Vikram University, Ujjain

Board of studies in Computer science (Faculty of Science)

SYLLABUS of M.Sc. (Information Security) Programme

[Choice Based Credit System & Grading System (CBCS& GS)]

Exclusively for University Teaching Department (ICS, VUU)

TWO YEAR M.Sc. (FULL TIME) PROGRAMME of UTD (ICS, VUU)

(Effective from Academic Session 2020-21)

[Modified as according to the provision of "Ordinance 14: Choice Based Credit System"

(Effective from Academic Session 2020-21)

COURSE STRUCTURE

M.Sc. (Information Security) FIRST SEMESTER

S N	Course Type	Course code	Title	End term sem Exam	Internal	Max Marks	Credits*			
							C	L	T	P
1	Core Course	MSIS-101	Computational Mathematics	60	40	100	6	4	2	
		MSIS-102	Operating system & system software	60	40	100	6	4		2
2	Course for Ability Enhancement & skill Development (AE & SD)	MSIS-103	Communication Skills	60	40	100	6	4	2	
			Choose any one From MSIS 104- E1 and 104- E2							
3	Elective Discipline Centric	MSIS 104-E1	Computer organisation & Architecture	60	40	100	6	4	2	
		MSIS 104-E2	Techniques of Operation Research	60	40	100	6	4	2	
			Choose any one From MSIS 105-E1, 105-E2 and 105-E3							
4	Elective Generic Categories	MSIS 105-E1	Object oriented programming using C++	60	40	100	6	4		2
		MSIS 105-E2	Data Communication and Computer Network	60	40	100	6	4	2	
		MSIS 105-E3	Any Course from Massive Open Online Courses (MOOCs)available at SWAYAM	60	40	100	6	4	2	
5		MSIS-106	Comprehensive Viva Voce	50	-	50	04 Virtual (VR)			
			Total			550	30+4	20	06	04

(C=Credit Per Week) / (L = Lectures Per Week)/ (T & PW =Tutorials & Practical Work per week)

*One Credit is equivalent to one hour (60 minutes) of teaching (lecture or tutorial) and two hours (120 minutes) for practical

M.Sc. IS (Information Security) SECOND SEMESTER

S N	Course Type	Course code	Title	End term sem Exam	Internal	Max Marks	Credits* C	Distribution of Credits L	T	P
			Core Courses				C	L	T	P
1	Core Course	MSIS-201	Data Structure Using C++	60	40	100	6	4		2
		MSIS-202	Data Base Management System	60	40	100	6	4	2	
2	Course for Ability Enhancement & skill Development (AE & SD)	MSIS-203	Computer Hardware and Networking	60	40	100	6	4	2	
			Choose any one From MSIS 204- E1 and 204- E2							
3	Elective Discipline Centric	MSIS 204-E1	Theory of Computation	60	40	100	6	4	2	
		MSIS 204-E2	Internet Programming	60	40	100	6	4	2	
			Choose any one From MSIS 205-E1 , 205-E2 and 205-E3							
4	Elective Generic Categories	MSIS 205-E1	programming with VB.Net	60	40	100	6	4		2
		MSIS205-E2	Computer System Architecture and parallel Processing	60	40	100	6	4	2	
		MSIS 205-E3	Any Course from Massive Open Online Courses (MOOCs)available at SWAYAM	60	40	100	6	4	2	
5		MSIS-206	Comprehensive Viva Voce	50	-	50	04 Virtual (VR)	20	06	04
			Total			550	30+04			

(C=Credit Per Week) / (L = Lectures Per Week)/ (T & PW =Tutorials & Project Work per week)

*One Credit is equivalent to one hour (60 minutes) of teaching (lecture or tutorial)and two hours (120 minutes) for practical

M.Sc. (Information Security) THIRD SEMESTER

SN	Course Type	Course code	Title	End term sem Exam	Internal	Max Marks	Credits*	Distribution of Credits		
							C	L	T	P
1	Core Course	MSIS-301	Basic Statistical Methods	60	40	100	6	4	2	
		MSIS-302	Advanced Computer Network	60	40	100	6	4	2	
2	Course for Ability Enhancement & skill Development (AE & SD)	MSIS-303	Information Security	60	40	100	6	4		2
	Choose any one From MSIS 304- E1 and 304- E2									
3	Elective Discipline Centric	MSIS 304-E1	Python Programming	60	40	100	6	4		2
		MSIS 304-E2	Network Security and cryptography	60	40	100	6	4	2	
	Choose any one From MSIS 305-E1, 305-E2 and 305- E3									
4	Elective Generic Categories	MSIS 305- E1	Machine Learning	60	40	100	6	4	2	
		MSIS 305- E2	Cloud Computing	60	40	100	6	4	2	
		MSIS 305-E3	Any Course from Massive Open Online Courses (MOOCs)available at SWAYAM	60	40	100	6	4	2	
5		MSIS-306	Comprehensive Viva Voce	50	-	50	04 Virtual (VR)			
			Total			550	30+04	20	06	04

C=Credit Per Week) / (L = Lectures Per Week)/ (T & PW =Tutorials &Practical Work per week)

*One Credit is equivalent to one hour (60 minutes) of teaching (lecture or tutorial)and two hours (120 minutes) for practical

Note: (1) The students will have the choice to opt a course under the category of Elective Courses available within the UTD (ICS, VUU) or in other UTDs but from same level of the programmes. (2)An alternative choice will also be available to the students to opt a course in each semester under elective-generic category including skill development course from Massive Open Online Courses (MOOCs) available at SWAYAM plate form. (3) The student can also opt a course under Elective- Discipline Centric category from Massive open online courses (MOOCs) available at SWAYAM plate form. In such cases, the provisions "Ordinance 14 : Choice Based Credit System" shall be applicable and the conditions mentioned therein will need to be satisfied by the student if they opt courses from Massive Open Online Courses (MOOCs) available at SWAYAM plate form.

M.Sc. (Information Security) FOURTH SEMESTER

SN	Course Type	Course code	Title	End term sem Exam	Internal	Max Marks	Credits*	Distribution of Credits		
							C	L	T	P
1	Core Course	MSIS-401	Network Management	60	40	100	6	4	2	
		MSIS-402	Legal Aspects of Information Security	60	40	100	6	4	2	
2	Course for Ability Enhancement & skill Development (AE & SD)	MSIS-403	Internet of Things	60	40	100	6	4		2
Choose any one From MSIS 404- E1 and 404- E2										
3	Elective Discipline Centric	MSIS 404-E1	Mobile & Wireless Systems	60	40	100	6	4	2	
		MSIS 404-E2	Advanced Algorithm Design	60	40	100	6	4		2
4		MSIS 405	Final presentation/ Seminar	30	20	50	3			3
		MSIS 405	Valuation of Dissertation	30	20	50	3			3
		MSIS 405	Final Viva-voce examination	50	-	50	04 Virtual (VR)			
			Total			550	30+04	16	04	10

C=Credit Per Week) / (L = Lectures Per Week)/ (T & PW =Tutorials & Practical Work per week)

*One Credit is equivalent to one hour (60 minutes) of teaching (lecture or tutorial)and two hours (120 minutes) for practical

Note: (1) The students will have the choice to opt a course under the category of Elective Courses available within the UTD (ICS, VUU) or in other UTDs but from same level of the programmes. (2)An alternative choice will also be available to the students to opt a course in each semester under elective-generic category including skill development course from Massive Open Online Courses (MOOCs) available at SWAYAM plate form. (3) The student can also opt a course under Elective- Discipline Centric category from Massive open online courses (MOOCs) available at SWAYAM plate form. In such cases, the provisions "Ordinance 14 : Choice Based Credit System" shall be applicable and the conditions mentioned thereinwill need to be satisfied by the student if they opt courses from Massive Open Online Courses (MOOCs) available at SWAYAM plate form.

MSIS 101: Computational Mathematics

UNIT 1

Set Theory: Introduction, Sets and Elements, Universal Set and Empty Set, Subsets, Venn Diagrams. Relations: Introduction, Product Sets, Relations, Pictorial Representation of Relations, Composition of Relations, Types of Relations, Partial Ordering Relations.

UNIT 2

Functions: Introduction, One-to-One, Onto, and Invertible Functions, Cardinality. Logic and Propositional Calculus: Introduction, Propositions and Compound Propositions, Basic Logical Operations, Propositions and Truth Tables, Tautologies and Contradictions.

UNIT 3

Counting: Introduction, Basic Counting Principles, Factorial Notation, Binomial Coefficients, Permutations and Combinations. Pigeon hole Principle.

