SEMMETER I

15MX11 PROBABILITY AND STATISTICS  3 2 0 4


JOINT PROBABILITY DISTRIBUTIONS: Joint distribution for two dimensional random variables - marginal distributions – conditional distributions – conditional expectation – regression of the mean – independence of random variables - covariance and correlation – distribution function for two dimensional random variables.  


LINEAR REGRESSION AND CORRELATION: Simple linear regression – prediction of new observations – Correlation. 

STATISTICAL QUALITY CONTROL: Quality improvement and statistics – control charts – control charts for measurements – control charts for individual measurements – control charts for attributes. 


REFERENCES:  

15MX12 MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE  3 2 0 4

SET THEORY: Set notation and description - basic set operations - Venn diagrams - laws of set theory - partition - min sets- Principle of inclusion and exclusion. 


FUNCTIONS AND RELATIONS: Injective, Surjective, Bijective functions - composition, identity, inverse; Relations - properties of relations - closure operations on relations.


FINITE AUTOMATA: Definition of deterministic finite state automaton (DFA), Non deterministic finite state automaton (NFA) - equivalence of DFA and NFA - Equivalence of regular grammars and finite automata. 


TURING MACHINE (TM): Construction of simple Turing Machines - Universal TM - Halting Problem. 

Total L: 45+T:30 = 75


REFERENCES:


15MX13 PRINCIPLES OF PROGRAMMING LANGUAGES


(10)

IMPRESSIVE PARADIGMS AND C-I: Elementary and Structured Data Types: Data object variables, constants, data types, elementary data types, declaration, assignment and initialization, enumeration, characters, strings. Structured data type and objects: Specification of data structured types, vectors and arrays, records, variable size data structure, pointers and programmer constructed data structure, sets, files. Sub Program and programmer defined data types: Evolution of data types, abstractions, encapsulations, information hiding, sub programs, abstract data types.

(18)

IMPRESSIVE PARADIGMS AND C-II : Sequence Control: Implicit and Explicit sequence control, sequence control with within expression and statements, recursive sub programs, exception handling, co-routines, Scheduled sub programs, concurrent execution. Data control referencing environments, static and dynamic scope, local data referencing environment, shared data: Explicit common environment dynamic scope parameter passing mechanism. Storage Management: Major run time requirements, storage management phases, static storage management, stack based, hop based storage management.

(22)

INTERNET LANGUAGE PARADIGMS: Markup and Script Languages - Multi- Paradigm –Domain specific Languages. Case study Script Languages.

(10)

REFERENCES:


15MX14 DATA STRUCTURES


(4)


(6)

STACKS AND QUEUES: Operations - implementation - Applications: Recursion handling; Parentheses matching; Evaluation of expressions, Queues: Operations - sequential implementation – Circular Queues-Priority Queues - Dequeues - Applications. (10)

LISTS: Insertion and deletion of nodes - Singly linked lists, Doubly linked lists, Circular lists, Multiple linked lists - Linked stacks - Linked queues- Applications: Addition of Polynomials; Sparse Matrix representation.

(8)


(8)

SORTING: Insertion Sort, Selection Sort, Shell Sort, Bubble Sort, Quick Sort, Heap Sort, Merge Sort, Radix Sort – Algorithms - Analyst.

(5)

TABLES: Operations – Hash Table: Hash functions – Implementation - Overflow handling techniques - Linear Open Addressing – Chaining - Successful and unsuccessful searches.

(4)

Total L : 60

Total L : 45
REFERENCES:

15MX15 COMPUTER SYSTEM ARCHITECTURE

DATA FORMATS:
- Introduction
- Number Systems
- Number Bases
- Arithmetic
- Number Base conversion
- Alphanumeric character data
- Other Binary codes
- Representing Integer Data
- Complements
- (r-1)’s
- r’s
- signed number representation
- Floating Point Representation
- Format
- Normalization
- Arithmetic operation
- IEEE 754 format
- Packed Decimal Format.

DIGITAL LOGIC CIRCUIT:
- Digital computer
- Logic gates
- Boolean Algebra
- Simplification of Boolean functions
- Boolean laws and postulates
- Karnaugh’s Map method
- NAND
- NOR implementation.

COMBINATIONAL CIRCUITS:
- Design of Combinational Circuits
- Half-Adder
- Full-Adder
- Subtractors
- parity checker
- comparator
- Multiplexer
- Demultiplexer
- Encoder
- Decoder.

SEQUENTIAL CIRCUITS:
- Basic concepts
- Clocks
- Flip-Flops
- SR/F/F
- D/F/F
- JK/F/F
- T/F/F
- Excitation Tables
- Characteristic equation
- Edge-triggered Flip-flops
- Registers
- Register with Parallel load
- Shift registers
- Its types
- Bidirectional shift register
- with parallel load
- Asynchronous Up-down counters
- Design of synchronous counters.

REGISTER TRANSFER AND MICROOPERATIONS:
- Bus and Memory Transfer
- Tri-state buffers
- Arithmetic, Logic, Shift Micro-operations
- Arithmetic Logic Shift Unit.

BASIC COMPUTER DESIGN:
- Stored Program Organisation
- Timing and Control
- Instruction Cycle
- Memory Reference
- Instructions
- Input-Output and interrupt cycle
- Design of basic computer
- Control Unit
- Design of Hardwired Control Unit.

CPU ORGANISATION:
- General Register Organisation
- Stack Organisation
- Instruction formats
- Types of Interrupts
- RISC
- Parallel Processing
- Pipelining
- Array Processors
- Performance of a processor.

INPUT AND OUTPUT ORGANISATION:
- Input and Output interface
- Asynchronous Data transfer
- Modes of Transfer
- DMA.

MEMORY ORGANISATION:
- Types of Memory
- Memory Hierarchy
- Main Memory
- Memory interface to CPU
- Associative Memory
- Cache Memory
- Cache mapping schemes.

Total L: 45+T:30 = 75

REFERENCES:

15MX16 PROGRAMMING LANGUAGES LABORATORY

DATA FORMATS:
- Introduction
- Number Systems
- Number Bases
- Arithmetic
- Number Base conversion
- Alphanumeric character data
- Other Binary codes
- Representing Integer Data
- Complements
- (r-1)’s
- r’s
- signed number representation
- Floating Point Representation
- Format
- Normalization
- Arithmetic operation
- IEEE 754 format
- Packed Decimal Format.

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- Half-Adder
- Full-Adder
- Subtractors
- parity checker
- comparator
- Multiplexer
- Demultiplexer
- Encoder
- Decoder.

SEQUENTIAL CIRCUITS:
- Basic concepts
- Clocks
- Flip-Flops
- SR/F/F
- D/F/F
- JK/F/F
- T/F/F
- Excitation Tables
- Characteristic equation
- Edge-triggered Flip-flops
- Registers
- Register with Parallel load
- Shift registers
- Its types
- Bidirectional shift register
- with parallel load
- Asynchronous Up-down counters
- Design of synchronous counters.

REGISTER TRANSFER AND MICROOPERATIONS:
- Bus and Memory Transfer
- Tri-state buffers
- Arithmetic, Logic, Shift Micro-operations
- Arithmetic Logic Shift Unit.

BASIC COMPUTER DESIGN:
- Stored Program Organisation
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- Memory Reference
- Instructions
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CPU ORGANISATION:
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- Types of Interrupts
- RISC
- Parallel Processing
- Pipelining
- Array Processors
- Performance of a processor.

INPUT AND OUTPUT ORGANISATION:
- Input and Output interface
- Asynchronous Data transfer
- Modes of Transfer
- DMA.

MEMORY ORGANISATION:
- Types of Memory
- Memory Hierarchy
- Main Memory
- Memory interface to CPU
- Associative Memory
- Cache Memory
- Cache mapping schemes.

Total P:60

15MX17 DATA STRUCTURES LABORATORY
4. An appropriate illustration using Records and Variant records.
5. Stacks: Operations and applications.
8. Binary trees and Threaded trees.
9. Hash Table.

