SEMESTER I

18X101 CALCULUS AND ITS APPLICATIONS

3 2 0 4

FUNCTIONS AND CONTINUITY: Functions- graphs of standard functions, limits, continuous and discontinuous functions, piecewise continuous functions, periodic functions – Fundamental theorem of Calculus - Application problems. (11+5)

DIFFERENTIAL CALCULUS: Derivatives, geometrical interpretation - Curvature in Cartesian and polar coordinates – Circle of curvature. (4+3)


INTEGRAL CALCULUS: Multiple integrals – change of order of integration, Application of multiple integrals in finding area and volume - Improper integrals - Beta and Gamma functions - Relation connecting Beta and Gamma functions - Evaluation of definite integrals in terms of Beta and Gamma functions - problems. (12+9)

VECTOR CALCULUS: Differentiation of vectors-Gradient, Divergence, Curl and directional derivatives - Integration of vectors - Line and surface integrals, Statement of Green’s, Gauss divergence and Stoke’s theorems- problems. (12+9)

TEXT BOOKS:

REFERENCES:

18X102 ENVIRONMENTAL SCIENCE AND GREEN COMPUTING

3 0 0 3

NATURAL RESOURCES, ECOSYSTEMS AND BIODIVERSITY: Environment, Definition, Scope and importance, Forest resources. Use and overexploitation, Water resources: Use and over utilization. Eco system; Structure and functions of an eco system, energy flow in the eco system. Bio Diversity; values of biodiversity, biodiversity at global, national and local levels – threats to bio diversity. Conservation of bio diversity – In-situ & Ex-situ conservation. (9)


ENVIRONMENTAL POLLUTION AND DISASTER MANAGEMENT: Definition – causes, effects and control measures of air pollution, water pollution, soil pollution, noise pollution, thermal pollution and nuclear hazards. Disaster management - floods, earthquake, cyclone and landslides. Solid waste management - causes, effects and control measures of municipal solid wastes (Biomedical wastes, hazardous wastes). Role of an individual in prevention of pollution. (9)


TEXT BOOKS:

Total L : 45

457
REFERENCES:

18X103 C PROGRAMMING

3 0 0 3

PROBLEM SOLVING: Introduction to Problem Solving- Program development- Analyzing and Defining the Problem- Modular Design – Algorithm - Flow Chart - What is a programming language-Types of programming language- Program Development Environment.

C LANGUAGE: Introduction to C Language - C character set - Identifiers and Keywords - Data Types - Constants - Variables - Arrays - Declarations - Expressions - Statements - Symbolic constants - Operators and Expressions - Library Functions - Data Input and Output Functions.

CONTROL STATEMENTS: While Statement - Do While Statement – For Loop – Nested Loop - If Else - Switch - Break - Continue - Comma Operator – Goto Statement -

FUNCTIONS: Defining Function - Accessing a Function - Passing Arguments to Functions - Specifying Arguments Data Types - Function Prototypes - Storage Classes - Auto - Static - Extern and Register Variables.

ARRAYS: Defining Array – Processing array - Passing array to a function - Multi dimensional array - Array and strings.

POINTERS: Declarations - Pointers to a function - Pointers and one dimensional arrays - Operating a pointer - Pointer and multi dimensional arrays - arrays of pointers - passing functions to other functions.

STRUCTURES AND UNIONS: Definition of Structure and Union - Processing a structure – Bit field representations - Structures and pointers - Passing structure to functions - Self referential structures – Nested structure.

FILES: File Structure concepts introduction - Definitions, concept of record, file operations: Storing, creating, retrieving, updating Sequential, relative, indexed and random access mode, Files with binary mode(Low level), performance of Sequential Files – Operations on Files – Types of Files, Various input and output functions on Files.

Enumerated Data Type – Typedef - Preprocessor Directives - Command Line Arguments.

Total L: 45

TEXT BOOKS:

REFERENCES:

18X104 ANALOG AND DIGITAL ELECTRONICS

3 0 0 3

ANALOG: Transistor as Amplifier and as switch - Basic idea of an OP-AMP - Inverting and non-inverting inputs – Adder – Subtractor- Integrator – Differentiator –Switched mode power supply – UPS.

NUMBER SYSTEMS AND CODES: Introduction to decimal, binary, octal, hexadecimal number systems – Inter conversions of Number Systems – Binary Codes: BCD, Excess 3, Gray, ASCII, Error Detecting Codes– 2’s complement addition, subtraction – BCD addition.

LOGIC GATES AND FAMILIES: AND, OR, NOT, NAND, NOR, Exclusive - OR and Exclusive - NOR- Implementations of Logic Functions using gates- NAND -NOR implementations.

BOOLEAN ARITHMETIC AND THEOREM: Boolean laws and theorems – Boolean expressions – Minimization - Sum of Products (SOP) -Product of Sums (POS) - Minterm - Maxterm - Canonical forms - Karnaugh map Minimization - Don't care conditions.

458

SHIFT REGISTERS AND COUNTERS: Parallel/serial in/out shift registers – Counters: Definition – Types - Asynchronous Counters - Synchronous counters - Design of counters. (6)

TEXT BOOKS:

REFERENCES:

18X105 ENGLISH

READING: Language learning through standard literary and non-literary texts to develop the reading comprehension skills such as Skimming, Scanning, Identifying topic sentences and focusing on language functions based on Vocabulary, tone, register and Syntax features (9)


WRITING: Note making , Paraphrasing, Summarising, Paragraph Writing and Essay Writing (6)
Practice in Writing Letters – Social, Official, Personal letters (3)
Writing Laboratory and Trip Reports (3)

SPEAKING: Conversational Practice, Short Speeches – Self Expression, Hobbies, Special interests / Preferences, Daily routine, news reviews, narration of events and participating in Role plays (10)

LISTENING ACTIVITIES: Listening to short conversations suchas TED Talks, BBC’s short interviews and narrating places and persons and Text based listening activities (5)

Total L: 45

TEXTBOOK:
Monograph prepared by the Faculty, Department of English, 2018.

REFERENCES:

18X106 C PROGRAMMING LABORATORY

1. Simple programs to understand the concepts of data types.
2. Familiarizing conditional, control and repetition statements.
3. Usage of single and double dimensional arrays including storage operations.
4. Implementation of functions, recursive functions.
5. Defining and handling structures, array of structures and union.
6. Implementation of pointers, operation on pointers dynamic storage allocation.
7. Creating and processing data files.