UNIT 4

Graph Theory: Introduction, Graphs and Multigraphs, Subgraphs, Paths, Connectivity, Weighted Graphs, Complete, Regular and Bipartite Graphs. Directed Graphs: Introduction, Rooted Trees, Graph Algorithms: Depth first and Breadth-First Searches.

UNIT 5

TREES AND CUT - SETS : Paths and Circuits, Shortest Paths, Eulerian Paths and Circuits, Hamiltonian Paths and Circuits. Rooted Trees, Path Lengths in Rooted Trees, Binary Search Trees. Spanning Trees, Minimum Spanning Trees.

Reference Books:

1. Elements of Discrete Mathematics, C.L.Liu, Second Edition, TMH

2. Discrete Mathematics and its applications, Kenneth H. Rosen, (Fifth Edition), Tata McGraw Hill Publishing Company.

3. Theory and Problems of Discrete Mathematics, SemmourLipschutz, Marc Lipson, Second Edition, Schaum's Outline, T.M.H.

MSIS 102: Operating System and System Software

UNIT 1

Introduction to System Programs & Operating Systems, Evolution of Operating System (mainframe, desktop, multiprocessor, Distributed, Network Operating System, Clustered & Handheld System), Operating system services, operating system structure, System Call & System Boots, Operating system design & Implementations, System protection, Buffering & Spooling. Types of Operating System: Bare machine, Batch Processing, Real Time, Multitasking & Multiprogramming, timesharing system.File: concepts, access methods, free space managements, allocation methods, directory systems, protection, organization,sharing & implementation issues.

UNIT 2

Process: Concept, Process Control Blocks(PCB), Scheduling criteria Preemptive & non Preemptive process scheduling, Scheduling algorithms, algorithm evaluation, multiple processor scheduling, real time scheduling, operations on processes, threads, inter process communication, precedence graphs, critical section problem, semaphores, classical problems of synchronization. Deadlock: Characterization, Methods for deadlock handling, deadlock prevention, deadlock avoidance, deadlock detection, recovery from deadlock Process Management in Linux.

UNIT 3

Memory Hierarchy, Concepts of memory management, MFT & MVT, logical and physical address space, swapping, contiguous and non-contiguous allocation, paging, segmentation, and paging combined with segmentation. Structure & implementation of Page table.Concepts of virtual memory, Cache Memory Organization, demand paging, page replacement algorithms, allocation of frames, thrashing, demand segmentation.

UNIT 4

Mass Storage Structure: Disk Structure, Disk Scheduling- FCFS, SSTF, SCAN Scheduling, Disk Management, Swap-Space Management. Distributed operating system:-Types, Design issues, File system, Remote file access, RPC, RMI, Distributed Shared Memory(DSM), Basic Concept of Parallel Processing &Concurent Programming.

UNIT 5

System software and application software, layered organization of system software. Assemblers, Macros, Compilers, Cross compilers, Linking and loading, Relocation. Case study of Unix, Linux & Windows

Reference Books:

1. Operating Systems Concepts, A. Silberschatz, P.Galvin, G.Gagne, John Wiley & Sons, Inc.
2. Systems Programming and Operating Systems (Part II - Operating Systems), Dhamdhere, 2nd Edition, TMH
3. Donovan, J.J. : System programming, Mcgraw Hill,1972.
4. Dhamdhere. D.M.: Introduction to system software, Tata Mcgraw Hill Publ.comp. 1986

MSIS 103: Communication Skill

UNIT 1

Definition of Language, nature of language, Characteristics of Human Language. Varieties of English Language: British, American, Indian, Australian etc., English for specific and special purposes.

UNIT 2

Meaning and process of communication, importance of effective communication, communication skills, barriers to communication, Animal and human communication, Methods of communication (Verbal & Non-Verbal).

UNIT 3

Objectives of communication, types of communication, principles of communication, essentials of effective communication. Media of communication: written, oral, face-to-face, visual, audio-visual, merits and demerits of written and oral communication, preparing for oral presentation.

UNIT 4

Basic skills of communication, listening to and Understanding, Extended natural speech in business situations (Both face to face and on the telephone), Understanding standard American, British and Indian accents, speaking with correct, Pronunciation, English Consonants, English Vowels, Speaking with right accent.

UNIT 5

Developing communication skills, interview- how to face and how to conduct. Planning and preparing to speak, Strategies for making powerful openings in presentations and conducting presentations, Body Language, Voice Modulations.

Reference Books:

1. Essentials of Business Communication by Rajendra Pal and J.S.Korilahalli, Sultan Chand & Sons Publishers, New Delhi.
2. Business Communications by U.S. Rai &S.M.Rai, Himalaya Publishing House.
3. Writing a Technical Paper by Menzal and D.H.Jones, McGraw Hill, 1960.
4. Business Communication : Strategy and Skill, Prentice Hall New Jersey, 1987.

MSIS 104 E1: Computer Organization and Architecture

UNIT 1

Binary Systems: Digital Computers and Digital Systems, Binary Numbers, Number Base Conversion, Octal and Hexadecimal Numbers, Complements, Binary Codes. Boolean Algebra and Logic Gates: Boolean Functions, Digital Logic Gates.Simplification of Boolean Functions: The Map Method, Two and Three Variable Maps, Four Variable Map, Product of Sums Simplification, NAND and NOR Implementation, Don't-Care Conditions.

UNIT 2

Combinational Logic: Introduction, Design Procedure, Adders, Subtractors, Code Conversion, Analysis Procedure. Combinational Logic with MSI and LSI: Binary Parallel Adder, Decoders, Multiplexers. Sequential Logic: Introduction, Flip-Flops, Triggering of Flip-Flops.

UNIT 3

Analysis of Clocked Sequential Circuits, State Reduction and Assignment, Flip-Flop Excitation Tables, Design Procedure, Design of Counters. Processor Logic Design: Introduction, Processor Organization, Arithmetic Logic Unit, Design of Arithmetic Circuit, Design of Logic Circuit, Design of Arithmetic Logic Unit, Status Register, Design of Shifter, Processor Unit.

UNIT 4

Microcomputer System Design: Introduction, Microprocessor Organization, Basic Concept of Instruction, Instruction Types, Micro Instruction Formatsand Addressing Modes, Subroutines Interrupt, Fetch and Execution cycle, Hardwired control unit, Micro-programmed Control unit-microprogram sequencer Control Memory, Sequencing and Execution of Micro Instruction.

UNIT 5

Memory Organization: Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory. Input Output Organization: Peripheral Devices, Input-Output Interface, Direct Memory Access (DMA), Input-Output Processors (IOP), Structure of Multiprocessor- Inter-processor Arbitration, InterProcessor Communication and Synchronization. Memory in Multiprocessor System, Concept of Pipelining, Vector Processing, Array Processing, RISC And CISC,Study of Multicore Processor – Intel, AMD.

Reference Books:
1. Digital Logic and Computer Design, M. Morris Mano, P.H.I., Eastern Economy Edition.
2. Computer System Architecture (3rd ed..), M.Morris Mano, P.H.I., Eastern Economy Edition.
3. Computer Architecture and Organization, J.P. Hays, McGraw Hill.
4. Digital Principle and Applications, Malvino and Leach
5. Digital Computer Fundamentals, Thomas C. Bartee
6. William stalling ,"Computer Architecture and Organization" PHI

MSIS 104 E2: Techniques of Operation Research

UNIT 1

Introduction: nature and meaning of O.R. Modelling in operations research, features of operation research, scope of operations research. Linear Programming Problem: formulation of L.P.P. solution of L.P.P. graphical method, simplex methods, duality.

UNIT 2

Assignment problems: Mathematical formulation, Reduction theorem, methods of solving the assignments problems, Unbalanced assignment problem, Transportation problem: formulation, basic feasible solution: North-West-Corner method, least cost method, Vogel's approximation method, Optimum solution: Modi method.

UNIT 3

Project management: introduction, network diagram representation, time estimates and critical path in network analysis, project evaluation and review techniques. Job sequencing: processing n jobs through 2 machines, processing n jobs through 3 machines, processing 2 jobs through m machines.

UNIT 4

Queuing Theory: introduction, queuing system Transient and steady traffic inlets, Distribution of arrival distribution of departure, M/M/I: ∞/ FCFS model. Replacement problems: replacement policy for items whose maintenance cost increases with time and money value is constant.

UNIT 5

Deterministic Inventory Models, what is inventory, types of inventory, inventory decisions, how to develop n variables model, costs involved in inventory problems, variables in inventory problem, classification of characteristics of inventory systems, EOQ model without shortage.