Total P: 30

SEMESTER II

15MX21 OPTIMIZATION TECHNIQUES


Transportation problem and its solution – Assignment problem and its solution by Hungarian method – Karmakar’s method – statement, Conversion of the Linear Programming problem into the required form, Algorithm. (6-4)


DYNAMIC PROGRAMMING: Recursive Nature – Multistage decision processes – Principles of optimality – Computation procedures. (4-3)

DECISION MAKING: Decisions under uncertainty, under certainty and under risk – Decision trees – Expected value of perfect information and imperfect information. (4-3)

Total L: 45+T:30 = 75

REFERENCES:

15MX22 OBJECT ORIENTED PROGRAMMING


FUNCTIONS IN C++: Function Prototyping - Call by Reference - Return by reference - Inline functions - Default, Const Arguments - Function Overloading. (3)

CLASSES AND OBJECTS: Data members - Member functions - Nesting of Member functions - Private member functions - Memory allocation for Objects - Static data members - Static Member Functions - Arrays of Objects - Objects as Function Arguments - Friend Functions - Returning Objects - Const Member functions - Pointers to Members. (6)

CONSTRUCTORS: Parameterized Constructors - Multiple Constructors in a Class - Constructors with Default Arguments – Copy and Dynamic Constructors – Destructors. (3)

INHERITANCE: Defining Derived Classes - Single Inheritance - Making a Private Member Inheritable - Multiple Inheritance – Hierarchical Inheritance - Hybrid Inheritance - Virtual Base Classes - Abstract Classes - Constructors in Derived Classes - Member Classes - Nesting of Classes – Composition – Aggregation. (8)


STREAMS: String I/O -Character I/O - Object I/O - I/O with multiple Objects - File pointers - Disk I/O with member functions.

REFERENCES:

15MX23 ADVANCED DATA STRUCTURES AND ALGORITHMS

INTRODUCTION: Review of fundamental data structure – Analysis of Algorithms.


GRAPHS: Definition – terminologies- Representations: Adjacency matrix, Adjacency list. – Graph search methods: Breadth first Search; Depth first Search.


GREEDY METHOD: Method – Examples – Minimum cost spanning tree, Kruskal’s algorithm, Prim’s algorithm.

DYNAMIC PROGRAMMING: Method – Examples – All pairs shortest path problem – Traveling salesman problem.


BRANCH AND BOUND: Method – Examples – 0/1 Knapsack.


REFERENCES:

15MX24 DATABASE MANAGEMENT SYSTEM


RELATIONAL MODEL: Relational data model basics - Codd’s rule – properties of Relations- Domains and Key concept – Integrity rules- Relational algebra – Relational algebra queries – Relational calculus: Tuple Relational calculus, Domain relational calculus – Queries in Relational calculus.

REFERENCES:

Total L : 45 + T:30 = 75

DATA BASE DESIGN THEORY: Functional dependencies - Normal forms – Normalization: 1NF to 5NF- Domain Key Normal Form – losses join and dependency preserving decomposition – Denormalization- Data base tuning.

DATABASE TRANSACTION & SECURITY: - Transaction processing- properties- security and integrity threats- security violations- identification and authentication - discretionary access control based on grant and revoking privilege-mandatory control and role based access control.

CASE STUDIES: Inventory system- Student information system- Hospital management system.

Total L: 45

REFERENCES:

15MX25 MICROPROCESSORS AND EMBEDDED SYSTEMS

INTRODUCTION TO COMPUTERS, MICROCOMPUTERS AND MICROPROCESSORS: Types of Computers - How computers and microcomputers are used – Overview of microcomputer structure and operation – Microprocessor evolution and types.


ASSEMBLY LANGUAGE PROGRAMMING: Assembly language program development – Instruction set – Addressing Modes – Machine Language Coding - Assembly Language Program Development with MASM - Syntax – Assembler directives – Assembling, linking, loading and executing programs – C, A high-level language for system programming.


INTRODUCTION TO EMBEDDED SYSTEMS: Embedded systems vs. general computing systems – History of embedded systems – Classification – Major application areas – Typical Embedded System – Core of embedded system – Communication Interface – Characteristics and Quality Attributes of Embedded Systems.


INTRODUCTION TO ADVANCED EMBEDDED PROCESSOR AND SOFTWARE: ARM Processor - Unified Model Language (UML) - Real Time Operating System (RTOS).

Total L: 45 + T:30 = 75

REFERENCES:

15MX26 OBJECT ORIENTED PROGRAMMING LABORATORY

Experiments in the following topics:
1. Function Overloading and default arguments.
2. Classes and objects.
3. Array of objects and dynamic data members.
4. Static members and member functions.
5. Constructors and destructors.
6. Inheritance.
7. Operator overloading.
8. Virtual functions.
10. Exception handling.
11. Namespaces.
12. File I/O.
13. Memory Handling.

Total P: 30

15MX27 RDBMS LABORATORY

Experiments in the following topics:
1. Table designing with related queries.
2. Database designing with constraints for
   i. functional dependency
   ii. referential integrity
   iii. multi-valued dependency
3. Views and indices.
4. Triggers.
5. Imposing restrictions on queries for security reasons.
6. Definition of cursors, stored procedures.
7. Transaction processing.
8. Front End design and connectivity with database system.

Total P: 30

15MX28 PROFESSIONAL COMMUNICATION

Interpersonal – Intrapersonal Communication
(2)
Group Communication
(2)
Meetings – Agenda and Minutes Preparation
(2)
Effective Presentation Skills
(2)
Writing Technical Reports – Characteristics - types
(2)
Writing E-mails & Business letters - Formats-Style- language
(3)
Interview Techniques
(2)

PRACTICALS
Making Presentations
Group Discussions
Mock Interviews
(24)
Case Study Presentation
(6)

Total L: 15+T:30 = 45

REFERENCES:
SEMESTER III
15MX31 JAVA AND .NET PROGRAMMING

INTRODUCTION TO CLIENT SIDE COMPUTING:
- Common Language Runtime – Microsoft Intermediate Languages.

JAVA PROGRAMMING:

PACKAGES AND INTERFACES:

MULTI THREADED PROGRAMMING:

C#.NET PROGRAMMING:

SERIALIZATION AND MULTITHREADING:

REFERENCES:

15MX32 OPERATING SYSTEMS

INTRODUCTION:

MEMORY MANAGEMENT:

VIRTUAL MEMORY MANAGEMENT:

PROCESS DESCRIPTION AND CONTROL:

PROCESS SYNCHRONIZATION:

I/O MANAGEMENT AND DISK SCHEDULING:

FILE MANAGEMENT:

Total L: 60
CASE STUDIES: Windows, Linux, and Android.

REFERENCES:

15MX33 COMPUTER NETWORKS


APPLICATIONS: Traditional Applications – E_Mail , WWW – Multimedia Applications – Session Control and Call Control – Infrastructure Services – Name Services , Network Management services – Overlay Networks – Routing overlays, Peer-to-peer networks, Content Distribution networks.

REFERENCES:

15MX34 PRINCIPLES OF COMPILER DESIGN

INTRODUCTION: Programming languages - language processing system - structure of a compiler – phases of a compiler - compiler writing tools.

LEXICAL ANALYSIS: Role of a lexical analyzer – finite automata –regular expressions to finite automata – minimizing the number of states of a deterministic finite automata – implementation of a lexical analyzer – symbol table management – introduction to Lex.


REFERENCES:
AUTOMATIC PARSING TECHNIQUES: LR parsers – canonical collection of LR (0) items – construction of SLR parsing tables – Construction of canonical LR parsing Table Parser- syntax error handling – recovery strategies - introduction to YAAC. (8+4)

INTERMEDIATE CODE GENERATION: Postfix notation – Three address code - Quadruples, triples , indirect triples – Syntax directed translation schemes - Intermediate code generation for assignment statements, Boolean expressions, Control statements: If-then-else, while loop, for loop. (9+8)

CODE OPTIMIZATION AND GENERATION: Code optimization techniques – basic blocks – flow graphs - DAG representation - error detection and recovery - code generation. (6+4)

REFERENCES:

15MX36 JAVA and .NET PROGRAMMING LABORATORY

JAVA LABORATORY EXPERIMENTS:
1. Study of IDE.
2. Arrays and strings.
4. Interface and Package.
5. Exception Handling.
6. FILE handling.
7. GUI application (swing/ awt).
8. Multithreading.