Total P: 60

18X107 WEB DESIGN LABORATORY

Exercises pertaining to the following concept are to be implemented
1. HTML formatting for images, text including list and link
2. HTML table formatting
3. Menu and frames
4. User interface using forms with audio and video
5. Dynamic web page using internal/external CSS
6. CSS involving text, color properties in tables
7. Including internal/external JAVA script
8. JAVA script control structures
9. JAVA script functions
10. A complete web application

Total P: 60

18X108  ANALOG AND DIGITAL ELECTRONICS LABORATORY

1. Introduction to equipments and components.
2. Verification of logic gates.
3. Realization of Boolean algebra.
4. Construction of half adder and full adder using XOR and NAND gates and verification of its operation.
5. Construction of half subtractor and full subtractor using XOR and verification of its operation.
6. Implementation of Binary to gray and Gray to binary code converter.
8. Construction of MUX/DEMUX.
9. Construction of different types of Flip-flops.
10. Implementation of Synchronous counter and asynchronous counter.

Total P: 30

SEMESTER II

18X201 LINEAR ALGEBRA

LINEAR SYSTEMS: System of linear equations - Consistent and inconsistent systems - Geometric interpretation of linear system in 2 and 3 unknowns - Row reduction and Echelon forms – Matrix equation – Matrix equation Ax=b - LU decomposition - Applications of linear systems. (6+4)

VECTOR SPACES: Euclidean n-space, General vector spaces, Subspaces, Linear independence, Basis and dimension, Row space, Column space and Null space, Rank and nullity – Change of basis – Similarity - Isomorphism. (10+7)

LINEAR TRANSFORMATIONS: Kernel and range, Linear Transformation from R^m to R^n, Matrices of linear transformations. (9+5)

INNER PRODUCT SPACES: Inner products, Length and Angle in inner product spaces - Orthonormal bases, Gram Schmidt process - Orthogonal matrices, OR decomposition - Best Approximation and Least-squares. (10+7)

EIGEN VALUES AND EIGEN VECTORS: Eigen values and Eigen vectors - Diagonalization, Symmetric Matrices, Orthogonal Diagonalization – Singular Value Decomposition – Eigen values and linear transformations - Discrete Dynamical systems. (10+7)

Total L: 45 + T: 30 = 75

TEXT BOOKS:

REFERENCES:

18X202 DISCRETE MATHEMATICS


functions – Identity and inverse functions – Characteristic functions. (8+5)

COMBINATORICS: Basics of Counting - pigeonhole principle – Permutations and Combinations with and without repetition – Generalized permutations and combinations. (7+5)

RECURRENCE RELATIONS: Recurrence relation modeling – solving linear homogeneous and non-homogeneous recurrence relations by the method of characteristic roots. (5+3)

GROUP THEORY: Definition and examples – Subgroups, Homomorphism & Isomorphism – Cosets and Lagrange’s theorem – Normal Subgroups. Application problems. (7+5)

GRAPH THEORY: Basic concepts – degree sequence - Matrix representation of graphs - connectedness – Euler and Hamilton graphs – Graph isomorphism. Tree–Spanning tree–matrix tree theorem-Dijkstra’s algorithm. (9+6)

TEXT BOOKS:

REFERENCES:

18X203 COMPUTER ARCHITECTURE 3 0 0 3

INTRODUCTION: Elements of a Computer system – Types of Architecture - Bus and memory transfer - RTL. (3)

ALU DESIGN: Arithmetic micro operations – Logic micro operations – Shift micro operations – Arithmetic, logic, shift units (5)


CPU DESIGN: General Register organization–Stack Organization–Instruction formats–Addressing modes–RISC, CISC (6)

INPUT OUTPUT ORGANIZATION: Peripheral device – I/O interface – Asynchronous data transfer- Modes of data transfer- Direct Memory Access (DMA) – I/O processor. (7)

MEMORY ORGANIZATION: Memory hierarchy – Main memory – Auxiliary memory – Associative memory – Cache memory - Virtual memory. (8)

MULTIPROCESSOR: Characteristics of Multiprocessors – Interconnection structures –Parallel Processing-Pipelining. (7)

Total L: 45

TEXT BOOKS:

REFERENCES:

18X204 DATA STRUCTURES 3 0 0 3

INTRODUCTION: Software Development process – Abstraction - Data structures - Abstract data Types - Primitive data structures (5)


461

REFERENCES:

18X205 OBJECT ORIENTED PROGRAMMING WITH C++

3 0 0 3


FUNCTIONS IN C++: Function Prototyping - Call by Reference - Return by reference - Inline functions - Default, Const Arguments - Function - Overloading - Friend and Virtual Functions - Classes and Objects - 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.

CONSTRUCTORS: Parameterized Constructors - Multiple Constructors in a Class - Constructors with Default Arguments - Dynamic Initialization of Objects - Copy and Dynamic Constructors – Destructors overloading.

OPERATOR OVERLOADING: Overloading Unary and Binary Operators - Overloading Binary Operators using Friend functions – Operator Type conversion.


TEMPLATES & EXCEPTION HANDLING: Introduction to Templates, Generic Functions and Generic Classes – Exception Handling – Examples.

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

REFERENCES:

TEXT BOOKS:

Total L: 45
1. Plot 2D and 3D functions.
2. Programs on differentiation and integration.
3. Solving system of Linear equations.
4. Determination of Vector space under given operations.
5. Determination of linear independence and basis.
6. Finding Row space, Column space and null space.
7. Programs for Linear transforms on $\mathbb{R}^n$.
8. Convert a standard basis into an orthonormal basis.
9. Compute Eigen values and Eigen bases for a given system.
10. Apply the orthogonal Diagonalization technique to reducing a Quadratic form.

Total P: 60

18X207 DATA STRUCTURES LABORATORY

1. Sparse Matrix operations using arrays.
2. Library of string operations - representing strings using arrays.
3. Set operations.
4. Stacks using array representation.
5. Conversion of infix expression to postfix expression and evaluation.
6. Queues using array representation.
7. Linked Lists: Singly linked, Doubly linked and Circular lists and applications.
8. Linked Stacks and Queues.
10. Binary trees and Threaded trees (with graphical representation).
12. Implementation and analysis of Table and Hash Table with collision handling.
13. Binary Search Tree insertion and deletion

Total P: 60

18X208 OBJECT ORIENTED PROGRAMMING WITH C++ LABORATORY

Exercises pertaining to the following outlines are to be experimented:
1. Arithmetic operations using array of objects and dynamic data members.
2. Creation of a class having read-only member function and processing the objects of that class.
3. Creation of a class which keeps track of the member of its instances. Usage of static data member, constructor and destructor to maintain updated information about active objects.
4. Illustration of a data structure using dynamic objects.
5. Usage of static member to count the number of instances of a class.
6. Illustration for the need of default arguments.
7. Usage of a function to perform the same operation on more than one data type.
8. Creation of a class with generic data member.
9. Overloading the operators to do arithmetic operations on objects.
10. Acquisition of the features of an existing class and creation of a new class with added features in it.
11. Implementation of run time polymorphism.
12. Overloading stream operators and creation of user manipulators.
13. Implementation of derived class which has direct access to both its own members and the public members of the base class.
14. Implementation of Streams to store and maintain Library system, with the features of Book Issue and Book Return.

