



Dr.M.G.R.
EDUCATIONAL AND RESEARCH INSTITUTE
UNIVERSITY
(Decl. U/S 3 of the UGC Act 1956)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

B.Tech – Computer Science Engineering (Full Time)
Curriculum and Syllabus
2013 Regulation

| III SEMESTER | | | | | | |
|---------------------|-----------------|--|-----------|----------|----------|-----------|
| S.No | Sub.Code | Title of Subject | L | T | P | C |
| 1 | BCS13001 | Data Structures and Algorithms | 3 | 0 | 0 | 3 |
| 2 | BCS13002 | Introduction to OOPS with C++ and Java | 3 | 0 | 0 | 3 |
| 3 | BMA13007 | Discrete Mathematics | 3 | 1 | 0 | 4 |
| 4 | BCS13004 | Computer Graphics and Multimedia | 3 | 1 | 0 | 4 |
| 5 | BEC13004 | Electrical and Electronics Devices | 3 | 1 | 0 | 4 |
| 6 | BEC13007 | Digital Electronics | 3 | 0 | 0 | 3 |
| 7 | BCS13L02 | Data Structures Using C++ Lab | 0 | 0 | 3 | 1 |
| 8 | BCS13L04 | Java Lab | 0 | 0 | 3 | 1 |
| 9 | BEC13L21 | Digital Electronics Lab | 0 | 0 | 3 | 1 |
| Total | | | 18 | 3 | 9 | 24 |

| IV SEMESTER | | | | | | |
|--------------------|-----------------|--|-----------|----------|----------|-----------|
| S.No | Sub.Code | Title of Subject | L | T | P | C |
| 1 | BCS13005 | Data Base Management Systems | 3 | 0 | 0 | 3 |
| 2 | BCS13006 | Software Engineering | 3 | 1 | 0 | 4 |
| 3 | BCS13007 | Operating Systems | 3 | 0 | 0 | 3 |
| 4 | BMA13012 | Probability and Linear Programming | 3 | 1 | 0 | 4 |
| 5 | BEC13012 | Communication Systems | 3 | 0 | 0 | 3 |
| 6 | BEC13032 | Microprocessors and Micro Controllers | 3 | 0 | 0 | 3 |
| 7 | BCS13L03 | DBMS Lab | 0 | 0 | 3 | 1 |
| 8 | BCS13L05 | Operating Systems Lab | 0 | 0 | 3 | 1 |
| 9 | BEC13L22 | Microprocessors and Peripheral Interfacing Lab | 0 | 0 | 3 | 1 |
| Total | | | 18 | 2 | 9 | 23 |



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| V SEMESTER | | | | | | |
|-------------------|-----------------|---|-----------|----------|----------|-----------|
| S.No | Sub.Code | Title of Subject | L | T | P | C |
| 1 | BCS13008 | System Software | 3 | 0 | 0 | 3 |
| 2 | BCS13009 | Computer Architecture | 3 | 0 | 0 | 3 |
| 3 | BMA13018 | Numerical Methods and Optimization Techniques | 3 | 1 | 0 | 4 |
| 4 | BCS13010 | Object Oriented System Analysis and Design | 3 | 0 | 0 | 3 |
| 5 | BCS13011 | Artificial Intelligence | 3 | 1 | 0 | 4 |
| 6 | BCS13012 | Computer Networks | 3 | 0 | 0 | 3 |
| 7 | BCS13L06 | System software Lab | 0 | 0 | 3 | 1 |
| 8 | BCS13L07 | Software System Development Lab | 0 | 0 | 3 | 1 |
| 9 | BCS13L08 | Network Programming Lab | 0 | 0 | 3 | 1 |
| 10 | BEN13L01 | Career & Confidence Building (Soft Skills-I) | 0 | 2 | 0 | 2 |
| Total | | | 18 | 4 | 9 | 25 |

