SYLLABUS

MASTER OF SCIENCE

INFORMATION TECHNOLOGY

JODHPUR NATIONAL UNIVERSITY

JODHPUR

Master of Science INFORMATION TECHNOLOGY

PREVIOUS

Paper I	**Fundamentals of Information Technology**
Paper II	**Database Management Systems**
Paper III	**Operating Systems**
Paper IV	**Mathematical Foundation of Information Technology**

FINAL

Paper V	**Internet and Web Technology**
Paper VI	**Advanced Internet Applications Development and Current Issues in IT**
Paper VII	**Visual Basic Programming**
Paper VIII	**Cyber Laws, Internet Security and Cryptography**
Paper IX	**Industry Based Environmental Studies**

Paper I Fundamentals of Information Technology

Unit I

What is IT, Information systems, Data and Information, IT in Business and Industry, IT in home and Play, IT in education and training, IT in entertainment and the Arts, IT in Science, Engg. and Maths Personal, Social and ethical issues in IT Semiconductor devices, PN junction didode, bipolar junction transistor, FET, Thyristors, Opto-electronic devices, display devices, rectifiters, Integrated Circuits, Digital Ics, Flip flops, Shift registers, Counters.
Overview of the Digital Computer System (Processor, Memory, Input and Output Devices, Storage Devices, Operation Systems, Application Software, Types of Computers)

Unit II

Digital versus Analog, Digital number system (binary, octal, decimal and hexa decimal numbers, conversion from one form to another, fractional numbers and signed numbers, complements, Fixed point and floating Point representations, Boolean algebra (addition, subtraction, multiplication and division), Logic Gates (NOT, OR, AND, NAND, NOR, XOR, XNOR)types of codes (ASCII, EBCDIC, Unicode), encoding and decoding.

Unit III

Introductory level :Emphasis shall be on basis concepts, features available in the component, characteristics and behavior of components, comparison, merits and limitations. Complete technical know how is not expected): Mother Board (Special reference to Intel 810 Chipset motherboard), CISC Micro Processors (Special reference to Pentium, AMD, Cyrix), RISC processors (Motorola; Power PC, and 680x0 series), Memory (ROM, RAM, flash, Cache,
Virtual, Buffers, CMOS), types of RAM (FPM, EDO, BEDO, SDRAM), types of memory modules (SIMM, DIMM), System clock Bus(Data, Address, Control), Ports (Serial, Parallel, AGP,UGP, Fire wire), cables (RS 232,
BIN), Plotters (pen, Ink- Jet, electrostatic), Voice Output], Storage devices
[Storage types (Magnetic, Optical, Magneto-optical, Solid state), random versus sequential access, formation, tracks and sectors, speed storage, capacity.

Reference Books

1.Bernard Grob: Basic Electronic, Tata McGraw Hill.

2.Albert Paul Malvino, Electronic Principles, McGraw Hill.
3.Jacob Millman and Christos, C. Halkias: Electronic Devices and Circuits, Tata McGraw Hill Publishing Company Ltd.,2000.
4.Peter Norton's Introduction to Computers, Third Edition, McGraw Hill.

Paper II Database Management Systems

Unit I

Data and InformationBasic Concepts, Problems of Early Information Systems, Advantage of a
DBMS. Database Architectures Three levels of the architecture: external, conceptual and internal level] centralized and distributed, Database models : hierarchical [Concepts of a Hierachy, IMS hierarchy], relational [Concepts of relational model, relational algebra, relational calculus], network [Concepts of a Network, DBTG Network DBA Schema declaration] and object oriented database [Only basic information about OODBMS and ORDBMS].

Unit II

Basic retrieval capability, retrieval and explosion, update commands QBE], client/server design, Standard Query language [Basic SQL Query Nested Queries, Aggregate Operators, Null Values, Embedded SQL, Cursor Dynamic SQL] query optimization [Query evaluation plans, pipelined evaluation. Heritor interface for operators and access methods, relational Query Optimizer].
Data Management Issues.
Backup, recovery, maintenance, and performance.

Unit III

Schema Refinement, Functional Dependencies, Normal forms Decompositions.
Normalization, tuning [Tuning indexes, Tuning queries and views, tuning the conceptual schema, DBMS benchmarking], Security [Access control, Discretionary and Mandatory Access control, Encryption] and impl ementation. Enterprise wide data applications [Information only], building client/server database [Information only]. Object oriented databases, [Information only] Internet databases [Information only]. Open database connectivity [ODBC] [Information Only], Accessing remote data sources, Transaction Management [Information only].
Database and Tools: MS-Access, SQL, Visual Basic, ORACLE (Wherever required these tools should be used).