Total P: 60

SEMESTER III

18X301 PROBABILITY AND STATISTICS

RANDOM VARIABLES: Discrete and continuous random variables - probability mass function and density function - distribution function - Expectation and variance. Discrete distributions: Binomial, Poisson and Geometric - Continuous distributions: Uniform, Normal, Exponential and Weibull. (9+7)

JOINT PROBABILITY DISTRIBUTIONS: Marginal and conditional distributions - statistical independence, Conditional expectation – Moments and moment generating functions. (5+3)

STATISTICAL INFERENCE: Sampling distribution - Estimation: Point estimation, interval estimation - Criteria of a good estimator – Interval estimation of mean, proportion, and variance (single sample and two samples) - Maximum likelihood estimator. Hypothesis Testing; General concepts - Errors in Hypothesis testing - One-and two-tailed tests - Tests concerning mean, proportion, and variance - Tests for Goodness of fit and independence of attributes. (12+8)

CORRELATION AND REGRESSION: introduction - Estimation using the regression line - Correlation analysis -Limitations, errors, and caveats of using regression and correlation analyses - Multiple regression analysis (7+5)

ANALYSIS OF VARIANCE: Introduction to design of experiments, Analysis of variance - Completely Randomized Design and Randomized Block Design. (4+2)

Total: L: 45 + T: 30 =75

TEXT BOOKS:

REFERENCES:

18X302 DATABASE MANAGEMENT SYSTEMS

3 0 0 3


DATA MODELING: Introduction – Data associations – Entities, attributes, relationships – Constraints - Design of Entity Relationship data models (ERD) – Generalization – Aggregation – Conversion of ERD into tables – Introduction to Network data model and Hierarchical data model. (7)


RELATIONAL DATABASE MANIPULATION: Introduction to Structured Query Language (SQL) – SQL Commands for defining Database, Constructing database, Manipulations on database – Basic data retrieval operations – Advanced Queries in SQL – Functions in SQL – Aggregation – Categorization – Updates in SQL – Views in SQL – embedded SQL (6)


DATABASE SECURITY, INTEGRITY CONTROL: Security and Integrity threats – Defense mechanisms – Transaction and concurrency control mechanisms- ACID properties, Serializability and concurrency control, Lock based concurrency control (2PL, Deadlocks), Time stamping methods, optimistic methods, Database recovery management. (6)

Total L: 45

TEXT BOOKS:

REFERENCES:
INTRODUCTION TO MICROPROCESSORS: Introduction to Microprocessors – Architecture of 8086 – Software model-Memory address space and Data organization - Generating memory address - Addressing modes – Bus cycles and timing diagram - Protected mode. (7)

ASSEMBLY LANGUAGE PROGRAMMING: Instruction Set Architecture (ISA) - Instruction format - Instruction set – 8086 Integer instructions and computations – Control flow instructions and program structures - Array processing - String processing - Assembler directives - Procedures and Macros. (10)

INTERFACING CONCEPTS: I/O Interfacing concepts - Interfacing I/O devices – 8255 Programmable Peripheral Interface -DMA – 8237 DMA Controller – Timer. (6)


MICROCONTROLLER ARCHITECTURE: Introduction- Architecture of 8051 – Special Function Registers(SFRs)- I/O pins ports and circuits – Instruction Set-Addressing modes – Assembly Language Programming. (7)


TUTORIAL PRACTICE:
1. Study of 8086 Emulator Tool
2. Familiarizing with Instruction Set
3. Exercises on Arithmetic , Logical and Branching Operations
4. Number System Conversions
5. Implementation of Control Structures
6. Programs using Arrays
7. Implementations of String Functions
8. Programs using Special Instructions
9. Programs Using INT 10h, 21h Functions
10. Package Implementation

TEXT BOOKS:

REFERENCES:


VIRTUAL MEMORY MANAGEMENT: Need for Virtual Memory management – Demand Paging – Copy on write - Page Fault handling - Page replacement - Frame allocation - Thrashing - working set model.

I/O MANAGEMENT AND DISK SCHEDULING: Organization of I/O function – Evolution of I/O function – Types of I/O devices – Logical Structure of I/O functions - I/O Buffering - Disk I/O - Disk Scheduling algorithms - RAID - Disk Cache.


TEXT BOOKS:

REFERENCES:

18X305 DESIGN AND ANALYSIS OF ALGORITHMS

INTRODUCTION: Algorithm – analysis of algorithms – best case and worst case complexities, asymptotic notations - analysis of some algorithms using simple data structures - Master's theorem


AVL TREES: Definition – Height – searching – insertion and deletion of elements, AVL rotations

SPLAY TREES: Definition, splay steps, searching, insertion and deletion.

MULTIWAY SEARCH TREES: Indexed Sequential Access – m-way search tree - B-Tree – searching, insertion and deletion - B+ tree

DIVIDE AND CONQUER: Method – examples – Merge sort, Quick sort, Binary Search - Strassen's matrix multiplication.

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

GREEDY METHOD: Optimization problems – method – examples – Minimum cost spanning tree (Kruskal's and prim's algorithms), Topological sorting, optimal storage on tapes


TEXT BOOKS:

REFERENCES:
18X306 DATABASE MANAGEMENT LABORATORY

SQL – ORACLE, SQL SERVER
1. Working with DDL and DML commands of SQL for creation and manipulation of single, multiple tables.
2. Working with PL/SQL, Triggers and stored procedures.
3. Embedded SQL
4. Developing a Package using a database.