.NET LABORATORY EXPERIMENTS:
1. Create Console applications.
2. Develop Windows applications.
3. Construct web application to connect and access database tables.
4. Create custom user control in web applications.
5. NET assembly creation and deployment.
6. Working with share point tools.

Total P: 60

15MX37 MULTIMEDIA APPLICATION DEVELOPMENT LABORATORY


2D TRANSFORMATIONS: Windowing – Clipping – Segmenting – Viewport Transformations. (2)

3D TRANSFORMATIONS AND OBJECT REPRESENTATION: Translation – Rotation – Scaling – Reflection – Shears - Composite Transformations - Projections - Parallel and Perspective, Clipping. (3)

INTRODUCTION TO ACTION SCRIPT IN FLASH: Programming Concepts – Variables, Data types, conditionals, loops, arrays, Functions, Custom objects - Properties, Methods and Events – Display List, Timeline Control. (3)

Total L : 15 + P: 30 x 45

LAB COMPONENT:
1. Implementation of 2D Transformations - scan conversions, windowing, clipping , segmenting and viewport transformation.
2. Implementation of 3D Transformations - Surfaces, Translation, Rotation, scaling, projection and clipping.

REFERENCES:

Total L : 45 + T:30 = 75
UNIX ARCHITECTURE: Overview of Unix structure – Distribution of unix. (3)

SHELL PROGRAMMING: Essential Commands - General Purpose Utilities - Bourne Shell - Simple Filters – Advanced filters - Process Commands - Communication and Scheduling Commands - Programming with Shell. (11)

FILE SYSTEM STRUCTURE: Kernel architecture - Kernel data structure - Buffer Cache - Structure of Buffer pool - Scenarios for buffer retrieval - Reading and Writing disk blocks - Advantages and Disadvantages of buffer cache - Inode - Structure of regular file - Conversion of a pathname to an inode - Inode assignment to a new file - allocation of disk blocks. (10)

PROCESS SYSTEM: Process states and transitions - Context of a process - Saving the context of a process - Manipulating Process address space - Process creation and termination – Signals – Awaiting process termination - System Boot and INIT process - Process Scheduling. (10)


CASE STUDY: Variants of Unix. (2)

REFERENCES:


ENTERPRISE DATA ENABLING: Enterprise Data - Basis of JDBC, Drivers, Connection, Statement, Result Set, AdvancedJDBC features, Distributed transactions. Other approaches for persistence. (8)

ENTERPRISE WEB ENABLING: Web Browsers and Web Servers in Enterprise-Web Programming, Java Servlets - Java Server pages, JSTL. JSF, State and session management. (7)

ENTERPRISE APPLICATION ENABLING : Enterprise Java Beans, Stateless Session Beans, Stateful Session Beans, Message Driven Beans, Entity beans, Accessing and integrating EJBs. (12)

DISTRIBUTED ENTERPRISE COMMUNICATIONS ENABLING: Distributed Enterprise Communications Basis – distributed object middleware – synchronous and Communications. (8)

CASE STUDIES: Development of Enterprise software for Hospital, University and manufacturing firm. Usage of frameworks for software development. (7)

REFERENCES:
15MX43 SOFTWARE ENGINEERING METHODOLOGIES

INTRODUCTION: Software Characteristics-Comparison with other Engineering disciplines-Software Crisis and Myths-Software life cycle models-Selection of process models for projects- Agile methods- Software Engineering paradigms. (6+4)

REQUIREMENTS GATHERING: Requirements gathering tasks – Requirements Engineering Process - Qualities of good requirements-Types of Requirements-Requirements elicitation- Requirements documentation- Analysis Documentation. (6+4)


OBJECT ORIENTED APPROACH: Objects and Classes-Object Identification-Relationship among objects-classification-Use cases- UML Diagrams to support Object Oriented Analysis and Design. (12+8)

PROGRAMMING STANDARDS AND CODING: Structured programming coding standards-Maintainability of code. (2+2)

SOFTWARE TESTING FUNDAMENTALS: Black-Box and White-Box testing – Basis Path testing – Requirements phase testing - Design phase testing - Program phase testing - Desk debugging and program peer view test tools - Evaluating test results - Installation phase testing - Acceptance testing – Testing GUI – Testing Web Applications. (6+4)

DEBUGGING: The art of Debugging – Debugging Process – Debugging Strategies. (3+2)

Total L: 45+T:30 = 75

REFERENCES:

15MX46 UNIX SYSTEM PROGRAMMING LABORATORY

Experiments in the following topics:
1. Simple Programs with basic Unix Commands (essentials, utilities, filters, Regular expressions).
2. Simple Programs with process Commands.
3. Simple Programs with communication Commands.
4. Simple Programs with advanced filters – (sed, awk).
5. Programs using eval, exec, getopts.

Total P: 30

15MX47 ENTERPRISE COMPUTING LABORATORY

Experiments in the following topics:
1. Multi-tier software.
2. Enterprise software development and deployment.
3. Web Programming using servlets / JSP.
4. Distributed object programming using synchronous, asynchronous communication and Web Services.
5. Enterprise Application using session and entity EJB.
6. Use of Struts, Hibernate and Spring for software development.

Total P: 60

15MX48 MINI PROJECT I

Total P: 60
SEMMETER V

15MX51 DATA MINING 3 2 0 4

DATA MINING: Motivation -Steps in Data Mining – Architecture - Data Mining and Databases – Data Warehouses – Data Mining functionalities – Classification – Data Mining Primitives – Major issues. (6+4)

DATA PREPROCESSING: Descriptive data summarization -Data Cleaning – Data integration and transformation – Data Reduction – Data discretization and concept hierarchy generation. (7+4)

DATA WAREHOUSE and OLAP TECHNOLOGY: Need for Data Warehouse- multidimensional data model- Data Warehouse architecture - Data Warehousing to Data mining. (5+4)

MINING FREQUENT PATTERNS, ASSOCIATIONS AND CORRELATIONS: Frequent itemsets, Association rules – Efficient and Scalable frequent itemset mining methods – mining various kinds of Association rules. (6+4)

CLASSIFICATION AND PREDICTION: Issues regarding classification and prediction – Classification by Decision Tree induction – Bayesian Classification – Rule based classification – Classification using Neural Networks Prediction – Accuracy and error measures – Evaluating the accuracy of classifiers and predictors. (7+4)

CLUSTER ANALYSIS: Types of data – Partitioning Methods: k means and k Medoids – Hierarchical Methods: Agglomerative and Divisive hierarchical clustering- Outlier analysis. (5+4)

MINING TIME SERIES, SEQUENCE DATA: Trend analysis – similarity search – sequence patterns in transactional data bases- sequential pattern mining: concepts and primitives. (4+2)

MINING TEXT, MULTIMEDIA AND THE WORLD WIDE WEB: Text data analysis and information retrieval- Dimensionality reduction for text – text mining approaches – similarity search in multimedia data – classification and prediction analysis - mining the web page layout structure – mining multimedia data on the web- web usage mining. (5+4)

Total L: 45+T:30 = 75

REFERENCES:


CASE STUDIES: Inter-Enterprise applications like Insurance Claim processing - Credit Card based online transaction – Direct to Home Services. SOA and Web services in J2EE and .Net Platform. (5)

Total L: 45
REFERENCES:

15MX56 SERVICE ORIENTED COMPUTING LABORATORY 0 0 4 2

Experiments / Packages in the following topics:
1. XML and XML Schema.
5. Web service Composition and Transaction.
6. Business process modelling using BPEL and BPMN.

