SEMESTER I

20MX11 MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE

3104


SET THEORY: Set notation and description - basic set operations - Venn diagrams - laws of set theory - partition - min sets - Principle of inclusion and exclusion: RELATIONS: Relations - properties of relations - closure operations on relations: MATHEMATICAL INDUCTION: Strong induction and well-ordering - Recursive definitions and structural induction - recursive algorithms - program correctness. (12+4)

FORMAL LANGUAGES: Four classes of grammars (Phrase Structure, Context sensitive, Context Free, Regular) - definitions - Context free Grammar: Right most, Left most derivations - Syntax trees - Unambiguous & ambiguous grammars - Construction of grammars for languages - Derivation of languages from grammars - Regular expressions. (11+3)


Total L: 45 + T: 15 = 60

REFERENCES:

20MX12 STRUCTURED PROGRAMMING CONCEPTS

3205

INTRODUCTION: Characteristics of programming Languages- factors influencing the evolution of programming language, developments in programming methodologies, desirable features and design issues- Programming language paradigms. Programming language processors: Structure and operations of translators, software simulated computer, syntax, semantics, structure, virtual computers, binding and binding time. Program development and execution environments Embedded system requirements and programming. Introduction to C Language and Background - C Programs - Structure - main function and command-line arguments. Identifiers, Data Types, Variables, Constants, Operators, Expressions, Types of expressions, Expression Evaluation and Data type conversions. Input / Output functions. (12+8)

Sequence controls in structured programming: Statements - Sequential statements and Compound statement- Selection Statements - if, else if ladder and switch statements- Repetition statements -while, for, do-while statements and other statements related to looping - break, continue, goto statements, Statements versus Expressions. Functions: Designing Structured Programs, Functions, user defined functions and Standard library functions, inter function communication, Scope, Storage classes-auto, register, static, extern, scope rules, type qualifiers. Recursion- Limitations of recursions- recursive function. Pre-processor commands and Macros. (12+8)

Structured data types and Files in programming: Arrays: Concepts, using arrays in C, array applications, two-dimensional arrays, multidimensional arrays, Strings - Concepts, C Strings, String Input / Output functions, arrays of strings, string manipulation functions, string / data conversion. Pointers: Introduction, pointer declarations Pointers for inter function communication, pointers to pointers, compatibility, Pointer Applications-Arrays and Pointers, Pointer Arithmetic Operations and arrays, Passing an array to a function, memory allocation functions, array of pointers, programming applications, pointers to functions, Structures - Declaration, initialization, accessing structures, operations on structures, Complex structures, structures and functions, passing structures through pointers, self referential structures, unions, bit fields. Enumerated types. Input and Output - Concept of a file, streams, text files and binary files, File handling functions -Applications for files. (12+10)

Markup and Script Languages: Introduction to script programming and processing. Motivation and applications of scripting. Script and Mark-up versus System programming languages. Fundamentals interpreters - dynamic typing-, dynamic scoping - merits and demerits of scripting languages - Types of scripting languagesApplications - Multi- Paradigm Programming languages - Domain specific Languages. Software stacks and Script languages. (9+4)
20MX13 DATA STRUCTURES


LISLs:Linked list Vs Array, Memory allocation and de-allocation for linked list - Insertion and deletion of nodes - Singly linked lists, Doubly linked lists, Circular lists, Multiply linked lists - linked stack- linked queue - Applications: addition of polynomials-representation of larger number. (12)

NON-LINEAR DATA STRUCTURES: Tree: Terminologies - Implementation-Binary Tree-Properties - Sequential and linked representation - Binary tree traversals-Basic operations - Graph: Terminologies - types-relationships - Graph Traversal: Breadth First Search and Depth First Search - Applications. TABLES: Operations- Hash Table: Hash functions, Implementation, collision resolution and overflow handling techniques, Linear Open Addressing, Chaining. (12)

REFERENCES:

20MX14 DATABASE MANAGEMENT SYSTEM


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. (12)
REFERENCES:

20MX15 UNIX ARCHITECTURE AND PROGRAMMING


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.