Total P: 60

18X307 OPERATING SYSTEMS LABORATORY (Linux)

1. Overview of an Operating System, Boots and Shutdown
2. UNIX Commands
3. SHELL Programming
4. UNIX System Calls
5. Process Creation and Execution
6. Thread Creation and Execution
7. Process / Thread Synchronization using semaphore
8. Developing Application using Inter Process communication (using sharedmemory, pipes or message queues)
9. Implementation of Memory Management Schemes
10. Implementation of file allocation technique (Linked, Indexed or Contiguous)

Total: P: 60

18X308 DESIGN AND ANALYSIS OF ALGORITHMS IN PYTHON LABORATORY

Implementation of the following problems:
1. Sorting and Searching.
2. Graphs – DFS & BFS
3. Demonstration of AVL Rotations.
4. B tree, B+ tree, Trie.
5. Divide and Conquer versions of Merge sort, Quick sort and binary search.
6. Greedy method implementation of Topological sort, Minimum cost spanning tree.
7. Eight queen’s problem backtracking.

Total P: 60

SEMESTER IV

18X401 COMPUTER NETWORKS

INTRODUCTION: Network goals - Applications of Networks - Design issues for the layers - OSI Reference Model - Types of Network - Network Topologies - Network Performance Measures: Bit Rate, Baud Rate – Band width. (5)


APPLICATIONS: FTP, SMTP - MIME Format, DNS, HTTP. (5)

TEXT BOOKS :

REFERENCES:

18X402 JAVA PROGRAMMING


EXCEPTION HANDLING: Exception types - Uncaught Exception - Using Try and Catch - Multiple catch clauses - Nested try statements - Throw - Throws - Java Built-in Exception – Custom exception.

MULTI THREADED PROGRAMMING: Java thread model - Priorities - Synchronization - Messaging - Thread class and runnable Interface - Main thread – Creating threads - Synchronization – Interthread Communication - Deadlock.

GUI PROGRAMMING: Applets - GUI Components - Event handling – Swing.


JDBC: Establishing a Connection - Manipulating Data - Error Handling - Closing a Connection.

Total P: 45

TEXT BOOKS:

REFERENCES:

18X403 SOFTWARE ENGINEERING


468

CASE STUDIES

TEXT BOOK:

REFERENCES:

18X404 SYSTEM SOFTWARE

SYSTEMS PROGRAMMING: Need and working of Assemblers, Macro processors, Linkers, Loaders, Interpreters and Compilers


SYNTAX DIRECTED TRANSLATION AND INTERMEDIATE CODE GENERATION: Semantic actions – Implementations of syntax directed translators – Intermediate code formats : Postfix notation, Quadruples, Triples , Indirect triples –Methods of translation of assignment statements, Boolean expressions and control statements - Representing information in a symbol table.

CODE OPTIMIZATION AND CODE GENERATION: Introduction to code optimization – Basic blocks – Loop optimization techniques - DAG representation – Error detection and recovery – A simple code generator.

TUTORIALS PRACTICE:
1. Implementing the transition diagram to strip off comment statements from a given source program.
2. Implementing the task of recognizing tokens from a given input program using LEX.
3. Using YACC to check the syntax of the statements in a given input program.
4. Using YACC to generate intermediate codes.
5. Designing a symbol table.

TEXT BOOKS:

REFERENCES:

18X405 OPTIMIZATION TECHNIQUES


DECISION THEORY: Decision Analysis – Decision making under certainty, uncertainty and risk.


TUTORIAL PRACTICE: 
1. Solving inequalities using Simplex, Two-Phase, Dual Simplex, Revised Simplex method. 
2. Finding initial basic feasible solution using North-West corner rule, Matrix minimum and Vogel’s approximation method and optimal test using MODI method. 
5. Solving Dynamic programming problems 
6. To find the critical path for the given PERT and CPM networks 
7. Solving problems under Random Search and Steepest descent method

Total L: 45 + T: 30 = 75

TEXT BOOKS: 

REFERENCES: 

18X406 COMMUNICATION SKILLS 

1. Inter and Intrapersonal Communication 
2. Group Communication 
3. Workplace Etiquette and Telephone Etiquette 
4. Conflict Management based Case Studies 
5. Public Speaking 
6. Technical Style and Mechanics 
7. Technical Report Writing 
8. Interpretation of Technical Data 
9. Business Correspondence and Email Writing 
10. Resume Writing and Interview Techniques 

REFERENCES: 
1. Monograph prepared by the Faculty, Department of English, 2018. 

18X407 COMPUTER NETWORKS LABORATORY 

1. Implement error detection and correction methods 
2. Implement bit stuffing and byte stuffing 
3. Stop and wait protocol 
4. Sliding window protocol 
5. IP addressing 
6. Distance vector routing protocol 
7. Socket programming 
8. Chat server implementation 
9. Assignments using the network simulator. 

Total P: 60

18X408 JAVA PROGRAMMING LABORATORY 

1. Working with classes and Objects 
2. Perform runtime polymorphism 
3. Implement interface 
4. Create and implement packages 
5. Handle checked, unchecked and user defined exceptions 
6. Multiple threads and inter thread communication

Total P: 60
SEMESTER V

18X501 MOBILE COMPUTING

3 0 0 3

INTRODUCTION: Introduction to mobile and wireless devices - wireless networking, Advantages and disadvantages of wireless networking, Evolution of mobile communication generations- Challenges in mobile computing – Vertical and horizontal mobile applications - Wireless LAN and Wireless WAN. (6)


CELLULAR NETWORK : GSM-Mobile services - System architecture -- Handover – GPRS – Mobile services – System architecture – LTE Network architecture and interfaces (10)


TEXT BOOKS:

REFERENCES:

18X502 COMPUTER GRAPHICS AND MULTIMEDIA

3 0 0 3


OUTPUT PRIMITIVES: Points and Lines, Line Drawing Algorithms (DDA & Bresenham's), Circle and Ellipse Generating Algorithms. (5)

TWO-DIMENSIONAL GEOMETRIC TRANSFORMATIONS: Different types of transformations and their matrix representations, Homogeneous Coordinates, Composite Transformations, transformations between Coordinate Systems, Affine transformations, Window-to-Viewport Coordinate transformation, Clipping-Point, Line, Polygon, Curve and Text Clipping. (8)

THREE-DIMENSIONAL CONCEPTS AND OBJECT REPRESENTATION: Three Dimensional Display Methods, Polygon Surfaces, Curved Lines & Surfaces, Quadric Surfaces, Spline Representations, Cubic Spline interpolation methods, Bezier Curves and Surfaces. (6)

THREE DIMENSIONAL TRANSFORMATIONS AND VIEWING: Translation, Rotation, Scaling, Reflection, Shears, Composite Transformations, Projections- Parallel and Perspective, Projection Transformations, Clipping. (6)


TEXT BOOKS:

REFERENCES:

18X503 MACHINE LEARNING

3 0 0 3

INTRODUCTION: Supervised learning – Supervised learning setup - Regression – Linear Regression – Polynomial Regression – Multiple Regression. (6)