Total P: 60

15MX57 MINI PROJECT II 0 0 4 2

1. Identification of real time problem.
2. Literature survey and exploring different solutions for the problem.
3. Model development and Design methodologies.
4. System requirements and specification.
5. Implementation and Testing.

Total P: 60

VI SEMESTER

15MX61 PROJECT WORK 0 0 2 4 1 2

The Project involves the following:
1. Preparing a brief project proposal including
   a. Problem Identification
   b. Literature Survey
   c. System requirements and specification
   d. Model Development and Design Methodologies
   e. Time Line activities
2. A report highlighting the design finalization based on [functional requirements & standards (if any)].
3. A presentation including the following:
   a. Implementation phase (Hardware/software/both)
   b. Testing & Validation of the system

Total P: 360
ELECTIVES

NETWORK SYSTEM AND TECHNOLOGIES

15MXAA NETWORK MANAGEMENT

3 0 0 3


SECURITY MANAGEMENT: Functions - Protecting Sensitive Information - Host and User Authentication - Key Management – User Based Security Model - View Based Access Model.

ACCOUNTING MANAGEMENT: Performance Management - Network Usage, Metrics and Quotas.


REFERENCES:

TOTAL L : 45

15MXAB WIRELESS NETWORKS

3 0 0 3

INTRODUCTION: Evolution of Wireless Networks - Overview of various Wireless Networks.


WLAN SECURITY: 802.11 Legacy Security Methods - Encryption - TKIP/CCMP - Authentication – Passphrases & 802.1X/EAP - EAPTLS-configuration and access control sequence in 802.1x - WPA/WPA2-Personal - WPA/WPA2-Enterprise –User Authentication and credentials Role-Based Access Control (RBAC)


REFERENCES:

15MXAC  SECURITY IN COMPUTING


REFERENCE:

15MXAD CLOUD COMPUTING

INTRODUCTION TO PARALLEL AND DISTRIBUTED COMPUTING: Software as a Service (SaaS) - Virtualization -Parallelization.


MAPPYREDUCE PARADIGMS: Introduction. GFS Architecture, HDFS Architecture, Hbase, Google big Table, Amazon’s (key value) pair storage and Microsoft’s Azure infrastructure, Map reduce programming examples.

CLOUD COMPUTING FRAMEWORK: Amazon EC3, S3 storage revises, Aneka frame work, Anexa frame work, IBM blue Cloud.

APPLICATIONS: Distributed search engine and distributed data mining in the cloud.
REFERENCES:

15MXAE PERSVasive COMPUTING


LOCATION UPDATES AND LOCATING MOVING OBJECTS: Location Update Strategies, Always update, Never-Update, Time Based, Movement Based, Distance Based Update Strategies – Architecture of Location Directors, Two-Tier Scheme, Hierarchical Scheme – Optimization of the Architecture – Taxonomy and Location Management Techniques – Case Studies. (10)

LOCATION BASED SERVICES: Research on Location Based Services – Location Relatedness and the Query Model – Location Dependent Data – Location Aware Queries – Location Dependent Queries – Moving Object Database Queries – Query Classification – Query Translation Steps in LDQ Processing – Case Studies. (10)

Total L : 45

REFERENCES:

15MXAF MOBILE COMPUTING

INTRODUCTION: Introduction to networking - Advantages and disadvantages of wireless networking - Evolution of mobile communication generations – Wireless LAN and Wireless WAN - Mobile devices Profiles. (4)


SQLite: Overview – Creating database – Editing tasks – cursors and content values. [3]

Total L : 45

REFERENCES:

15MXAG COMPUTER FORENSICS 3 0 0 3


Total L: 45

REFERENCES:

15MXAH HIGH PERFORMANCE COMPUTING 3 0 0 3


PROGRAM PROPERTIES: Data and resource Dependencies - Hardware and Software parallelism - Program partitioning and scheduling - Grain Size and latency - Program flow mechanisms - Control flow versus data flow - Data flow Architecture - Demand driven mechanisms - Comparisons of flow mechanisms. [9]

PRINCIPLES OF SCALABLE PERFORMANCE: Performance Metrics and Measures,Parallel Processing Applications - Speedup Performance Laws - Amdahl's law for fixed load, Gustafson's law for scaled problems, Memory Bounded Speedup Model. [8]


34
CLOUD-BASED HIGH PERFORMANCE COMPUTING: Cloud computing fundamentals - Cloud reference architectures - High Performance Computing (HPC) on Cloud - Integration of high performance computing into cloud computing services - HPC applications. 

REFERENCES:

15MXAI FOUNDATIONS OF MODERN NETWORKING

5
4
3
2
1

REFERENCES:

15MXAJ UBIQUITOUS COMPUTING

INTRODUCTION: Introduction to ubiquitous & pervasive computing - modeling ubiquitous computing systems to everywhere computing-applications of ubiquitous healthcare, tracking, emergency information systems, home networking appliances and entertainment - Internet of Things paradigm - Emerging trends in ubiquitous computing systems.


LOCATION AWARE SYSTEM: Basics of context aware computing -mobility awareness- context modeling languages. Location operations: Basics of mobile/cellular network - network topology - location management - architectures and protocols for location services– Technology for location awareness - enhanced emergency services-OpenGIS location services.

DATA MANAGEMENT IN LOCATION DEPENDENT INFORMATION SYSTEM: Conceptual view of location based services-Location dependent data - storing and retrieving location dependent data over a network - POI (point-of-interest) data representation - location dependent queries - moving object queries - query transition steps in location dependent query processing -Voronoi diagram - Voronoï index structure for modeling location dependent data - visualizing the data in a map.

CASE STUDIES: Case studies of ubiquitous systems to identify strengths, limitations and the future directions: smart home, assistive technology - m-healthcare- smart traffic - disaster management. Location based services case study: mobile local search -M-tourism-L-commerce - contextual and personalized recommendations on the go - navigation systems - taxi application. A spatial database perspective: - current research in the area of data management in ubiquitous and pervasive environments.

REFERENCES:

WEB SERVICES AND TECHNOLOGIES

15MXBA SOCIAL NETWORKING AND WEB MINING


STRUCTURAL PROPERTIES OF SOCIAL NETWORKS: Notions of centrality, cohesiveness of subgroups, roles and positions, block models - stochastic block models – Information diffusion – power law.


REFERENCES:

15MXBB XML AND ITS APPLICATIONS 3003


XML TECHNOLOGIES: XForms – XQUERY – XLINK – RSS.

XML SECURITY: XML Encryption – Signature – Key management.

Total L : 45

REFERENCES:

15MXBC SEMANTIC WEB TECHNOLOGIES 3003


Total L : 45

REFERENCES:
INTELLIGENT SYSTEM AND TECHNOLOGIES
15MXCA MACHINE LEARNING

INTRODUCTION: Overview of machine learning - related areas – applications - software tools. (3)

PARAMETRIC REGRESSION: Linear regression - polynomial regression - locally weighted regression - numerical optimization - gradient descent- kernel methods. (7)

GENERATIVE LEARNING: Gaussian parameter estimation - maximum likelihood estimation - Bayesian estimation. (6)

DISCRIMINATIVE LEARNING: Linear discrimination - logistic regression - logit and logistic functions. (5)


DIMENSIONALITY REDUCTION: Feature selection - principal component analysis - linear discriminant analysis - factor analysis - independent component analysis - multidimensional scaling - manifold learning. (8)

REFERENCES:

15MXCB SOFT COMPUTING


SOFT COMPUTING AND CONVENTIONAL AI: Constituents - Characteristics - Hybrid models. (2)

FUZZY SET THEORY: Fuzzy sets - Basic definitions - Membership functions - Fuzzy rules and reasoning - Fuzzy relations - Fuzzy if-then rules - Fuzzy reasoning. (10)


REFERENCES:

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15MXCC  ARTIFICIAL INTELLIGENCE  3 0 0 3