Reference Books

1.Ramakrishnan and Gharke, Database Management Systems, Tata McGraw Hill Pub. Co. Ltd.
2.Date, Database Management Systems, Pearson Education Asia.
3.Gerald V Post, Database Management Systems, Tata McGraw Hill.
4.Leon and Leon, SQL, Tata McGraw Hill Pub. Co. Ltd.
5.Ivan Bayross, Database Technologies, Sybex Computer Books Inc.

Paper III Operating Systems

Unit I

Types of software (System/Application), Programming Languages {Level (5GL/4GL/3L/2GL/1GL/0GL)} Translators (Interpreters/Compilers), OGL (Registers, Switches, Cycles, Interrupt).

Unit II

Functions of operating systems, characteristics of Operating Systems (single/multi user, single/multi tasking, portability), Information Management (File Systems, Device Drivers, Terminal I/O) Process Management (Process definition, control, interacting processes, implementation of interacting Processes, threads, scheduling) Memory Management (Contiguous, Non-Contiguous, Paging, Segmentation, Virtual memory), Deadlocks, Security and Protection, Parallels Processing.

Unit III

Booting sequence, system files and commands, file and directories, overview of MS-DOS commands , FDISK and Disk organization.

Unit IV

Graphical User Interfaces, Windows 98 Installation,Scan Disk, Task Bars, Toolbars, Settings, Control Panel and all features there in, Files and Folder management, Windows Explorer, Installing and Running Program, Using Accessories, Getting Help; Copying, Moving and Sharing Information between programs, Backing up files, Configuring keyboard and mouse, adding and removing hardware, setting up printers and fonts, working with sound, graphics and video, configuring windows by using the Accessibility Wizard, configuring modem, connection to PPP and SLIP Accounts, creating Windows Peer Net-work, Connecting Windows 98PC to Novell Netware and Windows NT Net-works and

Windows NT Networks, Sharing drive and printers, compressing disk and partitions. Tuning Windows 98 for maximum performance, registering programs and file types, troubleshooting Windows 98.

Unit V

Logging in and out, Directory Redirecting input and output, ca command, viz Editor, Shell Scripts, Shell and sub-shell variables, Meta characters, sort, head, tail, split, cut, paste, find, tr, dd commands, gripping and sedding, UUCP, Unix and Networking, Accessing the Internet, Unix system administration.

Paper IV Mathematical Foundation of Information Technology

Unit I

Number systems: natural numbers, integers, rational numbers, real numbers, complex numbers, arithmetic modulo a positive integer (binary, octal, decimal and hexadecimal number systems), radix r representation of integers, representing negative and rational numbers, floating point notation. Binary Arithmetic, 2's complement arithmetic, conversion of numbers from one of binary/octal/decimal/hexadecimal number system to other number systems, Codes (Natural BCD, Excess-3, Gray, Octal, Hexadecimal, Alphanumeric-EBCDIC and ASCII), Error codes.

Unit II

Logic and Proofs: Proposition, Conjunction, Disjunction, Negation, Compound proposition, Condition, Propositions (Hypothesis, Conclusion, necessary and sufficient condition and Logical equivalence, De Morgan's laws, quantifiers, Universally quantified statement, generalized De Morgan's Laws for Logic, component of mathematical system (axiom, definitions, undefined terms, theorm, leema and corollary), proofs (direct proofs, Indirect Proofs, proof by contra-positive), valid argument, deductive reasoning, modus ponens (rules of inference), universal instantiation, universal generalization, existential instantiation, universal generalization resolution, principle of mathematical induction, structural induction.

Unit III

Graph theory undirected graph, digraph, weighted graph, similarity graphs, paths and cycles, Hamiltonian cycles, shortest pathalgorithm, isomorphism of graphs, planar graphs. Trees, characterization of trees, spanning trees, breadth first search and depth first search method, tninimal spanning trees,binary trees, tree traversals, decision tree and the minimum time for sorting, isomorphism of trees.

Reference Books

1.C.L. Liu: Elements of Discrete Mathematics, Tata McGraw hill Publishing Company Ltd. 2000
2.Richard Johnsonbaugh-Discrete Mathematics, Pearson Education, Asia, 2001.
3.John Truss: Discrete Mathematics for computer Scientists, Pearson Education, Asia. 2001.
4.Robert, J. Mc. Eliece: Introduction to Discrete Mathematics, Tata McGraw Hill, India.

Paper V Internet and Web Technology

Unit I

Build HTML documents from scratch. View HTML document using a variety of Web Browsers.Organize information using lists. Use HTML frames and tables for page layout.
Connect to a variety of resources by using hypertext links. Create style sheets to format the look and feel of the pages. Understand key image theory concepts. Create new images from scans or from scratch.

Unit II

Optimize image sizes, Create animated gifs and transparent images, Be able to create graphical elements for use on web pages: buttons banners, navigation bars, background tiles, Embed images and other multimedia, Post information to HITTP server, Evaluate a document design for effectiveness usability and efficiency. Using DHTML create functionalities like animation, stages- based presentations, splash pages, pull-down menus, drop down means, drag drop techniques.

Unit III

Integrating Java Script with HTML and DHTML, Using Java Script Object Model, Java Script's Event System, Manipulating User defined objects and variables. Dynamically updating objects in a window, windows focusing and defocusing method, Using Java Script's time out Mechanisms and cookie Mechanism, Read and write cookies to store visitor's information.

Paper VI **Advanced Internet Applications Development and Current Issues in IT**

Unit I

Introduction to VB script, Microsoft. Visual Inte Dev IDE The request Object , the Response Object Interacting with sever object, session and Cookies, the sever Context Object, Web Site Development Tools.

Enterprise Java: Servlets, Java Server Pages," Remove Method Invocation, Java Beans, Enterprise Java beans, Java Security, Native Methods, Java Virtual machine, Future of Java application of Java Beans – COBRA, Architecture of COBRA.

Unit II

EJB-Introduction Transaction Process, Models of Transco-Two Tier Architecture/ Three-Tier Architecture, Distributed Transaction Processing. EJB Server and client features, RMI/COBRA Building and development of EJBs, Design and Implementation of beans.

COM/DCOM-Introduction to com Programming, COM Architecture,COM interfaces, class Factories, Types of COM Server, Active X Controls, Property Pages, Distributed Components.

Active Pages Server-Components, Interfaces, ASP with Database, Connections, Data Sources, Record Sets, Command Objects, Full text search. ASP Custom Components, Creating Multi-tier Distributed Applications, Window DNA, Using ASP with MS Transaction Sever and Message Server.

Unit III

CORBA-An Architecture of Interoperability, Internet Inter ORB Protocol. CORBA Filters and dynamic loaders, CORBA and Java servlets. CORBA Beans. XML-The Purpose and Nature of XML, XML's syntax & structure rules, XML Document Type Declaration, XML's linking mechanisms, XML's style language, Converting.

HTML documents into XML documents. Overview of JSP, Swing (JFC) Securities, JINI. Current Issue- Network Securities- IP and Web Security and Secure Transmission, Electronic, Biotechnological Issues. Authentication issues.

Paper VII Visual Basic Programming

Unit I

Introduction:Need Of Visual Languages, Integrated Development Environment (IDE), Advantage Of Visual BASIC, Characteristics And Features Of Visual BASIC, Characteristics And Features Of Visual BASIC-IDE, Project, User Interface, Objects Oriented, Visual Development and Even-Driven Programming, Forms/Graphic Controls, Data Processing, Sharing With Windows And Internet Applications.

Unit II

Visual BASIC Programming And Tools: An Introduction Of Visual BASIC Programming, Simple Program Construction, Statements, Input/Outputs, Comments, Editor, Subroutines, Control Flow Statements, Objects, and Variants. Visual BASIC Debugging Tools. Runtime Errors Handling.

Unit III

Designing User Interface: Elements of User Interface, Understanding Forms, Menus And Toolbars, Designing Menus and Tool-Bars, Building Dynamic Forms, Drag-And- Drop Operations, Working With Menus, Customizing The Toolbars. Active X Controls- Textbox, Combo Box, Scrollbar and Slider Controls Operations. Generating Timed Events. Drawing With Visual Basic
Using Graphic, Controls, Coordinate Systems and Graphic Method. Manipulation Colors And Pixels With Visual Basic. Operations with Common Dialogs Printer Object And Reports. Integrating With Microsoft Windows And Office 2000, Concepts Automation, ActiveX And Object Models, Automations With Word 2000, Excel 2000.
Database Programming With Visual Basic-Data Access Methods, Creating, Reaching And Writing Text File. Data Control, Creating Queries.

Reference Books

1.Petroutsos Evangelos : Mastering Visual Basic; BPB Publications; 1998.
2.Norton's Peter; Guide to Visual Basic; Techmedia; 1998.
3.Kurata Deborah: Doing Objects in Visual Basic; Techmedia; 1998.
4.Mastering Database Programming With Visual Basic 6 by Petroutsos.

Paper VIII Cyber Laws, Internet Security and Cryptography

Unit I

Introduction: Issue In Network Security, Thread To Network Security Service, Basic Concepts Of Encryption And Decryption, Substation Ciphers, Transposition Ciphers. Electronic Mail Security, IP Security, WEB Security, Intruders, Viruses and Worms, Firewalls.

Unit II

Cyber Laws: Cyber Laws for Cyberspace- Legal Identity and Private International Laws in Cyberspace. IT Act 2000, IT Act 2000, IT Act 2000 In Reference To Email, E- Commerce, Issues Of Privacy. IT Act 2000 and E-Contracts And IT Technology. The World Of Electronic Contracts- E Agreements And The Web Surfing, Terms Of Service Contracts, Terms Of Service Agreement For Web Site Owners. Tips of Frame A Private Policy for E-commerce Site.

Unit III

Cryptography: Basic Terms and Concepts, Brief History Of Cryptography and Cryptanalysis. Uses and Misuses. Basic Number Theory- Divisibility, Primarily, Bases, Congruence's Modular Arithmetic, GCD's Euclidian Algorithm, Fermat and Euler Theorems, Finding Large Primes, Pohlig-Hellman, RSA.

Unit IV

Cyber Piratesx– Copyright, Digital Contents Right, Steps to Protect The Contents Pf WWW, Software Patent, Domain Name System And Trademarks, ICANN's Functions, Cyber Trademarks Laws. IT Act And Issues Of Copyright, Patent And Trademark, Crimes- Cyber Crimes And Future Imperfect, Strategy
I To Combat Cyber Crimes, IT Act 2000 And Cyber Crimes.
Basic Information Theory: Entropy, Equivocation, Work Factors, Key Size V/S Message Size, Redundance, Unicity Distance And Perfect Secrecy.
Elementary And Historical Ciphers: Caesar Cipher, Transposition and Substitution, Polyalphabetic Ciphers, Prodeuict Ciphers, DES, IDEA and Exponentiation Ciphers.

Unit V

Cipher Modes– Block Ciphers, Stream Cipher, Public Vs. Private Keys, Meet-In-The- Middle, LFSRs. Authentication Methods- One Way Ciphers, Authentication Functions, Message Digests, MD5, SHA, Tripwire, Kerberos. Privacy- Enhanced

Communication Privacy, Non-Repudiation, Digital Signatures, Certificate Hierarchies, X. 509, PGP, PKI.
Key Management- Threshold Scheme, Random Number Generation, Key E s- Crow, Key Recovery. Application-Mental Poker, Quadratic Residues. Oblivious Transfer and Zer- Knowledge Proofs. Digital Cash, Digital Voting and Contract Signing.

Reference Books

1.William Stallings," Cryptography And Network Security: Principles And Practice", Person Education, 2000
2.Kernel Texpalan ,"Communication Network Management:, PHI, 1992.
3.D.E. Corner," Computer Networks And Internet", 2nd Edition, Addison Wesley Publication, 2000.
4.Sharma, Vakul, "Handbook of Cyber Laws ", Macmillan India Ltd. 2002.

Paper IX Industry Based Environmental Studies

UNIT – 1

Environment – Definition – Scope – Structure and function of eco system's procedures, consumers and decomposers – energy flow in the ecosystem – ecological succession – food chain, food web and ecological pyramids - concepts of sustainable development.

UNIT – 2

Natural resources: Renewable – air, water, soil, land and wildlife resources. Non-renewable – mineral, coal, oil and gas. Environmental problems related to the extraction and use of natural resources.

UNIT – 3

Biodiversity – Definition – values – consumption use, productive social, ethical, aesthetic and option values threats to biodiversity – Hotspots of bio diversity – conservation of bio-diversity: In-situ Ex-situ. Bio-wealth – national and global level.

UNIT – 4

Environmental pollution : Definition – causes, effects and mitigation measures – Air pollution, Water pollution, Soil pollution, Noise pollution, Thermal pollution – Nuclear hazards – solid wastes acid rain – climate change and global warming environmental laws and regulations in India – Earth summit.

UNIT – 5

Population and environment – Population explosion – Environment and human health – HIV / AIDS – Women and child welfare – Resettlement and Rehabilitation of people, role of information technology in environmental health – Environmental awareness.