LEARNING THEORY - Bias/variance tradeoff –VC dimension – PAC Learning (2)


TEXT BOOKS:

REFERENCES:

18X504 MOBILE COMPUTING LABORATORY

0 0 4 2

1. Android SDK installation and study
2. Defining Layouts
3. Single Activity Application, Application with multiple activities
4. Application using GUI Widgets
5. Application with Notifications
6. Using Intents to Launch Activities
7. Creating and Saving Shared Preferences
8. Retrieving Shared Preferences
9. Usage of SQLite Databases for storage
10. Location based service creation

Total P: 60

18X505 COMPUTER GRAPHICS AND MULTIMEDIA LABORATORY

0 0 4 2

1. OpenGL IDE and MINGW setup, . Implementation of A sample program in OpenGL
2. Designing primitive objects in OpenGL
3. Applications for keyboard and mouse interactions
4. Line drawing algorithms – basic line equation method, DDA Algorithm
5. Bresenham Line drawing algorithms and simple primitives using Bresenham algorithm.
7. Basic 2D transformations and applications

472
8. Window – Viewport simulation, Line Clipping Algorithm Implementation
9. Polygon Clipping Algorithm Implementation
10. Drawing 2D curves using Bezier
11. Drawing 2D curve using B-Spline
12. Applications for 3D Transformation
13. Implementation of 3D Projections
14. Implementation of Back face detection (Visible Surface Detection)
15. Construction of Multimedia database
16. Data Compression and decompression on multimedia data.

Total P: 60

18X506 MACHINE LEARNING LABORATORY
0 0 4 2
Download the datasets from UCI machine learning repository / www.kaggle.com for classification and clustering
1. Implement linear, polynomial and multiple regression.
2. Implement the following Classification algorithms for the above datasets.
   a. Naïve Bayes Algorithm
   b. Decision tree
   c. SVM
   d. K nearest neighbor
3. Do tenfold cross validation experiments and statistical validation using t-test and ANOVA.
4. Implement different clustering techniques.
5. Evaluate Performance measures for classification / clustering.

Total P: 60

SEMESTER VI
18X601 DISTRIBUTED ENTERPRISE COMPUTING
3 2 0 4


FRAMEWORKS: Introduction to Frameworks – Spring – Hibernate (6)

TUTORIAL PRACTICE:
1. Implementation of two, three and multi-tier applications
2. Developing distributed environment applications
3. RMI communication between two application
4. Servlet programs
5. JSP programs
6. Database connectivity programs
7. Component development using JavaBeans
8. Application using any one of the frameworks

Total L: 45 + T: 30 = 75

TEXT BOOKS:

REFERENCES:
INTRODUCTION: Need for testing – Psychology of testing – Testing economies – Types of testing – SDLC and testing – Verification and Validation.

TESTING STRATEGIES: White box testing techniques – Statement coverage – Branch coverage – Condition Coverage – Decision/condition coverage – Multiple condition coverage – Data flow coverage – Mutation testing – Automated code coverage analysis – Black box testing techniques – Boundary value analysis – Robustness analysis – Equivalence partitioning – Syntax testing – Finite state testing – Levels of testing – Unit, Integration and System testing.

TESTING A SOFTWARE USING A LIFE CYCLE METHODOLOGY: Requirements phase testing – Design phase testing – Program phase testing – Acceptance testing – Installation testing – Evaluating test effectiveness – Maintenance phase testing.

TEST PLAN: Positive and Negative Test cases, Preparation of test plan – Test script.

TESTING OBJECT ORIENTED SOFTWARE: Challenges – Differences from testing non-OO software – Class testing strategies

TECHNIQUES FOR AUTOMATING TEST EXECUTION: Testing and test automation – the V model – Tool support for lifecycle testing – promise of test automation, common problems of test automation – limitations of automating software testing

TUTORIALS PRACTICE:
1. Exercise for code review process.
2. Implementing Testing Techniques: White box testing, Basis Path, Looping, Black box methods.
3. Test the package for functional regression testing.
4. Preparation of test plan, test cases for developed package.
5. Design test cases using Rational test manager.
6. Use Rational robot for functional testing for developed package.
7. Use Configuration management tool for recording test artifacts.
8. Testing the package for load test using load runner.
9. Test the package for coverage analysis using tools.
10. Test the package for reliability testing using tools.
11. Test the package for memory management using Open source tools.

TEXT BOOK:

REFERENCES:

WSDL: WSDL Document structure – Types, Messages, Port types, Bindings, Ports, Services – SOAP binding – HTTP GET and POST Binding. (6)


TUTORIAL PRACTICE:
1. Validating XML using DTD
2. Validating XML using XML Schema
3. Formatting XML documents using CSS/XSLT
4. Implementation of Web Services Architecture
5. Creating Web Services communication in Windows Platform
6. Implementation of Web Services using Java Technology
7. Implementation of Web Services using .NET Technology

TEXT BOOKS:

REFERENCES:

18XA02 OPEN SOURCE SOFTWARE

INTRODUCTION: Proprietary Software, Free Software, Open Software, Licenses, Version Control, Explore GitHub – GitHub Workflows, Git Basics, Git Branching, Git on the Server, Distributed Git, GitHub, Git Tools, Customizing Git. (6)

PHP PROGRAMMING LANGUAGE: Basics – Data types – operators and flow control – String – Arrays – Functions – PHP with HTML – Client side validation – Working with Databases (9)

PYTHON PROGRAMMING LANGUAGE: Basic Syntax, Functions, Conditionals and Recursion, Iteration, Strings, Lists, Dictionaries, Tuples, Files, Classes and Objects, Inheritance, CGI, Multithreading, Networking, Python GUI - Tkinter, Distributing Python Modules, Python Standard Library, Django Framework. (9)


WEB SERVER: Application Server Vs Web server– Characteristics of Web server – Case Study: Apache Tomcat Web Server (5)

TUTORIAL PRACTICE:
1. Explore and contribute to GitHub
2. Working with PHP and MySQL
3. Exercises using NumPy/SciPy
4. Exercises in Ruby.
6. Installation of Apache Tomcat Web Server. (5)

TEXT BOOKS:

REFERENCES:
18XA03  SERVICE ORIENTED ARCHITECTURE


SOA ENABLED APPLICATION: SOA modeling – concepts and tools. SOA Assembly and Deploy – Integration developer, Enterprise Service Bus and Process Runtime. SOA Manage - SOA Governance (7)

SOA ENABLED ENTERPRISE: Enterprise Application Integration using SOA – Integrating applications and Data using Web Services and XML - Integration of legacy. (8)