Reference Books:

1. Operations Research by Taha.
2. Operations Research by S D Sharma.
3. Introduction to Operations Research (Sixth Edition) by F.S. Hillier and G.J. Lieberman, Mc Graw Hill International Edition, Industrial Engineering Series, 1995.
4. Linear Programming by G. Hadley, Narosa Publishing House, 1995.

MSIS 105 E1: Object Oriented Programming Using C++

UNIT 1
Object Oriented Systems Development : Introduction to traditional programming with C. Objectives of OOP, Object Oriented Analysis, Object Oriented Programming in C++: Concepts of Objects, Classes, Data Abstraction, Encapsulation, Inheritance, Polymorphism, Dynamic Binding and Message passing.

UNIT 2
Object modeling, Dynamic modeling, Events, Status, Scenarios, Event hate diagrams, Operations, State diagrams, Functional Models, Dataflow diagrams, Constraints specification, Relation of object, Functional and Dynamic models.

UNIT 3
Tokens, Expressions and Control Structures, Classes and Objects, Overloading and information hiding, Function overloading, Operator overloading in C++, Memory Management: Constructors, Overloading of constructors, copy constructors, destructors.

UNIT 4
Inheritance : Inheritance, Derived and base classes, Single, Multilevel, Hierarchical, Hybrid Inheritance, Protected member, overriding member function, class hierarchies, multiple inheritance, Containership

UNIT 5
Polymorphism : virtual functions, late binding, pure virtual functions, abstract classes, friend functions, friend classes, static functions, this pointer, templates, function templates, Class templates.

Reference Books:

1. Object-Oriented Programming with C++: E. Balagurusamy, TMH, 2005
2. Object Oriented Programming in C++, Robert Lafore, Galgotia Publication.
3. Object Oriented Programming, Tomothy Budd, Pearson education.
4. Object Oriented Modelling and Design, J. Rambaugh, M. Blaha, W. Premerlani, F. Eddy, W. Lorensen, P.H.I.

MSIS 105 E2: Data Communication & Computer Network

UNIT 1

Data Communication networks and system standards : Data Communication networks and open system standards: Data communication networks, Standards. ISO reference model. The Electrical Interface: Transmission media. Attenuation and distortion sources.

UNIT 2

Data Transmission: Data transmission basics. Asynchronous transmission. Synchronous transmission, Error detection methods. Data compression. Transmission control circuits. Communications control devices. Protocol basics: Error Control, Idle RQ, Continuous RQ, Link management.

UNIT 3

Local Area Networks : Topology Transmission Medium , Medium Access Control Methods, ICSMA/CD Bus, Token Ring , Performance , Wireless LANs , Wireless Media, Protocols, Network Layer, Bridges, Bridges, Source Routing Bridges Transparent , Internetworking with different types, Introduction to WAN.

UNIT 4

Transport Protocol : User Data Gram Protocol, TCP, Reliable Stream Service , Protocol Operations, Application support protocol, Session Layer, Token Concept, Presentation Layer, Data Encryption, Terminology, Message Authentication,

UNIT 5

TCP/IP Application protocols: Introduction to TELNET , FTP , SMTP , SNMP , World Wide Web, Directory Services, Domain Name system.

Reference Books:

1. Data Communications and Networking, Behrouz A. Forouzan, Tata McGraw Hill, 3rd Edition, ISBN 0-07-058408-7.
2. Data Communications and Networks, Godbole A, Tata McGraw-Hill Publications.
3. Data Communications, Gupta P., PHI, 2004, ISBN 81 - 203 - 1118 - 3
4. Understanding Data Communications and Networks, Shay W., Third Edition, Brooks Kale Thomson Learning/Vikas Publishing House, ISBN 981-254-966-8

MSIS 201 : Data Structures Using C++

UNIT 1

Stack and Queue: Introduction –Common operations on data structures, Types of data structures, Data structures & Programming,contiguous implementations of stack, various operations on stack, various polish notations-infix, prefix, postfix, conversion from one to another-using stack; evaluation of post and prefix expressions. Contiguous implementation of queue: Linear queue, its drawback; circular queue; various operations on queue; linked implementation of stack and queue- operations

UNIT 2

General List: list and it's contiguous implementation, it's drawback; singly linked list-operations on it; doubly linked list-operations on it; circular linked list; linked list using arrays.

UNIT 3

Trees: definitions-height, depth, order, degree, parent and child relationship etc; Binary Trees- various theorems, complete binary tree, almost complete binary tree; Tree traversals-preorder, in order and post order traversals, their recursive and non recursive implementations; expression tree- evaluation; linked representation of binary tree-operations. Threaded binary trees; forests, conversion of forest into tree. Heap-definition.

UNIT 4

Searching, Hashing and Sorting: requirements of a search algorithm; sequential search, binary search, indexed sequential search, interpolation search; hashing-basics, methods, collision, resolution of collision, chaining; Internal sorting- Bubble sort, selection sort, insertion sort, quick sort, merge sort on linked and contiguous list, shell sort, heap sort, tree sort.

UNIT 5

Graphs: related definitions: graph representations- adjacency matrix, adjacency lists, adjacency multilist; traversal schemes- depth first search, breadth first search; Minimum spanning tree; shortest path algorithm; kruskals&dijkstras algorithm. Miscellaneous features Basic idea of AVL tree-definition, insertion & deletion operations; basic idea of B-tree- definition, order, degree, insertion & deletion operations; B+-Tree- definitions, comparison with B-tree; basic idea of string processing.

Reference Books:

1. Introduction to Data Structures and Algorithms with C ++, GLENN W.ROWE, Prentice Hall India, 2003
2. Data Structures and Algorithms, Alfred V. Aho, John E. Hopecraft, Jaffrey D. Ullman, Pearson education
3. M. Tenenbaum, "Data Structures using C & C++", Pearson Pub
4. Venkatesan , Rose, "Data Structures" Wiley India Pvt.Ltd
5. Pai; Data structure and algorithm , TMH Publications
6. T.H.Coreman,"Introduction to algorithm",PHI.

MSIS 202 : Database Management System

UNIT 1

DBMS Concepts and architecture Introduction, Database approach v/s Traditional file accessing approach, Advantages, of database systems, Data models, Schemas and instances, Data independence, Data Base Language and interfaces, Overall Database Structure, Functions of DBA and designer, ER data model:Entitles and attributes, Entity types, Defining the E-R diagram,Concept of Generalization, Aggregation and Specialization. transforming ER diagram into the tables. Various other data models object oriented data Model, Network data model, and Relational data model, Comparison between the three types of models.

UNIT 2

Relational Data models: Domains, Tuples, Attributes, Relations, Characteristics of relations, Keys, Key attributes of relation, Relational database, Schemas, Integrity constraints. Referential integrity, Intension and Extension, Relational Query languages:SQL-DDL, DML, integrity constraints, Complex queries, various joins, indexing, triggers, ssertions,Relational algebra and relational calculus, Relational algebra operations like select, Project,Join, Division, outer union. Types of relational calculus i.e. Tuple oriented and domain oriented relational calculus and its operations.

UNIT 3

Data Base Design: Introduction to normalization, Normal forms, Functional dependency, Decomposition, Dependency preservation and losless join, problems with null valued and dangling tuples, multivalued dependencies.Query Optimization: Introduction, steps of optimization, various algorithms to implement select, project and join operations of relational algebra, optimization methods: heuristic based, cost estimation based.

UNIT 4

Transaction Processing Concepts: - Transaction System, Testing of Serilizability, Serializability of schedules, conflict & view serializable schedule, recoverability, Recovery from transaction failures. Log based recovery. Checkpoints deadlock handling. Concurrency Control Techniques: - Concurrency Control, locking Techniques for concurrency control, time stamping protocols for concurrency control, validation based protocol, multiple granularity. Multi version schemes, Recovery with concurrent transaction. Introduction to Distributed databases, data mining, data warehousing, Object Technology and DBMS, Comparative study of OODBMS Vs DBMS . Temporal, Deductive, Multimedia, Web & Mobile database.