INTRODUCTION: Computerized reasoning - Artificial Intelligence (AI) - characteristics of an AI problem - Problem representation in AI - State space representation - problem reduction-Concept of small talk programming.  (6)


AI AND GAME PLAYING: Major COMPONENT of a game playing program - plausible move generator - static evaluation - function generator - Minimal strategy - Alpha - Beta techniques - problems in computer game playing programs. (7)


KNOWLEDGE ENGINEERING: Design and architecture of expert systems - Expert system life cycle - Knowledge acquisition – difficulties - strategies - major applications areas - Qualitative study of expert systems, DENDRAL, MYCIN. (8)


Total L : 45

REFERENCES:

15MXCD  BIOINFORMATICS  3 0 0 3

INTRODUCTION: Bioinformatics - Classification of biological databases- Biological data formats - Application of bioinformatics in various fields. (5)

BASICS: Single letter code of amino acids -Symbols used in nucleotides.Gateway to Archives - Data retrieval– Entrez and SRS. (4)


EVOLUTIONARY ANALYSIS: Distances - Clustering methods – Rooted and unrooted tree representation – Bootstrapping strategies. (8)

PROTEIN STRUCTURE PREDICTION: Fragment assembly - Genome sequence assembly - Gene finding method - Gene prediction - Analysis and prediction of regulatory regions-Concepts and secondary structure prediction. (10)

PROBABILISTIC MODELS:Markov chain - Hidden Markov Models - Gene identification. and other applications. (6)

Total L: 45

REFERENCES:

15MXCE  EVOLUTIONARY COMPUTATION  3 0 0 3

INTRODUCTION: Historical development – Features– Classification and COMPONENT – Advantages – Applications. (5)


Ant CoLony optimization: Ant foraging behavior - Theoretical considerations – Convergence proofs – ACO Algorithm – ACO and model based search – Variations of ACO: Elitist Ant System (EAS), MinMax Ant System (MMAS) and Rank Based Ant Colony System (RANKAS). (8)

Particle Swarm Optimization: Principles of bird flocking and fish schooling – Evolution of PSO – Operating principles – PSO Algorithm – Neighborhood Topologies – Convergence criteria – Variations of PSO: Binary, weighted, repulsive, combined effect PSO and cLonal PSO. (7)


MultiObjectiVe eVolutionary Optimization: Introduction, Pareto optimality, Multi-Objective evolutionary algorithms. (5)

References:

15mxcf Programming for Robotics

Basics of Robotics: History – Definition – Components – Building a robot – The Robot drive mechanism. (3+2)

Robot Simulation: Mathematical modeling of the robot - Robot kinematics – Concepts of ROS and Gazebo. (4+4)

Designing ChefBot Hardware: Specifications - Block diagram - Working with Robotic Actuators and Wheel Encoders - Interfacing DC geared motor with Tiva C LaunchPad - Interfacing quadrature encoder with Tiva C Launchpad - Working with Dynamixel actuators. (5+5)

Working with Robotic Sensors: Working with ultrasonic distance sensors - Working with the IR proximity sensor - Working with Inertial Measurement Unit. (4+4)

Python and ROS: Introduction to OpenCV, OpenNI, and PCL - Programming Kinect with Python using ROS, OpenCV, and OpenNI - Working with Point Clouds using Kinect, ROS, OpenNI, and PCL. (6+6)


Total L: 30 + T: 30 = 60

References:

Total L: 45

Total L: 60
15MXCG DEEP LEARNING

INTRODUCTION: Motivation for deep learning - Machine learning Basics - From machine learning to deep learning. (10)

DEEP LEARNING NEURAL NETWORKS: Logistic Regression - Multilayer Perceptron - Elman Neural Network - Jordan Neural Network - Convolutional Neural Network - Recurrent and Recursive nets - Restricted Boltzmann Machine - Deep Belief Networks - Recurrent Neural Network with word embedding - Modeling and Generating Sequence. (10)


APPLICATIONS AND IMPLEMENTATION OF DEEP LEARNING: Overview of Languages and tools: JAVA, Python, R - Theano, Tensorflow. - Applications: Sentiment Analysis - Image Classification - Natural Language Processing - Speech Recognition. (15)

Total L: 45

REFERENCES:

ADVANCED COMPUTING AND TECHNOLOGIES

15MXDA ADVANCED DATABASE TECHNOLOGY


MOBILE DATABASES: Location and Handoff Management - Effect of Mobility on Data Management - Location Dependent Data Distribution - Mobile Transaction Models. (9)

Total L: 45

REFERENCES:
STORAGE TECHNOLOGY: Data proliferation and the varying value of data with time and usage - Sources of data and states of data creation - Data center requirements and evolution to accommodate storage needs - Overview of basic storage management - skills and activities - the five pillars of technology - Overview of storage infrastructure Component - Evolution of storage - Information Lifecycle Management concept - Data categorization within an enterprise - Storage and Regulations. (8)

STORAGE SYSTEMS ARCHITECTURE: Intelligent disk subsystems overview - Contrast of integrated vs. modular arrays - Component architecture of intelligent disk subsystems - Disk physical structure - Component - properties - performance and specifications - Logical partitioning of disks - RAID and parity algorithms - hot sparing - Physical vs. logical disk organization - protection and back end management - Array caching properties and algorithms - Front end connectivity and queuing properties - Front end to host storage provisioning - mapping and operation - Interaction of file systems with storage - Storage system - connectivity protocols. (8)


INFORMATION AVAILABILITY: Business Continuity and Disaster Recovery Basics - Local business continuity techniques - Remote business continuity techniques - Disaster Recovery principles and techniques. (8)

MANAGING & MONITORING: Management philosophies (holistic vs. system & component) - Industry management standards (SNMP, OSI-95, CIM) - Standard framework applications - Key management metrics (thresholds, availability, capacity, security, performance) - Metric analysis methodologies and trend analysis - Reactive and pro-active management best practices - Provisioning and configuration change planning - Problem reporting - prioritization and handling techniques - Management tools overview. (6)

SECURING STORAGE AND STORAGE VIRTUALIZATION: Storage security - critical security attributes for information systems - elements of a shared storage model and security extensions - storage security domains - common threats in each domain - virtualization technologies - block-level and file level virtualization technologies and processes. (6)

REFERENCES:

IMPORTANCE OF GREEN IT: The growing significance of Green IT and Green data centers - All basic steps towards Green IT - The Basics of Green IT. (4)

COLLABORATION FOR GREEN IT: The government’s role - Regulation and EPA activity - Regulating greenhouse gases - Role of the EPA - IT company support of government regulation - Educational institutions and government regulation. (12)

MAGIC OF INCENTIVE: The role of electric utilities - A most significant step - Virtualizing IT systems: Consolidation and Virtualization - Data Storage. (10)


CASE STUDIES: Web, Temporal and Spatial Data Mining Green IT Case Studies For Energy Utilities - Green IT case studies for universities and a large company - Worldwide green IT - Case studies - The future of green IT for corporations. (11)

REFERENCES:
15MXDD MULTIDIMENSIONAL DATA STRUCTURES

PROBABILISTIC ANALYSIS AND RANDOMIZED ALGORITHMS: The hiring problem – Indicator random variables – Randomized algorithms- Probabilistic analysis.


SEARCH TREES: Red-black trees – AVL trees - Splay trees.


REFERENCES:

15MXDE MULTI-CORE PROGRAMMING


PARALLEL PROGRAM CHALLENGES: Performance – Scalability – Synchronization and data sharing – Data races – Synchronization primitives (mutexes, locks, semaphores, barriers) – deadlocks and livelocks – communication between threads (condition variables, signals, message queues and pipes).


DISTRIBUTED MEMORY PROGRAMMING WITH MPI : MPI program execution – MPI constructs – libraries – MPI send and receive – Point-to-point and Collective communication – MPI derived datatypes – Performance evaluation.

PARALLEL PROGRAM DEVELOPMENT: Case studies – n-Body solvers – Tree Search – OpenMP and MPI implementations and comparison.

REFERENCES:

15MXDF APPLIED GRAPH THEORY


PATHS AND CONNECTIVITY: Connected Graphs and Digraphs-Menger’s Theorem for Graphs-Applications: Reliable Telecommunication Networks. (4)


COLORINGS AND DECOMPOSITIONS: Vertex Colorings – Edge Colorings – Algorithm for Vertex and Edge Colorings – Vertex Decomposition – Edge Decomposition. (6)

MATCHING AND FACTORS: Matching, Perfect matching, Tutte’s 1-factor theorem, weighted Bipartite matching, Hall’s theorem. (5)

NETWORK FLOWS AND APPLICATIONS: Flows and cuts in Networks, Maximum-flow problem, flows and connectivity-applications. (6)

RANDOM GRAPHS: Random graph – Properties of Random graph -Erdos theorem, threshold function. (7)

REFERENCES:

15MXDG COMPUTER GRAPHICS

GRAPHICS INPUT - OUTPUT DEVICES: Raster scan Displays - Random scan displays - Direct view storage tubes - Flat panel displays - Mouse - Track Ball - Joy Stick - Digitizers - Touch panels. (4)


RASTER GRAPHICS: Fundamentals: generating a raster image, representing a raster image, scan converting a line drawing, display characteristics, speed of scan conversion, natural images - Solid area scan conversion: Scan conversion of polygons, Y-X algorithm, properties of scan conversion algorithms - Interactive raster graphics: painting model, moving parts of an image, feed back images. (10)


THREE DIMENSIONAL GRAPHICS: 3D transformations - viewing 3D graphical data - orthographic, oblique, perspective projections - hidden lines and hidden surface removal. (5)

ANIMATION GRAPHICS: Design of Animation sequences - animation function - raster animation - key frame systems - motion specification -morphing - tweening. (3)

COMPUTER GRAPHICS REALISM: Tiling the plane - Recursively defined curves - Koch curves - C curves - Dragons - space filling curves - fractals - Grammar based models - graftals - turtle graphics - ray tracing. (5)

REFERENCES:
15MXDH OPEN SOURCE SYSTEMS

INTRODUCTION: Introduction to Open sources – Need of Open Sources – Advantages of Open Sources – Application of Open Sources: Bug Fixing – Commercial aspects of Open Source Systems- Software patenting and violations. (5)


Total L : 45

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15MXDI HUMAN COMPUTER INTERACTION


Total L: 45

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INTRODUCTION TO PATTERNS: Reusable object oriented software – Motivation - Best design practices of object oriented software - Benefits of patterns – Definition – Types - Pattern description - How design patterns solve design problems - Pattern Language – IDIOMS.


ARCHITECTURAL PATTERNS: From Mud to Structure: Layers - Pipes and Filters - Blackboard, Interactive Systems: Model View Controller (MVC), Case studies.


REFERENCES:
15MXDL BIG DATA ANALYTICS


Total L: 45

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15MXDM DATA ANALYTICS

INTRODUCTION: Data Science : Data science - Basic skills of a data scientist - Advice for aspiring Data Scientists/ Students – Role of Data Scientist. Data analysis: Decision making- modeling: graphical models, algebraic models, spread sheet models- seven step modeling process.

DATA WRANGLING: Introduction - Common Data Formats - Sanity Checking of Data - Dealing with missing data.


DECISION MAKING UNDER UNCERTAINTY: Elements of decision analysis - Baye's rule- Multistage decision problems-incorporating attitudes towards risk.


DATA VISUALIZATION: Introduction - Different data types - Data scales - Multivariate data.


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5. Gareth James, Daniel Witten, Trevor Hastie, Robert Tibshirani, ” An Introduction to Statistical Learning with Applications in R”, Springer 2013.

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15MXDN INTERNET OF THINGS


REFERENCES:
2. Dieter Uckelmann; Mark Harrison; Florian Michahelles, “Architecting the Internet of Things”, Springer 2011.

15MXDO SOFTWARE PROJECT MANAGEMENT

INTRODUCTION: Software Projects various other types of projects - Problems with software projects - an overview of project planning - Project evaluation - Project Analysis and technical planning - Project estimates - Preparation of Estimates - COCOMO model - Function Point Analysis - Putnam Model - Non-development overheads. (8)

ACTIVITY PLANNING: Project schedules - Sequencing and scheduling projects - Network planning models - Shortening project duration - Identifying critical activities. (9)

RISK MANAGEMENT: Resource allocation - Monitoring and Control - Managing people and organizing teams - Planning for small projects - Handling large projects - Divide and Conquer - Software Project survival. (8)

SOFTWARE CONFIGURATION MANAGEMENT: Basic functions, responsibilities, standards, configuration Management, Prototyping - Models of prototyping. (8)


CASE STUDY: Using Project management tools. (3)

REFERENCES:
15MXDP  HPC PROGRAMMING MODEL  2203

PARALLEL COMPUTING AND OPENMP: Fundamentals of Shared Memory Programming - Basic OpenMP concepts, Parallel directive - Data scoping rules - Basic OpenMP - constructs/directives/calls - examples - Parallelizing an existing code using OpenMP - More advanced OpenMP directives & functions - OpenMP Performance issues.  (6+6)

PARALLEL COMPUTING AND MPI POINT2POINT: OpenMP 3.0 enhancements - Fundamentals of Distributed Memory Programming - MPI concepts - Blocking Point to Point Communications.  (4+4)

PT2PT AND COLLECTIVE COMMUNICATIONS: Paired and Nonblocking Point to Point Communications - Other Point to Point routines - Collective Communications: One-with-All , All-with-All  (4+4)

ADVANCED MPI-1: Collective Communications: All-with-All- Derived Datatypes - Groups, Contexts and Communicators - Topologies - Language Binding issues - The Runtime and Environment Management - The MPI profiling interface and tracing.  (6+6)

MPI-1 AND PARALLEL PROGRAMMING: Hybrid MPI and OpenMP programming - MPI Performance Tuning & Portable Performance - Performance concepts and Scalability - Different modes of parallelism - Parallelizing an existing code using MPI - Using 3rd party libraries - using custom libraries.  (6+6)

MPI-2 STANDARD: Parallel I/O - Dynamic Process Spawning - IPC and MPI threads.  (4+4)

Total L: 30 + T: 30 = 60

REFERENCES:

15MXDQ  PROGRAMMING WITH ADVANCED ARCHITECTURES  2203


XEON PHI PROGRAMMING: Basic of Xeon Phi Architecture – Programming models of Xeon Phi – Porting of HPC applications in Xeon Phi – Tuning and optimization of HPC applications on Xeon Phi architecture.  (10+10)

HPC TOOLS: Profiling and Debugging of codes – Performance Libraries – mkl, lapack, fft – Analysis Tools – ITAC, alline DDT.  (6+6)

CASE STUDIES: Implementation of Algorithms and Parallelization Approaches.  (6+6)

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15MXDXR  VIDEO PROCESSING  2203

BASICS: Principles of video processing - Video display - Composite versus component video - Progressive and interlaced scan - Sampling of video signals.  (5+4)

MOTION ESTIMATION: TWO DIMENSIONAL - Optical flow - General methodologies - Pixel based motion estimation - Block matching algorithm - Deformable block matching algorithm - Mesh based motion estimation - Three dimensional - Feature based Motion Estimation - Direct motion Estimation - Iterative model.  (8+6)

BASIC OF VIDEO CODING: Categorization of video coding schemes - Information Theory for source coding - Binary encoding - Scalar quantization - Vector quantization - Wave form based coding - Block based transform coding - Predictive coding - Temporal prediction and transform coding.  (4+5)

CONTENT DEPENDENT VIDEO CODING: Two dimensional shape coding - Texture coding for arbitrarily shaped region - Joint shape and texture coding - Video Coding - Region based. Object based, Knowledge based, Semantic-Layered coding system.  (5+5)
ERROR CONTROL IN VIDEO COMMUNICATIONS- Overview of approaches - Video applications and communication networks - Transport level error control - Error resilient coding - Decoder error concealment - Encoder-decoder interactive error control (5+5)