CASE STUDIES: Inter-Enterprise applications like Insurance Claim processing - Credit Card based online transaction – Direct to Home Services. (4)

TUTORIAL PRACTICE:
1. Creation and validation of XML documents
2. Design Web Services
3. Invoking Web Services from other applications
4. Service assembly and deployment
5. Application integration

TEXT BOOKS:

REFERENCES:

18XA04  ARTIFICIAL INTELLIGENCE

INTRODUCTION: The foundations of AI - The History of AI - Intelligent agents - Agent based system. (2)


KNOWLEDGE REPRESENTATION AND REASONING: Knowledge representation - Logic - inference - Fuzzy logic: membership - Fuzzy rules and reasoning - Fuzzy inference (8)

UNCERTAIN KNOWLEDGE AND PROBABILISTIC REASONING: Uncertainty - Probabilistic reasoning - Semantics of Bayesian network - Exact inference in Bayesian network- Approximate inference in Bayesian network - Dynamic Bayesian Networks (10)

DECISION-MAKING: Basics of utility theory, Utility functions - Sequential decision problems - Markov decision process - Value iteration - Policy iteration - Decisions in Multi agent system: Multi agent decision theory - Group decision making. (10)

TUTORIAL PRACTICE:
2. Simple games – minimax and expectimax
3. Logic based exercises, Fuzzy Inference System.
4. Decision making: Implementing HMM models, sequential and multi agent decision making

TEXT BOOKS:

REFERENCES:

TEXT BOOKS:

REFERENCES:
INTRODUCTION: Natural language processing techniques - The different analysis levels used for NLP: morpho-lexical - syntactic - semantic - pragmatic - markup (TEI, UNICODE) - Applications - open problems.


CASE STUDIES: Sentiment Analysis - Information extraction - Automatic summarization - Information retrieval and Question answering - Named entity recognition and relation extraction - IE using sequence labeling

TUTORIAL PRACTICE:
1. Implementing word similarity.
2. Implementing simple problems related to word disambiguation.
3. Simple demonstration of part of speech tagging.
4. Lexical analyzer.
5. Semantic analyzer.
6. Translation from one language into another language
7. Word sense disambiguation

Total L: 45 + T: 30 = 75

TEXT BOOKS:

REFERENCES:

18XA07 SEMANTIC WEB


WEB Ontology Language: OWL Introduction - The OWL Language - Examples - OWL in OWL - Future Extensions.


Applications: Horizontal Information Products - Data Integration - e-Learning - Web Services - Other Scenarios.


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TUTORIAL PRACTICE:
1. Generate a well formed XML document.
2. Creating XML DTD and XSD for the given XML document.
3. Design a XSLT to display the XML document (given as input) based on the constraints given.
4. Generate an RDF graph.
5. Create an RDF/OWL ontology (in triple or graph notation).
6. Write an RDF/XML encoding for the given situation.
8. A Package to implement the techniques.

TEXT BOOK:

REFERENCES:

18XA08 CLOUD COMPUTING

INTRODUCTION TO PARALLEL AND DISTRIBUTED COMPUTING: Introduction, Architecture and Distributed computing models and technologies SOA, Web Services
GRID, CLUSTER AND UTILITY COMPUTING: Introduction, Architecture, Pros & Cons, Real time applications.
ADVANCED WEB TECHNOLOGIES: AJAX and Mashup – Programing examples using applications.
MAP REDUCE 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, IBM blue Cloud.
APPLICATIONS: Distributed search engine and distributed data mining in the cloud.

TUTORIAL PRACTICE:
1. Implement a distributed search engine.
2. Implement distributive data mining for an application.
3. Package to be developed using Virtualization and other cloud concepts.

TEXT BOOK:

REFERENCES:

18XA09 DEEP LEARNING


Total L: 45 + T: 30 = 75

Deep Learning Research: Linear Factor Models, Autoencoders, Representational Learning, Structured probabilistic models for deep learning, Monte Carlo Methods, Deep generative models.

Applications: Natural language processing, Big Data, Brain Computer Interface, Visual Data, IoT.

TUTORIAL PRACTICE:
1. Collect data sets from the url: http://deeplearning.net/datasets/
2. Use TensorFlow library for visualization of data sets in different domains and analysis:
   a. Music
   b. Image processing
   c. Text analysis (Next word prediction, etc)
   d. Speech processing

Total L: 45 + T: 30 = 75

TEXT BOOKS:

REFERENCES:

18XA10 BIG DATA ANALYTICS


MINING DATA STREAMS: Sampling Data in a Stream – Filtering Streams – Counting Distinct Elements in a Stream.


DATA MODELING FOR BIG DATA: Big Data and Challenges, NoSQL data models, Basic principles of NoSQL models, SQL databases Vs NoSQL databases.


Data Visualization

TUTORIAL PRACTICE:
1. Map Reduce Algorithm.
2. Shingling of Documents.
5. NoSql Databases
6. Adwords Implementation.

TEXT BOOKS:

REFERENCES:
18XA11 GRAPH THEORY


**CONNECTION:** Vertex and edge connectivity. Vertex and edge cuts, relationship between vertex and edge connectivity, bounds for connectivity. Harary’s construction of k-connected graphs.

**EULERIAN AND HAMILTONIAN GRAPHS:** Eulerian graphs, Route inspection problem, Hamiltonian graphs, Dirac’s and Ore’s theorems, Gray codes, traveling salesman problem.

**MATCHING:** Maximum matching – augmenting paths, Berge’s theorem, Bipartite matching - Hall’s theorem, Perfect matching – Tutte’s theorem, Edmonds’ algorithm.

**COLORING:** Vertex-coloring – upper chromatic number, bounds, sequential and largest degree first algorithms. Edge coloring – edge chromatic number, Vizing’s theorem.

**DOMINATION:** Dominating set, domination number, bounds, Types – distance-k domination, total domination, independence domination, connected. Applications to networks.

**TUTORIAL PRACTICE:**
1. Constructing spanning tree
2. Implementation of Harary’s construction of k-connected graphs
3. Fluery’s algorithm
4. Travelling Salesman Problem
5. Augmenting path algorithm for matching
6. Sequential and largest degree first algorithm for vertex coloring
7. Finding a minimal dominating set

**TEXT BOOKS:**

**REFERENCES:**

18XA12 SOFTWARE PATTERNS

**INTRODUCTION:** Reusable Software, Reusable object oriented software, Patterns, Definition, Overview & motivation, Categories, Relationship between patterns, Pattern description.