| VI SEMESTER | | | | | | |
|--------------------|-----------------|---|-----------|----------|-----------|-----------|
| S.No | Sub.Code | Title of Subject | L | T | P | C |
| 1 | BCS13013 | Modeling and Simulation for Engineers | 3 | 0 | 0 | 3 |
| 2 | BCS13014 | Principles of Compiler Design | 3 | 0 | 0 | 3 |
| 3 | BCS13015 | Web Technology | 3 | 0 | 0 | 3 |
| 4 | BCS13016 | Advanced Java Programming | 3 | 1 | 0 | 4 |
| 5 | BCS13EXX | Elective I | 3 | 0 | 0 | 3 |
| 6 | BCS13EXX | Elective II | 3 | 0 | 0 | 3 |
| 7 | BCS13L09 | Modeling and Simulation Lab | 0 | 0 | 3 | 1 |
| 8 | BCS13L10 | Compiler Design Lab | 0 | 0 | 3 | 1 |
| 9 | BCS13L11 | Value Added Training Programme / Three Tier Application Project | 0 | 0 | 2 | 1 |
| 10 | BCS13L12 | Web Technology Lab | 0 | 0 | 3 | 1 |
| 11 | BEN13L02 | Qualitative / Quantitative skills (Soft Skills-II) | 0 | 1 | 1 | 2 |
| Total | | | 18 | 2 | 12 | 25 |



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| VII SEMESTER | | | | | | |
|--------------|----------|--|-----------|----------|----------|-----------|
| S.No | Sub.Code | Title of Subject | L | T | P | C |
| 1 | BCS13017 | Dot Net Framework | 3 | 0 | 0 | 3 |
| 2 | BCS13018 | Data Warehousing and Data Mining | 3 | 1 | 0 | 4 |
| 3 | BMG13003 | Principles of Management | 3 | 1 | 0 | 4 |
| 4 | BCS13EXX | Elective III | 3 | 0 | 0 | 3 |
| 5 | BCS13EXX | Elective IV | 3 | 0 | 0 | 3 |
| 6 | BCS13L13 | Dot Net Lab | 0 | 0 | 3 | 1 |
| 7 | BCS13L14 | Comprehension / Foreign Language Certification | 0 | 2 | 0 | 2 |
| 8 | BCS13L15 | Project (Phase – I) | 0 | 1 | 3 | 2 |
| 9 | BCS13L16 | Free and Open Source Software (FOSS) Lab | 0 | 1 | 3 | 1 |
| Total | | | 15 | 6 | 9 | 23 |

| VIII SEMESTER | | | | | | |
|---------------|----------|--------------------------------|-----------|----------|-----------|-----------|
| S.No | Sub.Code | Title of Subject | L | T | P | C |
| 1 | BMG13004 | Entrepreneurship Development | 3 | 1 | 0 | 4 |
| 2 | BCS13019 | Information Storage Management | 3 | 0 | 0 | 3 |
| 3 | BCS13EXX | Elective V | 3 | 0 | 0 | 3 |
| 4 | BCS13EXX | Elective VI | 3 | 0 | 0 | 3 |
| 5 | BCS13L17 | Project (Phase – II) | 0 | 0 | 12 | 6 |
| Total | | | 12 | 1 | 12 | 19 |

Summary of Credits:

| | |
|--|------------|
| 1st Year Credits | 45 |
| 3rd Semester Credits | 24 |
| 4th Semester Credits | 23 |
| 5th Semester Credits | 25 |
| 6th Semester Credits | 25 |
| 7th Semester Credits | 23 |
| 8th Semester Credits | 19 |
| Total | 184 |