REFERENCES:

20MX16 DATA STRUCTURES LABORATORY

Experiments in the following topics:
1. Applications of arrays
2. Applications of strings.
3. Implementation of searching algorithms.
4. Stacks: operations and applications.
5. Queues: operations and applications.
6. Linked Lists: singly linked, doubly linked list and circular lists.
7. Linked stack and linked queue
8. Binary trees operations.
10. Graph Traversals.
11. Hash Table: collision resolution techniques

Total P: 60

20MX17 RDBMS LABORATORY

Experiments in the following topics:
1. Data definition Language – Create , Alter, Truncate.
2. Database designing with domain, key and integrity constraints
3. Data manipulation queries.
4. View, aggregate functions, sub queries on a database
5. Simple PL/SQL programs
6. PL/SQL programs using functions, stored procedures

Total P: 60
7. Usage of cursors
8. Implementing triggers

Total P: 30

20MX18 WEB APPLICATION DEVELOPMENT

Study and Develop experiments in the following topics:
1. HTML elements & attributes – link
2. HTML tables, forms & Canvas
3. HTML Multimedia, APIs
4. CSS selectors
5. CSS Media queries, Layout, Transformation, transition
6. JavaScript - DOM, BOM methods, Form Validation, Functions
7. GitHub Experiments using PHP & Oracle / MySQL

Experiments in the following topics:
1. Data definition Language – Create, Alter, Truncate.
2. Database designing with domain, key and integrity constraints
3. Data manipulation queries.
4. View, aggregate functions, sub queries on a database
5. Simple PL/SQL programs
6. PL/SQL programs using functions, stored procedures
7. Usage of cursors
8. Implementing triggers

Develop and deploy applications not limited to the following areas:
i) Ticket reservation
ii) Online quiz
iii) Content Management System

Total P: 60

20MX19 PROFESSIONAL COMMUNICATION

Introduction to communication concepts- verbal, non verbal, intra and interpersonal communication

Essentials of Group communication

Meetings, agenda, notice and minutes of meetings

Business correspondence- Different types of letters

Oral presentation- Introduction to public speeches

Interview techniques

Academic writing

Speech practice

Group discussions

Listening activities

Mock interviews

Software: Elab Technologies

Total P: 30

REFERENCES:
SEMESTER II

20MX21 OBJECT ORIENTED PROGRAMMING USING JAVA

3 0 0 3


INPUT / OUTPUT:Stream classes: Byte – Character - File class - File operations - Console class – Serialization – Garbage Collection. MULTITHREADING: Thread -based multitasking - Process-based multitasking - Java thread model - Creating threads - Thread priorities - Synchronization - Inter thread communication. (10)


REFERENCES:

20MX22 DESIGN AND ANALYSIS OF ALGORITHMS

3 1 0 4


DIVIDE AND CONQUER: Method – Finding the maximum and minimum- Binary Search – Merge sort, Quick sort – Performance Analysis. DYNAMIC PROGRAMMING: Method – All pairs shortest path problem – 0/1 Knapsack Problem - Traveling salesman problem-Multi stage decision graph. (12+3)


Total :L 45+T :15=60

REFERENCES:

20MX23 ENTERPRISE COMPUTING

3 1 0 4

ENTERPRISE FOUNDATIONS :Enterprise software characteristics – options - Enterprise Architectural overview – object oriented software development for enterprise - Component Based software development for enterprise. Multi-tier system - Java
Enterprise System. Use of patterns, frameworks, software stacks for Enterprise application development. Enterprise software for Hospital, University and manufacturing firm. (12+3)

**ENTERPRISE DATA ENABLING:** Enterprise Data - Basis of JDBC, Drivers, Connection, Statement, Result Set, Advanced JDBC features, Distributed transactions, ORM, JPA, Hibernate framework, NoSQL in Enterprise applications – CRUD operations and Query Languages. **ENTERPRISE APPLICATION ENABLING:** Enterprise Java Beans, Stateless Session Beans, Stateful Session Beans, Message Driven Beans, Entity beans, Accessing and integrating EJBs. (13+ 4)