**ARCHITECTURE PATTERNS:** From Mud to Structure – Layers, Pipes and Filters, Blackboard. Distributed systems – Broker. Interactive Systems - Model View Controller (MVC), Presentation Abstraction Control, Adaptable Systems, Reflection, Microkernel.

**REFACTORING AND CODE SMELLS:** Refactoring, Principles in Refactoring, Bad smells in Code. A Catalog of Refactoring with examples.

**IDIOMS** – Antipatterns in Software development, software architecture, Pattern mining, Pattern Language.

**TUTORIALS PRACTICE:**
1. Identifying any of the 23 GOF design patterns in the given design problem.
2. Design and Implementation of the patterns using Java with appropriate case studies.
3. Creating reusable solution to a design problem using a case study.
4. Use architecture styles like MVC, Pipes and Filters, and Layers to develop computational system.

**Total L: 45 + T: 30 = 75**
18XA13 ADVANCED DATABASE MANAGEMENT SYSTEMS


OBJECT DATABASES: Introduction to Object Relational Data Model - Complex data types - Structured types and Inheritance - Nesting - un nesting of Relations - Query Processing in ORDBMS - Object oriented data model - Object Identity - Persistent Programming Languages - Type and Class Hierarchies and Inheritance - Complex Objects - Object Oriented Database Design - Query Processing in object oriented database -Comparison of Object Oriented and Object Relational databases. (8)

PARALLEL AND DISTRIBUTED DATA BASES: Architecture of parallel databases - Parallel query evaluation, Paralyzing individual operations, Parallel query optimization - Homogeneous and Heterogeneous databases - Architecture of distributed data bases - Storing data in distributed data bases, Distributed Transactions - Concurrency control in Distributed databases - Distributed query processing. (8)

CURRENT DATABASES: Key - Value Stores – Amazon’s DynamoDB, Key - Value Stores (in-memory) : Redis, Column Oriented Store: Google BigTable - Document Oriented Stores – MongoDB - Graph databases: Neo4J. (10)


TUTORIAL PRACTICE:
1. Object Relational Databases - including object orientation features in relational databases and creation of nested relations. Projects using OR databases.
2. Mini projects in distributed databases to acquire hands on practice in fragmentation and replication strategies
3. Active databases - Assignments to create triggers for specifying active rules in relational databases.
4. Spatial databases – Creation and querying of databases which store geographic data such as graphs, maps.

Total L: 45 + T: 30 = 75

TEXT BOOKS:

REFERENCES:

18XA14 EMBEDDED SYSTEM AND DESIGN

INTRODUCTION TO EMBEDDED SYSTEMS: Definition – Examples of Applications – Important characteristics of these applications – real-time system and definitions – real –time system – Common misconceptions – Overview of science of real-time systems and examples of research problems. (6)


DESIGN USING RTOS: Design Principles – Short Interrupt Routines – RTOS Tasks – Tasks for Priority – Tasks for Encapsulation – Creating and Destroying tasks – Avoidance. (7)

TUTORIAL PRACTICE:
1. Design RTS program using Round Robin method.
2. Design RTS program using semaphore.
3. Design RTS program which uses message queue, mail box, pipe.

TEXT BOOKS:

REFERENCES:

18XA15 INFORMATION SEARCH AND RETRIEVAL

INTRODUCTION Overview of IR Systems - Historical Perspectives - Goals of IR - The impact of the web on IR - The role of artificial intelligence (AI) in IR. (3)


RETRIEVAL MODELS Similarity Measures and Ranking - Boolean matching - Extended Boolean models - Ranked retrieval - Vector Space Models - Text-similarity metrics - TF-IDF weighting - Cosine similarity - Probabilistic Models. (10)

QUERY PROCESSING Query Operations and Languages - Query expansion - Experimental evaluation of IR - Performance metrics recall, precision and F-measure. (5)

INFORMATION FILTERING TECHNIQUES Introduction to Information Filtering - Relevance Feedback - Applications of Information Filtering: Recommender Systems Collaborative filtering and Content-Based recommendation. (6)

WEB SEARCH IR Systems and the WWW - Search Engines - Spidering - Link analysis Hubs and Authorities - Google Page Rank. (7)

INFORMATION EXTRACTION AND INTEGRATION Extracting data from text - NE Recognition - Co-reference Resolution - Relation Extraction - Event Extraction - Extracting and Integrating specialized information on the web. (7)

TUTORIAL PRACTICE:
1. Designing a Desktop search engine
2. Building a web crawler
3. HITS/Page Rank for ranking of Web Pages
4. Spam detection using personal mails
5. Build a simple Recommender system
6. Designing a personalized Search Engine
7. Identifying near duplicates in web pages
8. Extracting information from web pages

TEXT BOOKS

REFERENCES

18XA16 VIRTUAL REALITY

INTRODUCTION TO VR AND AR: Overview of class, logistics, history of VR/AR. (3)

THE GRAPHICS PIPELINE AND OPENGL: Overview and Transformations: rotation, translation, scaling, model view matrix, projection matrix, Lighting and Shading. (6)

OPENGL SHADING LANGUAGE (GLSL):GLSL vertex and fragment shaders. (6)

THE HUMAN VISUAL SYSTEM: Perception of depth, color, contrast, resolution, Stereo Rendering. (6)

HEAD MOUNTED DISPLAY OPTICS: Magnifier designs, stereo rendering for HMDs, lens distortion correction, advanced HMD optics. (6)

INERTIAL MEASUREMENTS UNITS: gyros, accelerometers, magnetometers, sensor fusion, complementary filter, Arduino (6)

POSITIONAL TRACKING: Tracking with the light house, advanced positional tracking.- Spatial Sound (6)

PANORAMIC IMAGING AND CINEMATIC VR: VR Engines and Other Aspects of VR (latency, eye tracking, post-rendering warp) (6)

TUTORIAL PRACTICE:
1. Lab: Hello, WebGL!
2. Lighting and shading with GLSL
3. Stereo rendering, anaglyph
4. Building Own Head Mounted Display
5. Build Your Own IMU, Arduino Programming
6. Positional Tracking
7. Spatial Sound
8. Content creation with unity (Optional)

Total L: 45 + T: 30 = 75

TEXT BOOKS:

REFERENCES:

OPEN ELECTIVES

18X001 CRYPTOGRAPHY

MATHMATICS OF CRYPTOGRAPHY: Fundamental theorem of arithmetic (statement only) - Divisibility - Euclidean and Extended Euclidean algorithms, Primes - Euler totient function - Fermat’s little theorem, Modular arithmetic - Computing modular inverse – modular exponentiation - efficient algorithms, generators and primitive roots in groups - Discrete log problem - Chinese remainder theorem. (9)