UNIT 5

Study of Relational Database Management Systems through Oracle/Postgres SQL/MySQL: Architecture, physical files, memory structures, background process. Concept of table spaces, segments, extents and block. Dedicated server, multi threaded server. Distributed database, database links, and snapshot. Data dictionary, dynamic performance view.Security, role management, privilege management, profiles, invoker defined security model. SQL queries, Data extraction from single, multiple tables equi-join, non equi-join, self-join, outer join. Usage of like, any, all, exists, in Special operators. Hierarchical queries, inline queries, flashback queries. Introduction of ANSI SQL, anonymous block, nested anonymous block, branching and looping constructs in ANSI SQL. Cursor management: nested and parameterized cursors, Oracle exception handling mechanism. Stored procedures, in, out, in out type parameters, usage of parameters in procedures. User defined functions their limitations. Triggers, mutating errors, instead of triggers

Reference Books:

1. Date C J, "An Introduction To Database System", Pearson Educations

2. Korth, Silbertz, Sudarshan, "Fundamental of Database System", McGraw Hill

3. Rob, " Data Base System:Design Implementation & Management", Cengage Learninig

4. Elmasri, Navathe, "Fundamentals Of Database Systems", Pearson Educations

MSIS 203: Computer Hardware and Networking

UNIT 1

Introduction to computers, classification, generations, applications. Basic blocks of a digital computer. Hand Tools Basics and Specifications. Types of cabinets, relation with mother board form factor. Precautions to be taken while opening and closing PC cabinet. Main devices, components, cards, boards inside a PC(to card or device level only). Types and specifications of the cables and connectors used for interconnecting the devices, boards, cards, components inside a PC. Precautions to be taken while removing and/or reconnecting cables inside a PC

UNIT 2

Types of I/O devices and ports on a standard PC for connecting I/O devices. Function of keyboard, Function of Mouse, Function of monitor, Function of Speakers and Mic, Function of serial port, parallel port, brief principle of communication through these ports, types of devices that can be connected, interface standards, connectors, cable. Method of ensuring firm connection, Types of Processors and their specifications Memory devices, Semiconductor memories, Principle of working of Hard disk drive, cylinder, capacity, read write head, HDD interface IDE, SCSI-I/2/3 comparative study. Partitioning hard disk (primary and extended partitions) Precautions to be taken while fitting drives into bays and bay inside PC cabinet. CMOS setting(restrict to drive settings only).

UNIT 3

Installing UNIX / LINUX - Preparing functional system UNIX/LINUX - Adding new users, software, material components - Making back-up copies of the index and files - Dealing with the files and indexes, Basic Linux commands. - Linux file system, The Shell, Users and file permissions, VI editor, X window system, Filter Commands, Processes, Shell Scripting.Types of software. Functions of an operating system. Disk operating system. Version of a software, Service pack, Updating of OS, Different configurations of Computer system and its peripherals. Software Installation – Pre-installation - Prerequisites, Install procedure, Rollback or Uninstall procedure, Tests. Post-installation – Backup procedure & specifications, Restore procedure, Periodical view check. Awareness of legal aspects of using computers such as copyright, patent etc.

UNIT 4

OSI Model - The functions of different layers in OSI model, Network Components – Modems, Firewall, Hubs, Bridges, Routers, Gateways, Repeaters, Transceivers, Switches, Access point, etc. – their types, functions, advantages and applications. IP Routing in Network RIP IGRP Protocols, TCP/IP, FTP, Telnet etc., Theory on Setting IP Address(IP4/IP6) & Subnet Mask, Classes of IP Addressing.

UNIT 5

Concept of Internet. Architecture of Internet. DNS Server. Internet Access Techniques, ISPs and examples(Broadband/Dialup/ Wifi). Concept of Social Networking Sites, Video Calling & Conferencing. UTM and Firewall. Concept of Server, client, node, segment, backbone, host etc. Analog and Digital transmission, Network Interface Card, Crimping tools and Color standards for Straight crimping and Cross crimping Functions of NIC, Repeaters, Hub, Switches, Routers, Bridges, Router etc.

Reference Books:

1. PC Hardware: The Complete Reference Paperback – 2017 by Craig Zacker and John Rourke
2. "Computer Hardware: Installation, Interfacing, Troubleshooting and Maintenance" by James K L

MSIS 204 E1: Theory of Computation

UNIT 1

Automata: Basic machine, FSM , Transition graph, Transition matrix, Deterministic and nondeterministic FSM'S, Equivalence of DFA and NDFA, Mealy & Moore machines, minimization of finite automata, Two-way finite automata. Regular Sets and Regular Grammars: Alphabet, words, Operations, Regular sets, Finite automata and regular expression, Myhill- Nerode theorem Pumping lemma and regular sets, Application of pumping lemma, closure properties of regular sets.

UNIT 2

Regular Expressions, Two-way Finite Automata, Crossing Sequence of Two way Finite Automata Finite Automata with Output, Applications of Finite Automata, Closure Properties of Regular Sets.

UNIT 3

Context Free Grammars: Motivation and Introduction, Context-free Grammars, Derivation trees and Ambiguity,Normal Forms (Chomsky Normal Form and Greibach Normal forms), Unit Production Chomsky Normal Forms, The existence of inherently ambiguous context-free languages, Closure properties of Context Free Languages, Construction of Reduced Grammars, Elimination of null production.
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UNIT 4

Pushdown Automata: Definition of PDA, Deterministic Pushdown Automata, PDA corresponding to given CFG, CFG corresponding to a given PDA. Context Free Languages: The pumping lemma for CFL's, Closure properties of CFL's, Decision problems involving CFL's.
UNIT 5

Turing Machines: Introduction, TM model, representation and languages acceptability of TM Design of TM,Universal TM & Other modification, Church's hypothesis, composite & iterated TM. Turing machine as enumerators.Properties of recursive & recursively enumerable languages, Universal Turing Machine.

Reference Books:
1. Introduction to Automata Theory, Languages & Computation, J E Hopcraft& JD Ullman, Narosa Publications.
2. Theory of Computer Science, KLP Mishra & N Chandra Sekhar, PHI
3. Mathematical Foundations of Computer Science, Beckman
4. John C Martin, "Introdution to languages and theory of computation", McGraw Hill
5. Anami&Aribasappa , " Formal Languages and Automata Theory",Wiley India

MSIS 204 E2: Internet Programming

UNIT 1

Introduction to Internet Programming- Client-Server model, Browsers-Graphical and Hypertext Access to the Internet, HTTP–Hyper Text Transfer Protocol (how it actually works), The Phases of Web Site Development

UNIT 2

Creating Internet World Wide Web pages- HTML - Hypertext Markup Language , Basic HTML Concepts, HTML: Structured Language ,headers, body, html tags, tables , Text, graphics, sounds, video clips, multi- media ,Client side image mapping

UNIT 3

HTML forms programming: Building a form, Text fields and value, size, max length html buttons, radio, checkboxes, Selection lists.
CSS: Introduction To Style sheet, types of style sheets- Inline, External, Embedded CSS, text formatting properties, CSS Border, margin properties, Positioning Use of classes in CSS, color properties, use of <div>&<span>

UNIT 4

Intro to script, types, intro of JavaScript, JavaScript identifiers, operators, control & Looping structure, Intro of Array, Array with methods, Math, String, Date Objects with methods User defined & Predefined functions, DOM objects, Window Navigator, History, Location, Event handling, Validations On Forms

UNIT 5

Intro & features of XML, XML writing elements, attributes etc. XML with CSS, DSO, XML Namespaces XML, DTD, XML Schemas, Writing Simple sheets using XSLT, SAX & DOM Parsers, SOAP Introduction.

Reference Books:
1. Joe Fawcett,DannyAyers,Liam R.E. Quin, "Beginning XML" Wrox Press, 5th Ed., 2012
2. Deitel&Deitel, "XML how to program", Pearson, 2000
3. Hofstetterfred , "Internet Technology at work", Osborne pub. , ISBN : 9780072229998, 2004
4. Ivan Bayross , "HTML, DHTML, JavaScript, Perl & CGI" ,BPB pub. 3rd Ed.,2004
5. Ivan Bayross, "Web enabled commercial application development using HTML, DHTML, JavaScript, PERL-CGI", BPB pub., 2nd Ed., 2000

MSIS 205 E1: Programming with Visual Basic.Net

UNIT 1
Introduction to .NET, .NET Framework features & architecture, CLR, Common Type System, MSIL, Assemblies and class libraries. Introduction to visual studio, Project basics, types of project in .Net, IDE of VB.NET- Menu bar, Toolbar, Solution Explorer, Toolbox, Properties Window, Form Designer, Output Window, Object Browser.

UNIT 2
The VB.NET Language- Variables -Declaring variables, Data Type of variables, Forcing variables declarations, Scope & lifetime of a variable, Constants, Arrays, types of array, control array, Collections, Subroutines, Functions, Passing variable, Number of Argument, Optional Argument, Returning value from function. Control flow statements: conditional statement, loop statement. Msgbox&Inputbox.

UNIT 3
Working with Forms : Loading, showing and hiding forms, controlling One form within another. Using MDI form. Windows Form Control (with Properties, Methods and events): Textbox, Rich Text Boxes, Label, Link Label, Button, Checkbox, Radio Button, Panel, Group Box, Picture Box, Listbox, Combobox, Check Listbox, scroll bar, Timer. Advance Controls: Menus, Context Menus , Built-in Dialog Box: OpenFileDilog, SaveFileDialog, FontDialog, ColorDialog, PrintDialog, Printing. ListView, TreeView, toolbar, StatusBar..

UNIT 4
Object oriented Programming: Classes & objects, constructor, destructor, inheritance. Access Specifiers, Interfaces, Polymorphism. Exception Handling: using Try, Catch, Finally, Throw Keywords. Graphics Handling: Using Graphics & Pen classes for drawing colors and figures. File Handling: Opening or Creating a File, Writing & Reading Text.

UNIT 5

Database programming with ADO.NET – Overview of ADO, from ADO to ADO.NET, Accessing Data using Server Explorer. Creating Connection, Command, Data Adapter and Data Set with OLEDB and SQLDB. Display Data on data bound controls, display data on data grid. Generate Reports Using CrystalReportViwer.

Reference Books:
1. VB.NET Programming Black Book by stevenholzner –dreamtech publications
2. Mastering VB.NET by Evangelospetroutsos- BPB publications
3. Introduction to .NET framework-Worx publication

MSIS 205 E2: Computer System Architecture and parallel Processing

UNIT 1

Flynn's Classification, System Attributes to Performance, Parallel computer models Multiprocessors and multicomputer, Multivector and SIMD Computers. Data and resource dependences, Hardware and software parallelism, Program partitioning and scheduling, Grain size and latency, Control flow, data flow and Demand driven mechanisms. Static interconnection networks, Dynamic interconnection Networks: Bus Systems, Crossbar Switch, Multiport Memory, Multistage and Combining Networks

UNIT 2

Instruction set architecture, CISC Scalar Processors , RISC Scalar Processors, VLIW architecture, Memory Hierarchy, Inclusion, Coherence and Locality, Memory capacity planning. Interleaved memory organization- memory interleaving, pipelined memory access, Bandwidth and Fault Tolerance. Backplane Bus System :Backplane bus specification, Addressing and timing protocols, Arbitration transaction and interrupt.

UNIT 3

Linear pipeline processor, Nonlinear pipeline processor, Instruction pipeline design, Mechanisms for instruction pipelining, pipeline hazards, Dynamic instruction scheduling – score boarding and Tomosulo's algorithm, Branch handling techniques, Arithmetic Pipeline Design, Static arithmetic pipeline, Multifunctional arithmetic pipelines. Superscalar pipeline design, Super pipeline processor design.

UNIT 4

Cache coherence, Snoopy protocols, Directory based protocols. Message routing schemes in multicomputer network, deadlock and virtual channel. Vector Processing Principles, Vector Instruction types, Vector-access memory schemes. Vector supercomputer architecture, SIMD organization: distributed memory model and shared memory model. Principles of Multithreading: Multithreading Issues and Solutions, Multiple-Context Processors

UNIT 5

Parallel Programming Models, Shared-Variable Model, Message-Passing Model, Data-Parallel Model, Object-Oriented Model, Functional and Logic Models, Parallel Languages and Compilers, Language Features for Parallelism, Parallel Programming Environment, Software Tools and Environments

Reference Books:

1. Kai Hwang, "Advanced computer architecture", TMH. 2013 - 14
2. J.P.Hayes, "computer Architecture and organization"; MGH.
3. V.Rajaranam&C.S.R.Murthy, "Parallel computer"; PHI Learning.
4. Kain,"Advance Computer Architecture: - A System Design Approach", PHI Learning
5. M.J Flynn, "Computer Architecture, Pipelined and Parallel Processor Design"; Narosa Publishing.
6. Hwang and Briggs, "Computer Architecture and Parallel Processing"; MGH.

MSIS 301: Basic Statistical Methods

UNIT 1

Statistical analysis, Measures of central tendency and dispersion, mean, median, mode, range, mean and standard deviations, computing correlation in variables, linear and non-linear regression.

UNIT 2

Probability and Probability distributions Probability: classical, relative frequency and axiomatic definitions of probability, addition rule and conditional probability, multiplication rule, total probability, Bayes'Theorem and independence. Probability distributions: binomial, poison, geometric, negative binomial uniform exponential, normal and log normal distribution.

UNIT 3

Random Variables: Discrete, continuous and mixed random variables, probability mass, probability density and cumulative distribution functions, mathematical expectation, moments, probability and moment generating function, median and quintiles, Markov inequality, correlation and regression, independence of random variables.

UNIT 4

Sampling & DistributionsThe Central Limit Theorem, distributions of the sample mean and the sample variance for a normal population, ChiSquare, t and F distributions, problems.

UNIT 5

Hypothesis Testing: Basic ideas of testing hypothesis, null and alternative hypotheses, the critical and acceptance regions, two types of error, tests for one sample and two sample problems for normal populations, tests for proportions, Chi-square goodness of fit test and its applications. Software and Tools to be learnt: Statistical packages like SPSS and R.

Reference Books:

1. R. Panneerselvam, "Research Methodologies," PHI.
2. C.R. Kothari: Research methodology, Methods and Techniques, New Age Publication.
3. S.M. Ross, A First Course in Probability, 8 th Edition, Prentice Hall.

MSIS 302: Advanced Computer Network

UNIT 1

Review of Basic Network Architectures: OSI reference model, TCP/IP reference model, ATM reference model; Applications (WWW, Audio/Video Streaming, Video conference, Networked Games, Client/Server); Traffic Characterization (CBR, VBR); Switching Paradigms; Multiplexing; Error Control; Flow Control, SONET, Optical Networks.

UNIT 2

Local Area Network Technologies: Wired LANS: Ethernet Protocol, Fast Ethernet, Gigabit Ethernet, Wireless LANs, IEEE 802.11 Project, Bluetooth, Connecting LANs.

UNIT 3

Internetworking: Interdomain Routing, Border Gateway Protocol version 4, IPv6, Multicast Routing Protocols, Multi-Protocol Label Switching, Virtual Private Networks, High speed transport protocols, Quality of Service Mechanisms, Improving QoS in Internet.

UNIT 4

Distributed Systems: Naming, DNS, DDNS, Paradigms for Communication in Internet, Caching, Issues of Scaling in Internet and Distributed Systems, Caching Techniques for Web, Protocols to Support Streaming Media, Multimedia Transport Protocols, Content Delivery Networks, Overlay and P2P Networks.

UNIT 5

Applications and Other Networking Technologies: RTP, RTSP, SIP, VoIP, Security Systems, SSH, PGP, TLS, IPSEC, DDoS Attack, Mitigation in Internet, Security in MPLS; Introduction to Cellular, Satellite and Ad hoc Networks.

Reference Books:
1. Behrouz A. Forouzan, Data Communications and Networking, Fourth Ed., Tata McGraw Hill
2. Larry L. Peterson and Bruce S. Davie, Computer Networks: A Systems Approach, Fourth Ed., Morgan Kaufmann
3. Jean Walrand and Pravin Varaiya, High performance Communication Networking, 2nd Ed., Morgan Kaufmann, 1999.
4. Markus Hoffmann and Leland R. Beaumont, Content Networking: Architecture, Protocols, and Practice, Morgan Kaufmann, 2005.

MSIS 303: Information Security

UNIT 1

A Definition of Computer Security, The Challenges of Computer Security, The OSI Security Architecture. Security Attacks (Passive Attacks, Active Attacks). Security Services (Authentication, Access Control, Data Confidentiality, Data Integrity, Nonrepudiation, Availability Service). Security Mechanisms, Model for Network Security (Bell LaPadula, Biba, Clark Wilson, Chinese wall, Role based, Object oriented, Resource allocation monitor models).

UNIT 2

Symmetric Encryption Principle (Cryptography, Cryptanalysis, Feistel Cipher structure) Symmetric Block Encryption Algorithms (Data Encryption Standard, Triple DES, Advanced Encryption Standard). Stream Ciphers and RC4 (Stream Cipher Structure, The RC4 Algorithm). Cipher Block Modes of Operation (Electronic Codebook Mode, Cipher Block Chaining Mode, Cipher Feedback Mode, Counter Mode).

UNIT 3

Approaches to Message Authentication (Authentication Using Conventional Encryption, Message Authentication without Message Encryption). Secure Hash Functions (Hash Function Requirements, Security of Hash Functions, Simple Hash Functions, The SHA Secure Hash Function). Message Authentication Codes (HMAC, MACs Based on Block Ciphers). Public-Key Cryptography Principles (Public-Key Encryption Structure, Applications for Public-Key Cryptosystems, Requirements for Public-Key Cryptography). Public-Key Cryptography Algorithms (The RSA Public-Key Encryption Algorithm, Diffie-Hellman Key Exchange, Other Public-Key Cryptography Algorithms). Digital Signatures.

UNIT 4

Secure sockets – IPsec overview – IP security architecture – IPsec-Internet Key Exchanging (IKE) – IKE phases – encoding – Internet security – Threats to privacy – Packet. sniffing – Spoofing - Real Time communication security – Security standards– Kerberos.X.509AuthenticationService.

UNIT 5

IEEE 802.11 Wireless LAN Overview (The Wi-Fi Alliance, IEEE 802 Protocol Architecture, IEEE 802.11 Network Components and Architectural Model, IEEE 802.11 Services).. IEEE 802.11i Wireless LAN Security (IEEE 802.11i Services, IEEE 802.11i Phases of Operation, Discovery Phase, Authentication Phase, Key Management Phase, Protected Data Transfer Phase, The IEEE 802.11i Pseudorandom Function). Wireless Application Protocol Overview (Operational Overview, Wireless Markup Language, WAP Architecture, Wireless Application Environment, WAP Protocol Architecture). Wireless Transport Layer Security (WTLS Sessions and Connections, WTLS Protocol Architecture, Cryptographic Algorithms), WAP End-to-End Security.

Reference Books:
1. W. Stallings, Cryptography and Network Security Principles and practice, 3/e, Pearson Education Asia, 2003. 2. Charlie Kaufman, Radia Perlman and Mike Speciner, "Network Security: Private Communication in a public world", Prentice Hall India, 2nd Edition, 2002.
2. Charles P. Pleeger, "Security in Computing", Pearson Education Asia, 5th Edition, 2001.
3. William Stallings, "Network Security Essentials: Applications and standards", Person Education Asia, 2000.
4. W. Mao, Modern Cryptography: Theory & Practice, Pearson Education, 2004

MSIS 304-E1 Python Programming

UNIT 1

Introduction to Python: Python versus Java, Python Interpreter and it's Environment, Python installation, Python basics: variables, operators, Strings, Conditional and Control Statements, loops; Data structures: lists and dictionaries; functions: global functions, local functions, lambda functions and methods.

UNIT 2
Object Oriented Programming Concepts: Class, object, constructor, destructor and inheritance; Modules & Packages, File Input and Output, catching exceptions to deal with bad data, Multithreading, Database Connectivity.

UNIT 3
Numpy: Creating Arrays, Arrays Operations, Multidimensional Arrays, Arrays transformation, Array Concatenation, Array Math Operations, Multidimensional Array and
its Operations, Vector and Matrix.

UNIT IV
Visualization: Visualization with matplotlib, Figures and subplots, Labelling and arranging figures, Outputting graphics.

UNIT V:
Pandas: Manipulating data from CSV, Excel, HDF5, and SQL databases, Data analysis and modelling with Pandas, Time-series analysis with Pandas, Using Pandas, the Python data analysis library, Series and Data Frames, Grouping, aggregating and applying,
Merging and joining.

Reference Books:
1. McKinney Wes, "Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython", O'Reilly Media, 2012.
2. Hauck Trent, "Instant Data Intensive Apps with Pandas How-To", Packt Publishing Ltd, 2013.
3. Beazley David M.,"Advanced Python Programming", Pearson Education,2009.
4. Chun Wesley , Core Python Programming, 3rd Edition,Prentice Hall Professional, 2012.
5. Telles Matt "Python Power!: The Comprehensive Guide", Cengage Learning, 2008.

MSIS 304-E2 Network Security and Cryptography

UNIT 1
Obstacles to Security: Security is inconvenient, Computer Are Powerful and complex, Computer User Are Unsophisticated, Computer Created without a Thought to Security, Current Trend is to Share, Not Project Data Accessible from Anywhere security Isn't, Hardware and Software. The Bad Guys Are Very Sophisticated, Management Sees Security as a Drain on the Bottom Line.
Ten Steps to Building a Secure Organization: Evaluate the Risks and Threats, Beware of Common Misconceptions, Provide Security Training for IT Staff-Now and Forever, Think Employees: Develop a Culture of Security Identify and Utilize Built-In Security Features of the Operating System and Applications, Monitor System, Hire a Third Party to audit Security, Don't Forget the Basics, Patch.

UNIT 2
Internet Security
Internet Protocol Architecture: Communications Architecture Basics, An Internet Threat Model: The Dolev-Yoa Adversary Model Layer Threats, Defending Against Attacks on the Internet: Layer Session Defences, Session Stratup Defences.
Botnet Problem: Botnet Overview, Origin of Botnets, Botnet Topologies and Protocols, Typical Bot Life, Cycle.

UNIT 3
Content Filtering
The Problem with Content Filtering, Categories, Issues and Problems with Content Filtering, Bypass and circumvention, Client –Based Proxies, Open Proxies, HTTP web-Based Proxies(Public and private), Secure Public Web-Based Proxies, Process Killing Remote Pc Control Applications, Overblocking and Underblocking, Blacklist and Whitelist Determination, Detect Spyware and malware in the HTTP Payload, Scalability and Usability , Performance Issue, Technology and Techniques for Content-Filtering control ,Internet gateway-based Products Unified Threat Appliances.
Authentication Methods Hashing, HMAC, MD5, SHA-1, Symmetric Encryption, Asymmetric Cryptography Edge Devices, Password.

UNIT 4
Instant-Massaging Security, The Evolution of Networking Technology, Game Theory and Instant Messaging, your workforce, Generational Gaps, Transactions, The Nature of the Threat Malicious Threat, Vulnerabilities, Man-in-the-Middle Attacks, Phishing and Social Engineering, Knowledge Is the Commodity, Data and Traffic Analysis, Unintentional Threats, Regulatory Concerns.
Defensive Strategies: Asset Management, Built-in Security, Content Filtering, Classic Security, Compliance, Data Loss Prevention, Logging, Archival.

UNIT 5
Vulnerability Assessment: Why Vulnerability assessment, Penetration Testing Versus Vulnerability Assessment, Vulnerability Assessment Goal, Mapping the Network, Selecting the Right Scanner Central Scans versus local Scans, Defence in Depth Strategy, Network Scanning Countermeasures, Vulnerability Disclosure Date, Find Security Hole before They Become Problem, Proactive Security versus Reactive Security, Vulnerability Causes, Conclusion. **Firewall, IDS/IPS, Honeypot.**

Reference Books:
1. Charlie Kaufman, Radia Perlman, Mike Speciner, "Network Security", Prentice Hall, 2nd edition, 2002, ISBN-10: 0130460192, ISBN-13: 978-0130460196.
2. 2. Charles Pfleeger," Security in Computing", Prentice Hall, 4 th Edition, 2006, ISBN-10: 0132390779, ISBN-13: 978-01323907744.
3. 3. Ulysess Black, "Internet Security Protocols: Protecting IP Traffic", Prentice Hall PTR; 1st edition, 2000, ISBN-10: 0130142492, ISBN-13: 978-0130142498.
4. 4. Amir Ranjbar 2007, CCNP ONT Official Exam Certification Guide, Cisco Press [ISBN: 978-1-58720-176-3].
5. 5. Luc De Ghein 2006, MPLS Fundamentals, 1st Ed. Ed., Cisco Press [ISBN: 978-1- 58705-197-5]
6. 6. William Stallings, "Cryptography and Network Security", Pearson Education, 6th Edition, 2013,ISBN 10: 0133354695.

MSIS 305- E1 Machine Learning

UNIT 1

Learning Problems - Perspectives and Issues   - Concept Learning - Version Spaces and Candidate Eliminations - Inductive bias - Decision Tree learning - Representation Algorithm- Heuristic Space Search.

UNIT II

Neural Network Representation - Problems - Perceptrons – Multilayer Networks and Back Propagation Algorithms - Advanced Topics - Genetic Algorithms - Hypothesis Space Search Genetic Programming - Models of Evalution and Learning.

UNIT III

Bayes Theorem - Concept Learning - Maximum Likelihood – Minimum Description Length Principle - Bayes Optimal Classifier - Gibbs Algorithm - Naïve Bayes Classifier – Bayesian Belief Network - EM Algorithm - Probability Learning - Sample Complexity - Finite and Infinite Hypothesis Spaces - Mistake Bound Model.

UNIT IV

K- Nearest Neighbour Learning - Locally weighted Regression - Radial Bases Functions - Case Based Learning.

UNIT V

Learning Sets of Rules - Sequential Covering Algorithm - Learning Rule Set - First Order Rules - Sets of First Order Rules - Induction on Inverted Deduction - Inverting Resolution -Analytical Learning - Perfect Domain Theories - Explanation Base Learning – FOCL Algorithm- Reinforcement Learning - Task - Q-Learning - Temporal Difference Learning

TEXT BOOKS:

1. Machine Learning - Tom M. Mitchell, - MGH

REFERENCE BOOKS:
1. Machine Learning: An Algorithmic Perspective, Stephen Marsland, Taylor & Francis

MSIS 305-E2 Cloud Computing

UNIT 1

Cloud Computing: Definition, Cloud Architecture, Cloud Storage, Advantages and Disadvantages of Cloud Computing, Companies in the Cloud Today, Cloud Services, Cloud Types: The NIST Model, The Cloud Cube Model, Deployment Models, Service Models Cloud Computing, Service Models: Infrastructure as a Service (IaaS), Platform as a Service (PaaS), Software as a Service (SaaS).

UNIT 2

Web-Based Application– Pros and Cons of Cloud Service Development–Types of Cloud Service Development–Software as a Service– Platform as a Service–Web Services– On-Demand Computing–Discovering Cloud Services Development Services and Tools–AmazonEc2–Google App Engine–IBM Clouds.

UNIT 3

Centralizing Email Communications– Collaborating on Schedules–Collaborating on To-Do Lists–Collaborating Contact Lists–Cloud Computing for the Community–Collaborating on Group Projects and Events–Cloud Computing for the Corporation.

UNIT 4

Collaborating on Calendars, Schedules and Task Management–Exploring Online Scheduling Applications–Exploring Online Planning and Task Management–Collaborating on Event Management–Collaborating on Contact Management–Collaborating on Project Management–Collaborating on Word Processing-Collaborating on Databases–Storing and Sharing Files.

UNIT 5

Cloud computing security architecture: Architectural Considerations-
General Issues, Trusted Cloud computing, Secure Execution Environments and Communications, Micro-architectures; Identity Management and Access control Identity management, Access control, Autonomic Security Cloud computing security challenges: Virtualization security management virtual threats, VM Security Recommendations, VM-Specific Security techniques, Secure Execution Environments and Communications in cloud.

Reference Books:

1. Barrie Sosinsky,"Cloud Computing Bible",Wiley India pub.
2. Dinakar Sitaram,"MovingtoTheCloud",Elsevier,2014.
3. Danc.Marinercus,"CloudComputingTheoryAndPractice",Elsevier,2013.

MSIS - 401 Network Management

UNIT 1

Introduction: - Computer Network, Goals and Applications, Data Communications and Network Management Overview: Communications protocols and Standards. Case Histories of Networking and Management, Network Management: Goals, Organization, and Functions, Network and System Management, Network Management System Platform, Current Status and future of Network Management.
Fundamentals of computer network technology: Network Topology, LANs. Network node components Hubs, Bridges, Routers, Gateways, Switches, WAN, ISDN Transmission Technology. Network Management Standards, Network Management Model, Organization Model, Information Model, Communication Model, ASN.1, Encoding Structure.

UNIT 2

SNMPV1 Network Management: Managed network: Case Histories and Examples, The History of SNMP Management. The SNMP Model, The Organization Model, System Overview. The Information Model, The SNMP Communication Model, Functional Model.
SNMP Management: SNMPv2: Major Changes in SNMPv2, SNMPv2 System Architecture, SNMPv2 Structure of Management Information. The SNMPv2 Management Information Base, SNMPv2 Protocol, Compatibility with SNMPv1.

UNIT 3

Broadband Network Management-ATM Networks: Broadband Networks and Services, ATM Technology, ATM Network Management.
Broadband Network Management: Broadband Access Networks and Technologies, HFC Technology, HFC Management, DSL Technology, ADSL Technology, ADSL Management.
Telecommunication Management Network: Introduction, Operations Systems, TMN conceptual Model, TMN Architecture, TMN Management Service Architecture, An integrated view of TMN.

UNIT 4

Network Management Tools and Systems: Network Management Tools, Network Statistics Measurement Systems, History of Enterprise Management. Network Management systems, Commercial Network management Systems, System Management, Enterprise Management Solutions.

UNIT 5

Network Management Applications: Configuration management, Fault management, performance management. Event Correlation Techniques, security Management, Accounting management, Report Management, Policy Based Management Service Level Management.

1.Required Text(s)

- Network Management, Principles and Practice, Mani Subrahmanian, Pearson Education.

Essential References

- Network management, Morris, Pearson Education.
- Principles of Network System Administration, Mark Burges, Wiley Dreamtech.
- Distributed Network Management, Paul, John Wiley.
- Computer Networks, Andrew S. Tanenbaum, Addison-Wesley, 4th Ed.

MSIS – 402 Legal Aspects of Information Security

UNIT 1
Cyber World: An Overview: The internet and online resources, Security of information, Digital signature.

An Overview of Cyber Law: Introduction about the cyber space, Regulation of cyber space – introducing cyber law, UNCITRAL Model Law on Electronics Commerce 1996.

Understanding Cyber Crimes: Defining Crime, Crime in context of Internet –Actus Rea/Mens Rea, Types of crime in Internet, Computing damage in Internet crime.

Indian Penal Law & Cyber Crimes: Fraud, Hacking, Mischief, Tresspass, Defamation, Stalking, Spam.

Case #1: Study various cases relate to Phishing in people's account and write a report

UNIT 2
Freedom of Speech & Human Rights Issues in Internet: Freedom of Expression in Internet, Issues of Censorship, Hate speech, Sedition, Libel, Subversion, Privacy Issues, International Positions on Free Speech in Internet.

Obscenity: Internet and Potential of Obscenity, Indian Law on Obscenity & Pornography, Technical and Legal solutions, International efforts, Changes in Indian Law, Search and Seizure powers, Digital Forgery.

Case #2: Study Section 67,67A,67B,69A,69A and 69B related case study

UNIT 3
Contract in the InfoTech world Understanding Electronic Contracts: The Indian Law of Contract, Construction of Electronic Contracts, Issues of Security Issues of Privacy Technical Issues in Cyber Contracts.

Assignment: Write a contact policy b/w Your IT company and Client.

Types of Electronic Contracts: Employment Contracts Consultant Agreements Contractor Agreements Sales, Re-Seller and Distributor Agreements Non-Disclosure Agreements, Software Development & Licensing Agreements Shrink Wrap Contract, Source Code Escrow Agreements.

UNIT 4
E-Commerce & Taxation E-Commerce - Salient Features: On-line contracts, Mail Box rule, Privity of Contracts, Jurisdiction issues in E-Commerce, Electronic Data Interchange.

Security and Evidence in E-Commerce: Dual Key Encryption, Digital Signatures, Security issues in E-Commerce, Evidence related issues, UNCITRAL model law of E-Commerce, Indian Legal Position on E- Commerce, IT Act 2000/Indian Evidence Act/ Draft law on E-Commerce.

UNIT 5
Impact of Technology on Law, Understanding Copy Right in Information Technology: Understanding the technology of Software, Software - Copyrights vs. Patents debate, Authorship and Assignment Issues, Commissioned Work and Work for Hire, Idea/Expression dichotomy, Copyright in Internet.

Legal Issues in Internet and Software Copyright: Jurisdiction Issues and Copyright, Infringement, Remedies of Infringement, Multimedia and Copyright issues, Software Piracy.

Assignment: Write a Content uses copywrite policy for your open source software.

1.Required Text(s) :
1. Vivek Sood, Cyber law Simplified, Tata Mcgraw-Hill Publishing (2001).
2. Chris Reed and john Angel, Cyber law (2007)
3. Sudhir Naib, The Information Technology Act, 2005: A Handbook, OUP, New York, (2011)
4. S. R. Bhansali, Information Technology Act, 2000, University Book House Pvt. Ltd.

2. Essential References:
1. The Information Technology Act,2000.
2. Information Technology Law and practices by Vakulsharma.
3. Computers, Internet and New Technology Laws (A comprehensive reference work with a special focus on developments in India)" By: Karnika Seth.
4. Cyber Law & Crimes By: BarkhaBhasin, Rama Mohan Ukkalam.

3.Electronic Materials, Web Sites:
i) http://www.cyberlawsindia.net ii) http://www.madaan.com/cyberlaw.html

MSIS – 403 Internet of Things

UNIT 1
Introduction to IoT: Definition, Characteristics, Conceptual framework, Architectural view. Technology involved - Server-end technology, Hardware and Software components, Development tools & Open source framework, APIs & Device interfacing components, Platforms & Integration tools, Sources of IoT, Advantages and Disadvantages of IoT. Machine-to-Machine Communication: Definition, How M2M relates to IoT? M2M architecture.

UNIT 2
Design principles for connected devices: Communication Technologies – Near-field communication, RFID, Bluetooth, Zigbee (ZigBee IP/ZigBee SE 2.0), Wi-Fi, GPRS/GSM cellular Networks-Mobile Internet.
Design principles for web connectivity: Constrained Application Protocol (CoAP), MQTT, XMPP. Data formats: JSON, XML, TLV, MIME. Connectivity Models: Request/Response, Publish/Subscribe, Pull/ Push Data, Message cache, Message queue.
Gateway Protocols for Web Connectivity: HTTP, SOAP, REST, RESTful HTTP and Web Sockets.

UNIT 3
Data Acquiring: Data generation, Data Acquisition, Data validation, Data categorization for storage, Data Store – definition, Key/value store, Document store, tabular store (Column Family & Big Table), Object store, **Graph Stores-Graph Databases Data Organizing:** Definition, DBMS-ACID rules, Distributed database, CAP theorem , Query processing, SQL, NoSQL, ETL, MPP, in-memory databases , columnar database.

UNIT 4
Data Processing: Definition, Online tractions and processing (OLTP), Stream processing, Real-Time processing, Event Stream processing, Business process, Business Intelligence, Distributed Business Process, Enterprise Systems, Service Oriented Architecture(SOA). **Data Analytics:** Definition, Analytics phases- Descriptive, Predictive, Prescriptive), Online analytical processing (OLAP), Statistical tools for data analysis -descriptive and inferential statistics, random analysis, sampling concept, Sampling distribution techniques, statistical inference, regression analysis. **Machine Learning basics:** Supervise and un-supervised techniques, **Big Data analytics** - Big data definition, Characteristics, Big data Classifications on the basis of: sources, format, stores, analysis, type, users, rate. **Big data Analytics:** Architecture, Hadoop components, Berkley Data Analytics Stack (BDAS) Architecture. Knowledge Management: Definition, Knowledge Management Reference Architecture.

UNIT 5
Cloud Storage models and communication APIs for IoT, IoT Privacy, Security and Vulnerabilities Issues and Solutions, Prototyping and designing the software for IoT applications, Interoperability in IoT. Introduction to Arduino Programming: Integration of Sensors and Actuators with Arduino. IoT Case Studies: Agriculture, Healthcare, SCM, Connected Cars, Smart city, Smart Home.

TEXT BOOKS:
1. Adrian McEwen, Hakim Cassimally, "Designing the Internet of Thing", Wiley
2. Rajkamal, "Internet of Things: Architecture and Design Principles", McGraw Hill Education, 2017.

REFERENCEBOOKS:
1. Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, "From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence", 1st Edition, Academic Press, 2014.
2. Dr. Ovidiu Vermesan, Dr. Peter Friess, "Internet of Things: Converging Technologies for Smart Environments and Integrated Ecosystems", River Publishers , 2014
3. Jean-Philippe Vasseur, Adam Dunkels, Morgan Kuffmann, "Interconnecting Smart Objects with IP: The Next Internet"
 4. Michael Miller, "The Internet of Things", Pearson Education, 2015.
5. Vijay Madisetti , Arshdeep Bahga, " Internet of Things (A Hands-on-Approach)", Universities Press, 2015, ISBN: 9788173719547
6. Tanenbaum, Andrew S, "Computer Networks", Pearson Education Pte. Ltd., Delhi, 4 th Edition
7. Barrie Sosinsky, "Cloud Computing Bible", Wiley-India, 2010
8. Charalampos Doukas, "Building Internet of Things with the Arduino".

MSIS 404 – E1 Mobile & Wireless Systems

UNIT 1

Overview of the emerging fields of mobile computing; Historical perspectives (mainly from the perspective of radio), Mobile applications, Limitations, Health Concerns, Cordless phone, Land mobile vs. Satellite vs. In-building communications systems, Frequencies for radio transmission. Characteristics of Cellular Systems, Mobility support in cellular telephone networks, Personal Communications Systems/Personal Communications Networks, Wireless Personal Area Network, Wireless Local Area Network and Internet Access. Mobility management, Security, Cellular telephony as a case study in network support: hand-off, mobility, roaming, billing/authorization/authentication.

UNIT 2

Mobile communication: Fibre or wire-based transmission, Wireless Transmission - Frequencies, Signals, Antennas and Signal Propagation, Modulation Techniques, Multiplexing techniques, Coding techniques. Cellular structure, Voice Oriented Data Communication - GSM, CDMA, GSM Architecture, Authentication & security, frequency hopping, Speech coding, Data communication with PCs, Wireless web browsing, Testing cellular Systems Speech coding.

UNIT 3

Satellite Systems: History, Application, and Basics of Satellite Systems: LEO, MEO, GEO, Routing, Handover, VSAT, installation & Configuration. Cyclic repetition of data, Digital Audio Video Broadcasting, Multimedia object tran-sfer Protocol, Wireless LAN topologies, requirements. Physical layer, MAC sublayer, IEEE802.11.HIPERLAN: Protocol architecture, layers, Information bases and networking, Bluetooth.

UNIT 4

Basics of Discrete Event Simulation, Application and Experimentation, Simulation models. Case Study on Performance Evolution of IEEE 802.11 WLAN configuration using Simulation, MobileIP, goals, assumptions requirements, entities and terminology, IP packet delivery, tunnelling and encapsulation, Feature and format of IPv6, DHCP, TCP over Wireless. Characteristic of Ad Hoc networks, Applications, need for routing, routing classification, Wireless sensor networks, classification and Fundamentals of MAC protocol for wireless sensor networks.

UNIT 5

Economics Benefits of Wireless Networks, Wireless Data Forecast, charging issues, Role of Government, Infrastructure manufacturer, Enabling Applications Mobile operating System, file system, Process, Task, Thread, ISR and IST, CODA, HTTP versus HTML, WML, XML application for wireless handheld devices. UWB systems Characteristics, Current approaches for security.

Text Book(s):

1. Mobile Communications author Jochen Schiller, publication John Willy & Sons, Ltd.

Reference Book(s):
1. Wireless And Mobile Systems,D. P. Agrawal,Qing-An zeng, Thomson publication.
2. Wireless Networks, P Nicopotidis, Addision –Wesley-An zeng publication

MSIS 404- E2 Advanced Algorithm Design

UNIT 1

Order Analysis: Objectives of time analysis of algorithms; Big-oh and Theta notations. Master Theorem and its proof, solution of divide and conquer recurrence relations. Searching, Sorting and Divide and Conquer Strategy: Linear Search, Binary Search.

UNIT 2

Searching, Sorting and Divide and Conquer Strategy: Merge - sort; Quick - sort with average case analysis. Heaps and heap - sort. Lower bound on comparison - based sorting and Counting sort. Dynamic Programming: methodology and examples (Fibonaci numbers, Knapsack problem and some other simple examples) Dynamic Programming: Longest integer subsequence, Longest common subsequence, Weighted interval scheduling.

UNIT 3

Greedy Method: Methodology, examples (lecture Scheduling, process scheduling) and comparison with DP (more examples to come later in graph algorithms) Greedy Method: Knapsack problem and some other simple examples. Graph Algorithms: Basics of graphs and their representations. BFS. DFS. Topological sorting.

UNIT 4

Minimum spanning trees (Kruskal and Prim's algorithms and brief discussions of disjoint set and Fibonacci heap data structures). Shortest Paths (Dijkstra, Bellman - Ford, Floyd - Warshall). Hard problems and approximation algorithms. Problem classes P, NP, NP - hard and NP - complete, deterministic and nondeterministic polynomial - time algorithms, Approximation algorithms for some NP - complete problems.

UNIT 5

Backtracking, Branch and Bound technique, String Matching, Naive algorithm, KMP algorithm, Parallel Algorithms.

Text Book:

Cormen, Leiserson, and Rivest. Algorithms, MIT Press 2011.