**DISTRIBUTED ENTERPRISE COMMUNICATIONS ENABLING:** Distributed Enterprise Communications Basis – distributed object middleware – synchronous and Communications, Java web services using both SOAP and RESTFUL for Enterprise Applications Message queues, JSON API and Binding - Micro services for Enterprise applications. (10+5)

References:
5. Francesco Marchioni, Practical Enterprise Application Development, Independently published, 2019

**20MX24 ARTIFICIAL INTELLIGENCE**

3104


Knowledge, Reasoning, and Planning: Logical Agents- Propositional Logic- First-order predicate Logic – Real world modeling and Inference - Backward Chaining - Forward Chaining – Resolution - Illustrative problems and applications. (11+3)

Probabilistic Reasoning: Semantics of Bayesian Networks – Inference. LEARNING: Supervised learning - Unsupervised learning-reinforcement learning – Illustrative problems and applications. (11+4)

Total L: 45 + T:15 = 60

References:

**20MX25 SOFTWARE ENGINEERING METHODOLOGIES**

3104


OBJECT ORIENTED APPROACH: Objects and Classes-Object Identification-Relationship among objects-classification-Use cases-UML Diagrams to support Object Oriented Analysis and Design. PROGRAMMING STANDARDS AND CODING: Structured programming coding standards-Maintainability of code.


REFERENCES:
2. Ian Sommerville, "Software Engineering", Pearson Education, 2018

20MX27 JAVA PROGRAMMING LABORATORY

- Implement the following concepts, using the problem sheets given during the lab sessions:
  - Object-oriented features.
  - Arrays and strings.
  - Inheritance
  - Interfaces and packages.
  - User-defined exceptions.
  - Stream classes.
  - Multithreading.
  - Operations on objects using Collections framework.
  - Event driven programming with database connectivity.

- Design, develop and deploy packages to apply features of Java in solving real world problems.

Total P: 60

20MX28 ENTERPRISE APPLICATION DEVELOPMENT

1. Handson in the following topics/concepts:
   i) Primitive data types
   ii) Containers.
   iii) Functions
   iv) Object oriented programming using python
   v) Files in python
   vi) User Interface using open source frameworks like Django/Flask
   vii) Concepts and features of J2EE Technology
   viii) Features and feasibility study of MEAN Stack technology
   ix) Features and feasibility study of Typescript

2. Design, deploy and document application specific to the areas not limited to the following:
   i) User Interface using open source frameworks like Django/Flask
   ii) Applications using web scrapping
   iii) Applications using image processing
   iv) Developing sensors based applications
   v) Applications for Data Analytics

Total P: 60
SEMESTER III
20MX31 CLOUD COMPUTING

3 2 0 5


CLOUD ARCHITECTURE AND PLATFORMS: HDFS Architecture - Google Big Table - Amazon AWS - Amazon EC2, Amazon Simple Storage Service (S3) - Windows Azure - Aneka frame work - IBM blue Cloud - Eucalyptus – Open Stack. CLOUD PROGRAMMING MODELS: Implementation of Map reduce - Twister and Iterative Map Reduce. (11+8)


Total L: 45 + T:30= 75

REFERENCES:

20MX36 MOBILE APPLICATION DEVELOPMENT

0 0 4 2

0 Design of simple apps using Text and Page Layout
1 Create apps using various Controls and Styles
2 Develop apps with Page Navigation.
3 Creating apps with menu, list, grid layouts and multimedia controls
4 Designing apps with notification management
5 Creating apps with data storage and content provider support
6 Designing apps that supports Mobility and Location Based Services
7 Packaging and Deploying apps in Market place

Total P: 60
SEMESTER IV
20MX41 PROJECT WORK

The Project work 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
PROFESSIONAL ELECTIVES

20MXAA DESIGN PATTERNS

3003

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. (10)


ARCHITECTURAL PATTERNS: From Mud to Structure: Layers - Pipes and Filters - Blackboard, Interactive Systems: Model View Controller (MVC), Case studies. (10)

CODE Refactoring: What is refactoring - Principles in refactoring - Bad smells in code - Composing methods - Moving features between objects - Organizing data - Simplifying conditional expressions - Making method calls simpler - Dealing with generalization. (13)

Total L : 45

REFERENCES:
1. Erich Gamma, Richard Helm, Ralph Johnsons and John Vlissides, "Design Patterns: Elements of Reusable Object Oriented Software", Pearson Education, New Delhi, 2015.

20MXAB SOFTWARE PROJECT MANAGEMENT

3003

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. (12)

ACTIVITY PLANNING: Project schedules - Sequencing and scheduling projects - Network planning models - Shortening project duration - Identifying critical activities. (11)


Total L : 45

REFERENCES:
20MXAC SECURITY IN COMPUTING


REFERENCES:

Total L : 45

20MXAD ADVANCED DATABASE TECHNOLOGY


EMERGING SYSTEMS:
Enhanced Data Models - Client/Server Model - Mobile Databases- -NoSQL models:.JSON- Document databases

REFERENCES:

Total L : 45

20MXAE COMPUTER GRAPHICS

INTRODUCTION:Overview of Graphics Systems - Raster Scan Displays - Random Scan Displays –Graphics Input and Output Devices – Graphics software and standards – OUTPUT PRIMITIVES: Points and lines, Line drawing algorithms,
Mid-point circle and ellipse algorithms. **FILLED AREA PRIMITIVES:** Scan line polygon fill algorithm, Boundary-fill and flood-fill algorithms.

**TWO DIMENSIONAL GRAPHICS:** Basic transformations - Matrix representation and homogeneous coordinates - Composite transformations - **2D VIEWING:** The viewing pipeline, Viewing coordinate reference frame, Window to view-port coordinate transformation, Viewing functions, Cohen-Sutherland and Cyrus-beck line clipping algorithms, Sutherland - Hodgenman polygon clipping algorithm.

**CURVES AND SURFACES:** Parametric representation of curves - Bezier curves - B-Spline curves - Parametric representation of surfaces - Bezier surfaces - Curved surfaces - Ruled surfaces - Quadric surfaces. **THREE DIMENSIONAL GRAPHICS:** 3D transformations - Viewing 3D graphical data - Orthographic, oblique, perspective projections - Hidden lines and hidden surface removal.

**ANIMATION GRAPHICS:** Design of animation sequences - Animation functions - Raster animation - Key frame systems - Motion specification - Morphing - Tweening. **COMPUTER GRAPHICS REALISM:** Tiling the plane - Recursively defined curves - Koch curves - C curves - Dragons - Space filling curves - Fractals - Grammar based models - Turtle graphics - Ray tracing.

**REFERENCES:**

**20MXAF EVOLUTIONARY COMPUTING**

**INTRODUCTION:** Historical development – Features – Classification and COMPONENT – Advantages – Applications.

**EVOLUTIONARY ALGORITHM:** COMPONENT of Evolutionary Algorithms (EA) - Working principle of EA, Applications: N-Queens problem - Knapsack problem - Introduction to different branches of evolutionary computation: Genetic algorithm - Evolutionary programming - Evolutionary strategies - Genetic programming.

**EVOLUTIONARY COMBINATORIAL OPTIMIZATION:** Local search: Simulated annealing - Tabu search, Hybrid algorithm: Lamarckian evolution - Memetic algorithms, Application: Knapsack problem - Minimum spanning tree problem - Travelling Salesman Problem (TSP).

**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).


**REFERENCES:**

**20MXBA COMPUTER NETWORKS**


Internet Applications: HTTP - FTP - SMTP - Infrastructure Services - Name Services, Network Management services - RTTP - VOIP - Overlay Networks - Routing overlays, Peer-to-peer networks, Content Distribution Networks. Case study: NS1, NS2.

Network Infrastructure: Organizational policies, IT infrastructure services, user and hardware provisioning - Server operating systems - Virtualization - Network services - DNS for web services - Troubleshoot network services - Configure email services, security services, file services, print services, and platform services.

Total L: 45

REFERENCES:

20MXBB DATA MINING AND ANALYTICS

DATA MINING: Motivation - Steps in Data Mining - Architecture - Data Mining and Databases - Data Warehouses - Data Mining functionalities - Classification - Data Mining primitives - Major issues. DESCRIPTIVE ANALYTICS: Descriptive data summarization - Types of measurement scales - Measures of central tendency - Measures of Variance - Data Visualization - Data cleaning - Data integration and transformation - Data reduction - Data discretization and concept hierarchy generation.


Total L: 45

REFERENCES:

20MXBC MACHINE LEARNING


Total L: 45

REFERENCES:

20MXBD INTERNET OF THINGS

3 0 0 3


REFERENCES:

20MXBE WIRELESS NETWORKS

3 0 0 3


REFERENCES:

20MXBF DEEP LEARNING


Backpropagation :Back propagation neural nets;Learning via gradient descent- recursive chain rule - bias-variance tradeoff – Regularization and output units: linear- softmax - RELU;


Sequence modeling: Recurrent and Recursive nets- Recurrent Neural Networks- Bidirectional RNNs-Encoder-Decoder Sequence-to-Sequence Architectures - Implementation of RNNS

REFERENCES:

20MXBG MULTIDIMENSIONAL DATA STRUCTURES


BOUNDARY-BASED REPRESENTATIONS: Image-Based: Line Quadtree-Edge Quadtree-Sector Tree-Cone Tree . Object-Based: Strip Tree-Prism Tree-HAL Tree.

HIGH-DIMENSIONAL DATA : Multidimensional Indexing Methods -. X-Tree-Sphere Tree-OS Tree-Distance-Based Indexing Methods: M-Tree, Sa-Tree.

AUDIO AND VIDEO DATA: Frame Segment Tree-R-Segment Tree-Video Segmentation-model of audio data-meta data to represent audio content-capturing audio content-indexing audio data- TV trees.

REFERENCES:
18MXBH OPEN SOURCE SYSTEMS


OPEN SOURCE DATABASES: NoSQL Databases - Types - Documents Database – MongoDB - CRUD operations - Two phase commit - Data models – Aggregation – Indexes - Mongo shell – Query operators – Replication. Case Study: Column and Graph based databases.

OPEN SOURCE SOFTWARE TOOLS: IDEs (Eclipse) - Model Driven Architecture tools (OpenXava)- Software Testing IDE (Selenium) – Version control system (Git) – Content Management System (Joomla) - Web server (Apache) – Framework (Rails, Bootstrap).

REFERENCES:

Total L:45

20MXBI UBQUITOUS AND PERVERSIVE COMPUTING


LOCATION BASED SERVICES: Location Based Services – Location Relatedness and Query Model - Location Dependent Data – Location Aware Queries – Location Dependent Queries – Moving Object Database Queries – Query Classification – Query Translation Steps in LDQ Processing - introduction to Voronoi diagram, Voronoi index structure for modeling location dependent information system. CASE STUDIES: Ubiquitous and pervasive computing systems to identify their strengths, limitations and the future directions: smart home, smart healthcare, smart traffic. LBS Applications and Services case study: Development of the Yellow pages search, m-tourism- Find friend- application- L-Commerce - Navigation Systems: A Spatial Database Perspective. Current trends in the area of data management in ubiquitous and pervasive environments.

REFERENCES:

Total L:45
20MXBJ HUMAN COMPUTER INTERACTION

3003


(12)


(10)


(12)


(11)

Total L:45

REFERENCES:

20MXBK SOFT COMPUTING

3003


(11)

FUZZY SYSTEMS: Fuzzy sets - Membership functions – Basic fuzzy operations– Fuzzy relations - operations on fuzzy relations – Fuzzy logic - Fuzzy rule based systems - Defuzzification - Graphical inference method – Applications to real world problems.

(12)


(11)


(11)

Total L:45

REFERENCES

20MXBL SOCIAL NETWORKING AND WEB MINING

3003


(12)

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

(11)
WEB MINING: Web crawler – types of web crawler - Web search – Characteristic of Web data – types of web mining, WEB
WEB LINKAGE MINING: Hyperlinks- co-citation and bibliographic coupling- page rank and HITS algorithm – web community
discovery.

REFERENCES:
1. Guandongyu and Yanchunzhang, "Web mining and social networking: Techniques and applications", Springer Science and
Business Media, 2011.

20MXBM MULTI-CORE PROGRAMMING

MULTI-CORE PROCESSORS: Single core to Multi-core architectures – SIMD and MIMD systems – Interconnection
networks – Symmetric and Distributed Shared Memory Architectures – Cache coherence – Performance Issues – Parallel
program design.

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).

SHARED MEMORY PROGRAMMING WITH OpenMP: OpenMP Execution Model – Memory Model – OpenMP Directives –
Work-sharing Constructs – Library functions – Handling Data and Functional Parallelism – Handling Loops –
Performance Considerations.

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.

REFERENCES:
3. Hughes C and Hughes T, "Professional Multi-core programming: Design and Implementation for C++developers", Wrox,
2008.

20MXCA ENTREPRENEURSHIP

INTRODUCTION TO ENTREPRENEURSHIP: Definition – Characteristics and Functions of an Entrepreneur – Common myths
about entrepreneurs – Importance or Entrepreneurship. CREATIVITY AND INNOVATION: The role of creativity – The
innovation Process – Sources of New Ideas – Methods of Generating Ideas – Creative Problem Solving – Entrepreneurial
Process.

FORMS OF BUSINESS ORGANIZATION: Sole Proprietorship – Partnership – Limited liability partnership - Joint Stock
Companies and Cooperatives. DEVELOPING AN EFFECTIVE BUSINESS MODEL: The Importance of a Business Model –
Starting a small scale industry - Components of an Effective Business Model.

APPRAISAL OF PROJECTS: Importance of Evaluating various options and future investments – Entrepreneurship incentives
and subsidies – Appraisal techniques. FINANCING THE NEW VENTURE: Determining Financial Needs – Sources of
Financing – Equity and Debt Funding – Case studies in Evaluating Financial Performance.

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, INTELLECTUAL PROPERTY PROTECTION AND ETHICS:

REFERENCES:

20MXCB 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 organizations. BUSINESS ORGANISATION: Forms of business Organizations and Resource Mobilization - internal and external sources of resources.

GLOBALISATION: Evolving paradigm for the new Economic Era issues for global competitiveness, and proactive forces of globalization - Importance and functions of Marketing, Advertisement and sales promotion activities. MATERIALS MANAGEMENT: Importance and scope of materials management - Inventory control and its systems - ROL, EOQ, ABC Analysis, MRP, VED, FSN and value analysis.


GROUP BEHAVIOUR: Group dynamics, conformity, Sociometry and group cohesiveness leadership - Group Dynamics Informal Organization- sociometry- cohesiveness-Interaction analysis. WELFARE INDUSTRY: Working Condition, service facilities and safety industries.

REFERENCES:

20MXCC PROBABILITY AND STATISTICS

3 0 0 3


REFERENCES:

20MXCD OPTIMIZATION TECHNIQUES


REFERENCES:

20MXCE NUMERICAL METHODS


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. (12)

DIFFERENTIATION AND INTEGRATION: Numerical differentiation using Newton-Gregory forward and backward polynomials. Numerical integration-Gaussian quadrature, Trapezoidal rule and Simpson’s one third rule. (10)

ORDINARY DIFFERENTIAL EQUATIONS: Taylor series method, Euler and Modified Euler method, (Heun’s method), Runge-Kutta method, Milne’s method, Adams-Moulton method, Solution of boundary value problems of second order by finite difference method. (11)

REFERENCES:

Total L : 45
18MXCF APPLIED GRAPH THEORY

3003


(10)


(11)


(13)


(11)

Total L: 45

REFERENCES:
ONE CREDIT COURSES

20XK01 DOMAIN SPECIFIC LANGUAGES

1 0 0 1

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. (2)

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. (2)

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. (2)

Integrating with the IDE: Creating and editing the grammar in Eclipse IDE. (2)

Runtime for the language in a Java VM. (2)

Hands on sessions in the Laboratory (10)

Total L: 15

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

20XK02 SOFTWARE TESTING – INDUSTRY PERSPECTIVES

1 0 0 1

Testing Overview / Evolution of testing - Testing approaches; evolution of Software Development models, Various black box testing techniques, test design techniques, Software Testing in Industry, Testing throughout the Life cycle, Types of Software Testing, Test Concepts. (2)

Test Management- Application of Project Management with respect to Testing, Evolution of Test Management, Test Management in various Test cycles/phases. (2)


Testing of Enterprise applications- testing techniques/methodologies that are followed in end-to-end of the Enterprise applications, challenges faced. (2)

Testing Big Data (HANA)/Mobile applications - testing of applications run on HANA DB, testing of mobile applications, challenges faced. (1)

PROJECT (5)

Total L: 15

REFERENCES:

20XK03 OPERATING SYSTEM PERFORMANCE ASSESSMENT

1 0 0 1

Workload Definition- Elements of OS Performance - CPU, I/O - Memory & Disk, Network- Elements of a performance test - Load, Stress, Endurance, Spike, Volume, Scalability, Throughput. (2)

In detail- CPU Performance - Memory Performance - Storage Performance - Network Performance. (2)

Typical Performance Parameters monitored - Performance Tools - Designing a real world Performance test. (2)
Some quick ways to check a system performance. (2)

Comparison of a specific workload on Windows & Linux - Performance in a virtualized world - Distributed Systems & Performance. (2)

Case Studies. (5)

REFERENCES:

20XK04 MULTI-CORE TECHNOLOGY


Programming the Multicore- Programming – OS Interaction – Applications – Synchronization – Scheduling. (6)

Programming Paradigms - Threading as a Parallel Programming Model – Virtual Environments. (2)

PROJECT (5)

REFERENCES:

20XK05 SKILLS FOR VIRTUAL TEAMS

VIRTUAL TEAMS: Introduction to Geographically Distributed teams -Need -Difference between Virtual and physical teams - cominations- 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:
20XK06 SOFTWARE CONFIGURATION MANAGEMENT AND CONTINUOUS DELIVERY

Software Configuration Management (SCM): Components of Software Configuration Management Plan – Process of identifying, maintaining, controlling and baselining configuration items – case study from one of the live projects – tool set to assist SCM – Lab exercise on creating SCM plan for the project and set up the Development Environment. (2.5)

Version Control Systems (VCS): Importance of controlling versions – life cycle / state of a configuration items – Role of coding standards and coding style – Product semantic versioning – Branching & Merging – case study from one of the live projects – Lab exercise using git – Role of Backups – Conducting configuration audit. (2.5)

Build and Unit Test Automation: Build life cycle – Build automation tools (Maven or Gradle or Webpack) – automate code review, unit test, code quality reports as part of build automation. (2)

Continuously Integrate (CI) and Integration Test Automation: Scope and advantages of Continuous Integration – Introducing complete toolset involved in CI – Case study from a live project – Lab exercise using Jenkins as CI, Selenium / Protractor as Integration Test Automation (2)

Continuous Deployment and Deployment Automation: Importance of Continuous Deployment – Setting up deployment environment in AWS instance – Automate application deployment using Docker and / or Ansible – Continuous monitoring or health check. (2)

PROJECT: Given a simple use case, define and implement the complete Software Configuration Management process along with Continuous Delivery leveraging the tools introduced in the class. (4)

Total L: 15

REFERENCES:
3. Continuous Integration (CI), https://martinfowler.com/articles/continuousIntegration.html
4. Continuous Delivery: https://martinfowler.com/bliki/ContinuousDelivery.html
5. Version Control System,
7. CI Automation: https://jenkins.io/