SYMMETRIC KEY CRYPTOGRAPHY: Stream cipher – Block ciphers – DES – Modes of operation. (6)
PUBLIC KEY CRYPTOGRAPHY: Concept of public key cryptography – RSA cryptosystem - cryptanalysis against RSA - Discrete log problem, ElGamal cryptosystem. (6)

DATA INTEGRITY TECHNIQUES: Symmetric techniques - Cryptographic hash functions – MAC, asymmetric techniques – Digital signatures – RSA signatures, the ElGamal signature scheme, DSA. (8)


TUTORIAL PRACTICE:
1. Implementation of Extended Euclidean algorithms
2. Implementation of modular inverse – modular exponentiation
4. Implementation of one time pad
5. Implementation of RSA cryptosystem
8. Implementation of Fiat Shamir protocol.
9. Implementation of Diffie- Hellman key pre-distribution

Total L: 45 + T: 30 = 75

TEXT BOOKS:

REFERENCES:

18X002 NUMERICAL ANALYSIS
3 2 0 4

TYPES OF ERRORS: Different types of errors. (3)


EIGENVALUES AND EIGENVECTORS: Power method ,inverse power method , Jacobi method (4)

FINITE DIFFERENCES AND INTERPOLATION: Finite difference operators – . Interpolation: Newton’s divided difference formula , Lagrange’s interpolation formula , Newton’s-Gregory forward and backward interpolation. (8)

DIFFERENTIATION AND INTEGRATION: Numerical differentiation using Newton’s-Gregory forward and backward polynomials. Numerical Integration: Gaussian Quadrature , Trapezoidal rule , Simpson’s one third rule. (6)


TUTORIAL PRACTICE:
1. Solution of Non-linear equations (Bisection method, Regula Falsi method, Graeffe’s method, Bairstow’s method)
2. Solution of system of linear equations (Gauss-Jordan elimination, Gauss Jacobi and Gauss Seidel methods)
3. Finding Eigenvalues and Eigenvectors(Power method and Jacobi method)
4. Interpolation (Newton forward, Newton backward, Newton divided difference, Lagrange’s interpolation)
5. Numerical integration (Trapezoidal rule, Simpson’s one-third rule, Gaussian quadrature)
6. Solution of ordinary differential equations(Euler and modified Euler methods, Runge-Kutta method and Mlne’s method)

Total L: 45 + T: 30 = 75

TEXT BOOKS:

REFERENCES:
18X003 CYBER SECURITY


(6)

CYBERCRIME FUNDAMENTALS & ISSUES: Unauthorized access to computers, Internet hacking & Cracking, Viruses & malicious code, Software piracy- Cyberstalking - Social media crimes-Understanding social media marketing - Best practices with use of Social marketing tools - Case studies.

(8)


(8)

INVESTIGATION: Cybercrime Investigations-Evidence handling - Collection & Preservation -E-mail & Mobile tracking - IP tracking - Password cracking and Evidence recovery.

(8)

DEFENSE AND ANALYSIS TECHNIQUES: Threat, Types of Threat, Vulnerabilities, Controls and Counter measures, Attacks examples – Reconnaissance attack, Access attacks, Masquerading, IP Spoofing, and Denial of Service attack, Distributed Denial of Service- Honeypots – DNS-Firewall.

(8)

LAWS & ACTS: Legal perspective-India & global, IT ACT, CrPC, IPC, IPR in cyberspace, Cyber ethics, Evidence Act & Privacy Act- Guidelines and computer usage policy.

(7)

TUTORIAL PRACTICE:
1. Hacking web applications
2. Hacking web server
3. Network hacking
4. Database hacking
5. Password cracking
6. Mobile device tracking
7. IP tracking

Total L: 45 + T: 30 = 75

TEXT BOOKS:

REFERENCES:

18X004 ENTERPRENEURSHIP

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

(5)


(6)

DEVELOPING AN EFFECTIVE BUSINESS MODEL: The Importance of a Business Model – Starting a small scale industry - Components of an Effective Business Model.

(5)


(8)


(4)


(9)
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. (5)

INTELLECTUAL PROPERTY PROTECTION AND ETHICS: Patents – Copyright - Trademark- Geographical indications – Ethical and social responsibility and challenges. (4)

TUTORIAL PRACTICE: Case studies

Total L: 45+T: 30=75

TEXT BOOKS:

REFERENCES:

18XO05 HUMAN MACHINE INTERFACE DESIGN


HUMAN BODY AND DEVICE DESIGN: Input Devices and Ergonomics – Virtual Reality. (8)


USER INTERFACE: Events and Handlers – Responsiveness – Speech and Multimodal –Case Study. (5)

TUTORIAL PRACTICE:
1. Analyzing a Usability Problem on Machines
2. Information Visualization
3. Time and Motion Study of GUI
4. Widget Survey
5. Sketch People and Task Decomposition

Total L: 45 + T: 30 = 75

TEXT BOOKS:

REFERENCES:
2. Jenifer Tidwell, "Designing Interfaces", O'Reilly, 2011

18XO06 INTERNET OF THINGS

INTRODUCTION to IOT: smart connectivity - smart technology – smart TVs - smart appliances - smart homes - smart cars - smart cities. (5)

RFID: Automatic identification systems - Features of RFID systems - fundamental operating principles - physical principles of RFID systems - Readers - contactless smart cards. (6)

NFC: Introduction to near field communication - NFC data exchange format - NDEF messages on android - NFC operating modes - reader/writer mode - peer to peer mode - card emulation mode - peer to peer exchanges using NFC on android. (6)

Hardware Devices: Types of Sensors – Interfacing (8)
ARDUINO: Basics of sensors and actuators - The Arduino microcontroller platform - reading from sensors - talking to android phone - connecting to internet - read and write NDEF messages using arduino NDEF library. (10)

RASPBERRY PI: setup and management - networking - operating system - python basics - python lists and dictionaries - general purpose input output - controlling hardware. (10)

TUTORIALS PRACTICE:
1. Send data from Arduino to internet.
3. Running program automatically on startup of Raspberry Pi.
4. Running program automatically at regular intervals on Raspberry Pi. Total L: 45 + T: 30 = 75

TEXT BOOKS:
1. Tom Igoe, Don Coleman and Brian Jepson, "Beginning NFC", O'Reilly, 2014
3. Charalampos Doukas, "Building Internet of Things with the Arduino", Create space, 2012

REFERENCES: