embedded Systems Design World - a View, Major Components of an Embedded System

UNIT-II

Microprocessor and Microcontroller Basics

Introduction, Basic of Microprocessor, Some microprocessor design options, The microcontroller Basics, Microcontroller Characteristics & applications, Some examples of microcontrollers, Programming microcontrollers

UNIT-III

Embedded Programming Basics

Introduction, Example Embedded Program, Compiling, Linking and Locating, Downloading and Debugging

UNIT-IV

Embedded Operating System Features

Introduction, Embedded Operating System, RTOS design issues,

UNIT-V

Real time kernels, Performance Characteristics of RTOSs, An example RTOS: VxWorks

ECOMMERCE

MCA 303

UNIT – I :

Electronic Commerce: Electronic Commerce - Electronic Data Interchange - Value Added Networks - Electronic Commerce Over the Internet - Internet Commerce Examples - CommerceNet. PCs and Networking: Networking - Communication Media. Electronic Mail: Computer Communication Systems - ISO's Open System Interconnection Model - Electronic Mail - The X.400 Message Handling System - Internet Mail - E-Mail Security - X.500 Directory Services - Mail User Agent.

UNIT – II :

The Internet: The Internet : A Brief Introduction - Internet Communication Protocols - Internet Services and Resources - Internet Mail - Internet Search - Concerns About The Internet - Browsers - Hypertext Markup Language - Java- The Java Electronic Commerce Framework - Internet 2. Intranets: Intranet - Intranet services - Intranet Implementation - The Webmaster - Electronic Data Interchange: Electronic Data Interchange - Costs and Benefits - components of EDI Systems - EDI Implementation Issues - Legal Aspects.

UNIT – III :

The UN/EDIFACT Standard: Introduction - An EDIFACT Message - Interchange structure - UN/EDIFACT Message Directories. The Internet and Extranets for Electronic Commerce: E-Commerce - Commerce over the Internet - Commerce over Extranets. Identification and Tracking Tolls for Electronic Commerce: The EAN System - EANCOM - Article. Numbering - Bar Coding - The serial shipping container code and the EAN label - EAN Location Numbers - How It Works: Warehousing Example. Internet Bandwidth and Technology Issues: Bandwidth Issues - Technology Issue for The Internet/NII - NII Standards - NII services - Actors in the NII - NII Agenda - GII.

UNIT – IV :

Security Issues: Security Concerns – Security solutions – Electronic Cash Over the Internet – Security and UN/EDIFACT Messages – Internet Security – Guidelines for Cryptography Policy. Business Process Reengineering: Introduction – Approach to BPR – Strategic Alignment Model – BPR Methodology. Management of Change: Change Management – Change Management in Public Administration – The Implementation Plan.

UNIT – V :

Legal Issues: Legal Issues – Risks: Paper Document Versus Electronic Document – Technology for Authenticating an Electronic Document – Laws for E-Commerce – EDI Interchange Agreement – Legal Issues for Internet Commerce. E-commerce in India: EDI in India – The internet in India – Laws For E-Commerce in India. Getting Started: Getting Connected: What Do You Need? – Setting Up a Website – Web Servers – Business-to-Business EC – Payment for Goods and Services – Bottlenecks.

Case Studies: EDI in Indian Customs – US Electronic Procurement – Banks – EDI Pilot Project in the Automotive Industry.

CYBER LAWS AND INTELLECTUAL PROPERTY RIGHTS

MCA 304

Unit 1

Basics of Technology and Law-The Science of Cryptography-Scope of Cyber Laws -Cyber Jurisprudence -Law of Digital Contracts- Digital Contracts-The System of Digital Signatures-The Role and Function of Certifying Authorities

Unit - 2

Cyber Crimes and Cyber terrorism- E-Governance- The National e-Governance Plan-e-Governance Challenges -Copyright in the Digital Media

Unit -3

Information Technology Act 2000-Preliminary-digital signature-electronic governance-attribution, acknowledgment and dispatch of electronic records-secure electronic records and secure digital signatures-regulation of certifying authorities-digital signature certificates-duties of subscribers-penalties and adjudication-the cyber regulations appellate tribunal-offences-network service providers not to be liable in certain cases

Unit-4

Information Technology Act 2000-Miscellaneous-Amendments to the Indian penal code-amendments to the Indian evidence act, 1872

Unit -5

Intellectual Property Rights-Structure-Introduction-Constituents of IPR-Patent -Industrial design-Copyright-Trademark-Managing IPR in Business Organization-Trading with IPR-Role players of Technology Transfer

SOFTWARE TESTING AND QUALITY MANAGEMENT

MCA 305

Unit 1

Software Testing and Software Testing Techniques

Introduction_ Verification and Validation_ Software Testing And Its Relation With -Software Lifecycle_ Significance and Potential of Software Testing_ Principles of Software Testing_ Software Testability And Its Characteristics_ Stages in Software -Testing Process_ Types of Software Testing_ Black-box Testing (BBT)_ BBT Techniques_ White-box Testing (WBT)_ WBT Techniques

Unit 2

Software Testing Techniques and Object-Oriented Testing

Introduction_ Static Analysis_ Dynamic Analysis_ Software Test Design_ Software -Testing Strategies_ Defect Testing_ Interface Testing_ Alpha and Beta Testing_ Object Oriented Testing Methods_ Real-Time Systems Testing_ Automated Software Testing Tools_ Debugging_ Debugging Techniques

Unit 3

Software Quality and Quality Assurance

Introduction-software quality definition-software quality factors-factors affecting software quality-software quality assurance (sqa)-sqa objectives-sqa goals-sqa activities-sqa plan-software reviews-formal technical reviews (ftrs)-code reviews and walkthroughs-metrics for rating the software quality factors-software quality metrics-technical metrics for software

Unit 4

Software Quality System and Models

Introduction_ Software Quality System and Quality Management Principles_ International Standards And Their Importance_ Overview of ISO Standards_ ISO 9000 Quality Standard_ Elements of the ISO 9000 Standard_ Applicability of ISO 9000 Standard_ Implementation Success Factors of ISO 9000_ ISO 9000 Quality System -Certification_ SEI Capability Maturity Models_ CMM Evaluation Assessment_ CMM Vs ISO

Unit 5

Software Reliability, Safety and Hazard Analysis

Introduction-Software Reliability Definitions-Software Reliability Vs Hardware -Reliability-Factors Influencing Software Reliability-Basic Concepts of Faults, Failures, Time and Failure Functions-Software Failure Classification-Characteristics of Fault-Free Software-Dependable Systems-Benefits of Software Reliability-Limitations of -Software Reliability-Hazard Definitions-Concept of Software Safety-Significance of Software Safety-Safety Critical System-Hazard Analysis-Software Hazard Analysis-Hazard Analysis Techniques

DATA WAREHOUSING AND MINING

MCA 306

UNIT-I

Distributed Computing System, Evolution of Distributed Computing System, Distributed Computing System Models, Uses of Distributed Computed System, Introduction to Distributed Computing Environment-Introduction to Data Warehouse Concepts, Characteristics Of Data warehouse, Benefits Of Data warehouse.

UNIT-II

Comparison Between A Database System And Data warehouse System, Environment Of A Data warehouse, The Concepts Used In Developing The Warehouse, Data Modeling, Data Models, Olap, Characteristics Of Olap, Olap Tools, Relational Olap, Oltp, Managed Query Environment-Strategy For A Data Warehouse, Design Of A Warehouse, Issues Related With Development Of Data warehouse, Metadata, The Process Of A Data Warehouse Design, Considerations Of Technology-Fact Table, Dimension Table, Granularity Or Grain Of Fact Table, Star Schema, Snow Flake Schema, Complexity Of Transformation And Integration.

UNIT-III

Providing Data Access To The Enterprise, Operational Vs. Informational Systems, Data Warehouse Architecture, Designing Data Warehouses,. Managing Data Warehouses, Data warehouse Team-Case Study

UNIT-IV

Data Warehousing-Characteristics and Benefits of Data warehousing, Classification of Data. Learning-Introduction, What is learning, Features and characteristics of educational software, A conceptual framework for the integration of learning technology

An Overview of Data Mining Techniques: Introduction, Classical Techniques: Statistics, Neighborhoods and Clustering, What is different between statistics and data mining?

UNIT-V

Next Generation Techniques: Trees, Networks and Rules, The Next Generation, Decision Trees, Viewing decision trees as segmentation with a purpose, where can decision trees be used? Rule Induction, Discovery Data Mining and Customer Relationships, Relevance to a Business Process-Data Mining and Customer Relationship Management, Evaluating the Benefits of a Data Mining Model-From Data Mining to Database Marketing: Introduction, Data Mining vs. Database Marketing, What exactly is Data Mining? Who is developing the Technology? Conclusion Knowledge discovery process: Introduction, The knowledge discovery process in details, Data selection, Data Cleaning, Data Mining, OLAP Tools, Decision Table, Neural Network, Genetic Algorithm