STREAMING VIDEO OVER THE INTERNET AND WIRELESS IP NETWORKS - Architecture for video streaming systems – Video Compression – Protocols for video streaming – Streaming video over wireless IP networks (3+5)

Total L: 30 + T: 30 = 60

REFERENCES:

15MXDS VIRTUALIZATION


SYSTEM VIRTUAL MACHINES: Key Concepts - Resource Virtualization: Processors, Memory, I/O - Performance Enhancement. (5+4)

MULTIPROCESSOR VIRTUALIZATION: Partitioning of Multiprocessor Systems - Partitioning: Physical, Logical - Different Host and Guest Instruction Set Architectures - Security - Migration of Computing Environments. (5+5)

VM APPLICATIONS AND CASE STUDIES: Grid & Cloud Technologies - VMware, Hyper-V, XEN, Linux KVM, VirtualBox. (4+5)

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15MXDT SOCIAL NETWORK ANALYSIS


MINING COMMUNITIES: Aggregating and reasoning with social network data, Advanced Representations – Extracting evolution of Web Community from a Series of Web Archive - Detecting Communities in Social Networks - Evaluating Communities – Core Methods for Community Detection & Mining - Applications of Community Mining Algorithms - Node Classification in Social Networks. (8)


REFERENCES:

15MXDU PYTHON APPLICATION PROGRAMMING

BASICS: Python - Variables - Executing Python from the Command Line - Editing Python Files - Python Reserved Words - Basic Syntax-Comments - Strings and Numeric Data Types - Simple Input and Output - Lists – Tuples - Sets - Dictionaries. (10)

CONTROL STATEMENTS: Control Flow and Syntax - Indentation - if Statement - Relational Operators - Logical Operators - Bit Wise Operators - while Loop - break and continue - for Loop (6)

FUNCTIONS: Definition - Passing parameters to a Function - Variable Number of Arguments - Scope - Passing Functions to a Function - Mapping Functions in a Dictionary – Lambda - Modules - Standard Modules – sys – math – time. (7)

OBJECT ORIENTED FEATURES: Classes Principles of Object Orientation - Creating Classes - Class Variables – Inheritance – Polymorphism - Type Identification (6)

ERROR HANDLING AND REGULAR EXPRESSIONS: Run Time Errors - Exception Model - Exception Hierarchy - Handling Multiple Exceptions - Access Modes Writing - Data to a File Reading - Data From a File - Additional File Methods - Data Streams - Using Pipes as Data Streams - Handling IO Exceptions -REGULAR EXPRESSIONS: Simple Character Matches - Special Characters - Character Classes – Quantifiers - Dot Character - Greedy Matches – Grouping - Matching at Beginning or End - Match Objects – Substituting - Splitting a String - Compiling Regular Expressions. (8)

APPLICATIONS USING PYTHON: Exploratory analysis in Python - Building predictive models: logistic regression, decision tree – visualization -Web application development: opening an url-creating a simple web page-Overview of webapp2 and Flask. (8)

Total L: 45

REFERENCES:
MANAGEMENT AND DECISION MAKING

15MXEA KNOWLEDGE MANAGEMENT

3 0 0 3


KNOWLEDGE MANAGEMENT CONSTRUCTION, MODELLING AND ELICITATION: Stages – Knowledge Identification – Knowledge specification – Knowledge Refinement – Documenting the Knowledge Model. (6)


Total L: 45

REFERENCES:

15MXEB PRINCIPLES OF MANAGEMENT AND BEHAVIOURAL SCIENCES

3 0 0 3

PRINCIPLES OF MANAGEMENT: Definition and significance of management - functions of Management - society and environment, social responsibility of organisations. (5)

BUSINESS ORGANISATION: Forms of business Organisations and Resource Mobilisation - internal and external sources of resources. (6)

GLOBALISATION: Evolving paradigm for the new Economic Era issues for global competitiveness, and proactive forces of globalisation - Importance and functions of Marketing, Advertisement and sales promotion activities. (6)

MATERIALS MANAGEMENT: Importance and scope of materials management - Inventory control and its systems - ROL, EOQ, ABC Analysis, MRP, VED, FSN and value analysis. (7)

PROJECT MANAGEMENT: Definition and Objectives of Project Management - Phases in Project Management cycle - Project appraisal. (5)


GROUP BEHAVIOUR: Group dynamics, conformity, Sociometry and group cohesiveness leadership - Group Dynamics Informal Organization-sociometry-cohesiveness-Interaction analysis. (6)

WELFARE INDUSTRY: Working Condition, service facilities and safety industries (4)

Total L : 45

REFERENCES:
15MXEC ACCOUNTING AND FINANCIAL MANAGEMENT

3 0 0 3

COST ACCOUNTING: Cost classification – Types of costs - Preparation of Cost sheet and Machine Hour Rate Calculation-simple problems - Concept of cost volume profit analysis - simple problems- Principles of Job costing, batch costing - Process costing , operating costing and Activity Based Costing - Cost control Techniques. (7)


WORKING CAPITAL MANAGEMENT: Definition and importance of working capital - factors affecting working capital - Inventory management - simple problems - Receivables Management - cash Budget Preparation - working capital Estimation. (5)

INTERNATIONAL FINANCE: International Business methods – Exchange Rate Mechanism – Interest Rate Parity (IRP) and Purchasing Power Parity (PPP) – Exchange Rate Risks – Currency Derivatives - Exchange Rate Calculations -Simple Problems. (5)

Case Study - Accounting software.

Total L: 45

REFERENCES:

15MXED ENTREPRENEURSHIP

3 0 0 3

INTRODUCTION TO ENTREPRENEURSHIP: Definition – Characteristics and Functions of an Entrepreneur – Common myths about entrepreneurs – Importance or Entrepreneurship. Seminar in R5 and R6. (5)


DEVELOPING AN EFFECTIVE BUSINESS MODEL: The Importance of a Business Model – COMPONENT of an Effective Business Model – Case studies in Developing and Writing the Business Plan. (5)

APPRAISAL OF PROJECTS: Importance of Evaluating Various options – Case studies in Appraisal Techniques. (4)

FORMS OF BUSINESS ORGANIZATION: Sole Proprietorship – Partnership – Limited liability partnership - Joint Stock Companies and Cooperatives. (5)


THE MARKETING FUNCTION: Industry Analysis – Competitor Analysis – Marketing Research for the New Venture – Defining the Purpose or Objectives – Gathering Data from Secondary Sources – Gathering Information from Primary Sources – Analyzing and Interpreting the Results – The Marketing Process. (6)


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ETHICAL AND SOCIAL RESPONSIBILITY CHALLENGES FOR ENTREPRENEURS: Ethics, Values and Social Responsibility – Ethics and Business Decisions. (4)

Total L : 45

TEXT BOOKS:

REFERENCES:
5. Successful startups, IIM, Ahmadabad.
6. Successful Entrepreneurs, CII.
INFORMATION SYSTEM AND TECHNOLOGIES

15MXFA  TEXT MINING

3 0 0 3


CLUSTERING: Similarity and Distance Measures – Hierarchical Algorithms – Partition Algorithms – Clustering – Large Databases – Clustering with Categorical Attributes. (11)

REFERENCES:

15MXFB INTELLIGENT INFORMATION RETRIEVAL

3 0 0 3


SCORING-TERM WEIGHTING- VECTOR SPACE MODEL: Term frequency and weighting- vector space model- variant tf-idf functions- Computing scores in System: Efficient scoring and ranking- vector space scoring – query operator interaction. (4)

EVALUATION IN IR: Evaluation of unranked retrieval sets- evaluation of ranked retrieval results-assessing relevance - Relevance feedback and query expansion - Global methods for query reformulation. (8)

RETRIEVAL MODELS: Probabilistic information retrieval- The probability ranking principle - The binary independence model Language models for information retrieval: The query likelihood model - Language modeling versus other approaches in information retrieval Text classification- Naïve Bayes- Vector space classification- Support vector machines- machine learning on documents. (8)


WEB SEARCHING: Basics - Web characteristics- The search user experience - Index size and estimation- Near-duplicates and shingling –Crawling- Distributed indexes- Connectivity servers. Link analysis-Web graph-page rank. (7)

REFERENCES:

15MXFC  GEOGRAPHIC INFORMATION SYSTEM

2 2 0 3


Topological Consistency – Non topological file formats - Attribute Data linking – Linking External Databases – GPS Data Integration-Geodatabases


DATA MANAGEMENT AND OUTPUT: Import / Export – Data Management functions - Raster to Vector - Vector to Raster Conversion - Data Output - Map Compilation – Chart/Graphs – Multimedia – Enterprise Vs Desktop GIS - Distributed GIS.


REFERENCES:

MATHEMATICAL MODELING
15MXGA NUMERICAL METHODS


EIGEN VALUES AND ELGEN VECTORS: Power method of finding dominant eigen value and inverse power method for finding smallest eigen value, Jacobi method for symmetric matrices.

FINITE DIFFERENCES AND INTERPOLATION: Finite difference operators- Interpolation-Newton-Gregory forward and backward interpolation, Lagrange’s Interpolation formula. Solution of linear second order difference equations constant coefficients.

DIFFERENTIATION AND INTEGRATION: Numerical differentiation using Newton-Gregory forward and backward polynomials.


REFERENCES:

15MXGB APPLIED MATHEMATICAL MODELING

INTRODUCTION TO MODELING: Modeling process - Overview of different kinds of models.

EMPIRICAL MODELING WITH DATA FITTING: Error functions - least squares - fitting data with polynomials and splines.

QUALITATIVE MODELING WITH FUNCTIONS: Modeling species propagation - supply and demand - market equilibrium - market adjustment. Inventory Models - Various types of inventory models with shortage and without shortage - Probabilistic Models.

CAUSAL MODELING FORECASTING: Introduction - Modeling the causal time series - forecasting by regression analysis - prediction by regression. Planning, development and maintenance of linear models - trend analysis - modeling seasonality and trend.

56
THEORY OF GAMES: Introduction – Two person zero sum games - The rules of dominance graphical method - linear programming method. (8)


REFERENCES:

ONE CREDIT COURSES

15XXK01 CREATIVITY AND INNOVATION IN SOFTWARE PROBLEM SOLVING AND DESIGN 1 0 0 1

An Exploration of software creativity-Discipline Vs Flexibility- Formal methods Vs Heuristics – Qualitative Vs Quantitative reasoning- Process Vs Product- Theory Vs Practice (10)

PROJECT 1 0 0 1

REFERENCES:
1. Robert L Glass, Tom DeMarco, Software Creativity 2.0, developer.

15XXK02 BUSINESS ANALYTICS 1 0 0 1

INTRODUCTION TO BUSINESS ANALYTICS: Need for analytics in business – differences between analysis and analytics - appropriate uses of analysis and analytics - importance of analytics in solving business problem. (1)

BUSINESS MODELLING – EXAMPLES AND ISSUES: analytics with examples from the business world - sample real world problems - issues involved in solving these problems. – utility of these solutions in business decision making. (1)

MODELLING WITH LINEAR REGRESSION: Ordinary Least Square (OLS) Regression – single variable – multiple-regression - basics of the techniques – practical implementation over a data set – interpretation of the results. (2)

MODELLING WITH LOGISTIC REGRESSION: Natural sequel to OLS regression - Logistic Regression - Banking and business applications - implementation over real world data - logistic regression solutions. (2)

MODELLING WITH TIME SERIES: Decision making and modeling - Time Series solutions to enable decision making – Exposure to single and multiple time series – Banking applications – limitations and utility of time series. (2)

MODELLING WITH ARTIFICIAL NEURAL NETWORK: Data handling in real world business environment – limitations of Statistical Modelling – Artificial Neural Networks (ANN) – solutions by ANN – advantages and dis-advantages of ANNs – real world marketing applications. (2)

Case studies on business real world perspective to modeling. (5)

REFERENCES:

Total L: 15

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15XK03 DOMAIN SPECIFIC LANGUAGES

Introduction: Domain Specific Language (DSL) - differences between a regular language and DSL. Usefulness and the power of DSL. Need for DSL - its power over the generic languages such as Java and C# - Real world examples of DSL: SQL - a language dedicated to access the data from relational databases; XSLT: a language for transforming XML documents.

Grammar Language: describing the "text" of a DSL - syntax of the DSL - a simple DSL - the problem statement: Move a graphical cursor across the screen, as per the program instructions.

Defining the language: Extension from the XBase language - support to declare variables, define and call subroutines (like square) - accessing Java's Math.* functions - color constants.

Integrating with the IDE: Creating and editing the grammar in Eclipse IDE.

Runtime for the language in a Java VM.

Hands on sessions in the Laboratory

REFERENCES:
1. Xtext Framework http://www.eclipse.org/xtext
2. Grammar of XText http://git.eclipse.org
3. XBase language http://www.wiki.org/xbase
4. XText Documentation http://www.eclipse.org/xtext

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15XK04 SOFTWARE TESTING – INDUSTRY PERSPECTIVES


Testing of Enterprise applications - testing techniques/methodologies that are followed in end-to-end of the Enterprise applications, challenges faced.

Testing Big Data (HANA)/Mobile applications - testing of applications run on HANA DB, testing of mobile applications, challenges faced.

PROJECT

Total L: 15

REFERENCES:

15XK05 MAINFRAME SYSTEMS

INTRODUCTION: Definition of a Mainframe system, Difference between Centralized and Distributed computing. History of Mainframes, Attributes of Mainframes / Reasons for opting for Mainframes, Users of Mainframes - Batch processing. Online/Interactive transactions.

MAINFRAME WORKLOADS : Concept, strategy, and benefits of the z/OS environment. Application enablement in z/OS - Overview of e-business support in z/OS, Connectivity to the z/OS environment - Security support provided by z/OS, System management support. Scalability, availability, backup, and recovery features in z/OS, z/OS system services, zSeries processor configurations.

Case Study : z/VM, Linux, zVSE, zIIP.

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REFERENCES:

15XX06 OPERATING SYSTEM PERFORMANCE ASSESSMENT

Workload Definition: Elements of OS Performance - CPU, I/O - Memory & Disk, Network - Elements of a performance test - Load, Stress, Endurance, Spike, Volume, Scalability, Throughput.


Typical Performance Parameters monitored - Performance Tools - Designing a real world Performance test.

Some quick ways to check a system performance.

Comparison of a specific workload on Windows & Linux - Performance in a virtualized world - Distributed Systems & Performance.

Case Studies.

REFERENCES:

15XX07 RESPONSIVE WEB DESIGN

REST based Web Services using Spring.

HTML5 and CSS3.

JavaScript Frameworks - JQuery, Backbone, Handlebars.

Android and IOS Development.

Hands on training.

REFERENCES:

15XX08 MULTI-CORE TECHNOLOGY


Programming the Multicore - Programming – OS Interaction – Applications – Synchronization – Scheduling.

Programming Paradigms - Threading as a Parallel Programming Model – Virtual Environments.

REFERENCES:
15K09 SKILLS FOR VIRTUAL TEAMS

VIRTUAL TEAMS: Introduction to Geographically Distributed teams – Need – Difference between Virtual and physical teams - compositions- Advantages of virtual teams (2)

ISSUES AND RISKS: Communication Issues - Temporal Issues - Cultural Issues – Challenges - Project risks . (3)

TOOLS AND SOLUTIONS: Process changes, Tools - Planning - Tracking, Communication, Tool issues (2)


CASE STUDIES: Different cases - Observation – Participation as team - Skill Building (6)

REFERENCES:

Total L: 15