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| CSE Elective Stream – Database Specialization | | | | | | |
|--|-----------------|------------------------------------|----------|----------|----------|----------|
| S.No | Sub.Code | Title of Subject | L | T | P | C |
| 1 | BCS13E01 | Database Tuning | 3 | 0 | 0 | 3 |
| 2 | BCS13E02 | Advanced Knowledge Management | 3 | 0 | 0 | 3 |
| 3 | BCS13E03 | Infometrics | 3 | 0 | 0 | 3 |
| 4 | BCS13E04 | Enterprise Application Integration | 3 | 0 | 0 | 3 |
| 5 | BCS13E05 | Web Data Design & Management | 3 | 0 | 0 | 3 |
| 6 | BCS13E06 | Advanced Databases | 3 | 0 | 0 | 3 |

| CSE Elective Stream – Networking Specialization | | | | | | |
|--|-----------------|------------------------------------|----------|----------|----------|----------|
| S.No | Sub.Code | Title of Subject | L | T | P | C |
| 1 | BCS13E07 | Mobile and Wireless Networks | 3 | 0 | 0 | 3 |
| 2 | BCS13E08 | TCP / IP Design and Implementation | 3 | 0 | 0 | 3 |
| 3 | BCS13E09 | Ad-hoc Networks | 3 | 0 | 0 | 3 |
| 4 | BCS13E10 | 3G- Networking | 3 | 0 | 0 | 3 |
| 5 | BCS13E11 | Network Security and Cryptography | 3 | 0 | 0 | 3 |
| 6 | BCS13E12 | Pervasive Computing | 3 | 0 | 0 | 3 |

| CSE Elective Stream – OS Specialization | | | | | | |
|--|-----------------|---------------------------|----------|----------|----------|----------|
| S.No | Sub.Code | Title of Subject | L | T | P | C |
| 1 | BCS13E13 | Unix Internals | 3 | 0 | 0 | 3 |
| 2 | BCS13E14 | Distributed Computing | 3 | 0 | 0 | 3 |
| 3 | BCS13E15 | Real Time System Design | 3 | 0 | 0 | 3 |
| 4 | BCS13E16 | Advanced Operating System | 3 | 0 | 0 | 3 |
| 5 | BCS13E17 | Parallel Processing | 3 | 0 | 0 | 3 |
| 6 | BCS13E18 | Fault Tolerance Systems | 3 | 0 | 0 | 3 |



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| CSE Elective Stream – Computational Theory Specialization | | | | | | |
|--|-----------------|-------------------------------------|----------|----------|----------|----------|
| S.No | Sub.Code | Title of Subject | L | T | P | C |
| 1 | BCS13E19 | Design of Algorithms | 3 | 0 | 0 | 3 |
| 2 | BMA13E31 | Optimization Techniques | 3 | 0 | 0 | 3 |
| 3 | BCS13E20 | Theory of Computation | 3 | 0 | 0 | 3 |
| 4 | BCS13E21 | Algorithmic graph Theory | 3 | 0 | 0 | 3 |
| 5 | BCS13E22 | Principles of Programming Languages | 3 | 0 | 0 | 3 |
| 6 | BCS13E23 | Natural Language Processing | 3 | 0 | 0 | 3 |

| CSE Elective Stream – VLSI & Embedded Specialization | | | | | | |
|---|-----------------|--|----------|----------|----------|----------|
| S.No | Sub.Code | Title of Subject | L | T | P | C |
| 1 | BEC13E31 | VLSI Technology | 3 | 0 | 0 | 3 |
| 2 | BEC13E32 | System Modeling Using Hardware Description Languages | 3 | 0 | 0 | 3 |
| 3 | BEC13E33 | VLSI Design | 3 | 0 | 0 | 3 |
| 4 | BEC13E34 | Computer Aided Design of VLSI | 3 | 0 | 0 | 3 |
| 5 | BCS13E24 | Embedded System Design | 3 | 0 | 0 | 3 |
| 6 | BEC13E35 | Micro Controller Architecture & Design | 3 | 0 | 0 | 3 |

| CSE Elective Stream – Bio Informatics Specialization | | | | | | |
|---|-----------------|--|----------|----------|----------|----------|
| S.No | Sub.Code | Title of Subject | L | T | P | C |
| 1 | BBT13E31 | Bio Informatics | 3 | 0 | 0 | 3 |
| 2 | BBT13E32 | Biological Database and Data Analysis | 3 | 0 | 0 | 3 |
| 3 | BBT13E33 | Cell Biology and Genetics | 3 | 0 | 0 | 3 |
| 4 | BCS13E25 | Programming in PERL | 3 | 0 | 0 | 3 |
| 5 | BBT13E34 | Machine Learning Models in Bio Informatics | 3 | 0 | 0 | 3 |
| 6 | BBT13E35 | Advance Techniques for Sequence and Structure Analysis | 3 | 0 | 0 | 3 |



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| CSE Elective Stream – Digital Image Processing Specialization | | | | | | |
|--|-----------------|---|----------|----------|----------|----------|
| S.No | Sub.Code | Title of Subject | L | T | P | C |
| 1 | BCS13E26 | Digital Image Processing | 3 | 0 | 0 | 3 |
| 2 | BCS13E27 | Pattern Recognition and Neural Networks | 3 | 0 | 0 | 3 |
| 3 | BCS13E28 | Medical Imaging Techniques | 3 | 0 | 0 | 3 |
| 4 | BCS13E29 | Digital Image Processing Algorithms | 3 | 0 | 0 | 3 |
| 5 | BCS13E30 | Intelligent Image Databases | 3 | 0 | 0 | 3 |
| 6 | BCS13E33 | Geographical Information System | 3 | 0 | 0 | 3 |

| CSE Elective Stream – Artificial Intelligence Specialization | | | | | | |
|---|-----------------|-------------------------|----------|----------|----------|----------|
| S.No | Sub.Code | Title of Subject | L | T | P | C |
| 1 | BCS13E34 | Software Agents | 3 | 0 | 0 | 3 |
| 2 | BCS13E35 | Knowledge Engineering | 3 | 0 | 0 | 3 |
| 3 | BCS13E36 | Parallel Algorithms | 3 | 0 | 0 | 3 |
| 4 | BCS13E37 | Speech Processing | 3 | 0 | 0 | 3 |
| 5 | BCS13E38 | Soft Computing | 3 | 0 | 0 | 3 |
| 6 | BCS13E39 | Machine Learning | 3 | 0 | 0 | 3 |

| CSE Elective Stream – Hardware Specialization | | | | | | |
|--|-----------------|---|----------|----------|----------|----------|
| S.No | Sub.Code | Title of Subject | L | T | P | C |
| 1 | BEC13E36 | Digital Signal Processing | 3 | 0 | 0 | 3 |
| 2 | BCS13E40 | Advanced Computer Architecture | 3 | 0 | 0 | 3 |
| 3 | BCS13E41 | Robotics | 3 | 0 | 0 | 3 |
| 4 | BCS13E42 | Multi Core Architecture and Programming | 3 | 0 | 0 | 3 |
| 5 | - | Special Elective - I | 3 | 0 | 0 | 3 |
| 6 | - | Special Elective - II | 3 | 0 | 0 | 3 |



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| CSE Elective Stream – Societal Specialization | | | | | | |
|--|-----------------|--------------------------------|----------|----------|----------|----------|
| S.No | Sub.Code | Title of Subject | L | T | P | C |
| 1 | BMG13E01 | Disaster Management | 3 | 0 | 0 | 3 |
| 2 | BMG13E02 | Professional Ethics | 3 | 0 | 0 | 3 |
| 3 | BMG13E03 | Economics for Engineers | 3 | 0 | 0 | 3 |
| 4 | BCS13E43 | Social Computing (Web 2.0) | 3 | 0 | 0 | 3 |
| 5 | BMG13E04 | Global Strategy and Technology | 3 | 0 | 0 | 3 |
| 6 | BMG13E05 | Human Values and Human Rights | 3 | 0 | 0 | 3 |



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BCS13001

DATA STRUCTURES AND ALGORITHMS

3 0 0 3

OBJECTIVES:

- The students will be able to identify, model, solve and develop code for real life problems like shortest path using graph theory.
- Interpret and compute asymptotic notations of an algorithm to analyze the consumption of resources (time/space).
- Identify appropriate data structure and algorithm for a given contextual problem and develop in C++.

UNIT I : LINEAR DATA STRUCTURES

9 Hrs

Stacks, - Queues - Implementation and Applications - Singly linked list-Doubly linked Lists-circular linked list-Applications

UNIT II : NON LINEAR DATA STRUCTURES

9 Hrs

Trees – Binary Trees – Binary Search Tree Implementation – Tree Traversals – AVL Trees

UNIT III : ALGORITHM ANALYSIS

9 Hrs

Sorting and Searching – Space Complexity - Time Complexity Linear and Binary Searching Analysis - Quick Sort - Heap Sort - Merge Sort - Selection Sort - RADIX Sort - Bubble Sort - Insertion Sort - Shell Sort - Analysis

UNIT IV : GRAPH ALGORITHMS

9 Hrs

Graph Operations – DFS – BFS - Minimum Cost Spanning Tree - Krushkal's Algorithm - Prim's Algorithm - Applications of Graphs

UNIT V : ALGORITHM DESIGN METHODS

9 Hrs

Greedy method – Shortest path – Divide and Conquer – Matrix Multiplication - Dynamic Programming - Back Tracking – Branch and Bound - NP Complete Traveling Sales Person Problem - N Queens Problem

Total No. of Hrs: 45

TEXT BOOKS

1. Horowitz, E. Sahani, S. Mehta (2007) *Fundamentals of Data Structures in C++*, Galgotia

REFERENCES

1. Weiss Mark Allen (2007) *Data Structures and Algorithm Analysis in C* (3rd ed.) Pearson Education
2. Horowitz, E. Sahni. Sanguthevar R. (2007) *Fundamentals of Computer Algorithms*, Galgotia Publications
3. Jean-Paul Tremblay. Paul G. S. (2007) *An Introduction to Data Structures with Applications* (2nd ed.) Tata McGraw-Hill
4. Sara B. Allen, Van, G. (2000) *Computer Algorithms* Galgotia



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BCS13002

INTRODUCTION TO OOPS WITH C++ AND JAVA

3 0 0 3

OBJECTIVES:

- The students will be able to distinguish OOPS features with procedural Oriented and analyze these features to a real world object,
- To analyze generic data type for the data type independent programming which relate it to reusability.
- To understand the concepts of Java programs and develop basic networking programs using Java.

UNIT I : BASIC CONCEPTS OF OOPS

9 Hrs

Programming methodologies - Object Oriented Concepts – Definition - Data members - Function members - Access specifiers – Constructors - Default constructors - Copy constructors – Destructors - Static members - Control statements - Basics of C++environment

UNIT II : INHERITANCE AND POLYMORPHISM

9 Hrs

Overloading Operators – Functions – Friends - Class derivation - Virtual functions - Abstract base classes - Multiple inheritance

UNIT III : TEMPLATES

9 Hrs

Class templates - Function templates - Exception handling - Streams

UNIT IV : JAVA PROGRAMMING

9 Hrs

Java environment - Classes-Definition - Fields-Methods - Object creation – Constructors - Overloading methods- Static members - This keyword - Nested classes - Extending classes

UNIT V : INHERITANCE AND EXCEPTION IN JAVA

9 Hrs

Inheritance - Member accessibility - Overriding methods - Abstract classes – Interfaces - Exceptions And Threads - Exception and errors - Exception classes - Runtime Exception - Uncompact Exception - Finally block – User defined Exceptions - Creating Threads - Controlling Threads

Total No. of Hrs: 45

TEXT BOOKS

1. Stanley, B. Lippman (2012) *The C++ Primer*, (5th ed.), Addison Wesley
2. H.Schildt (2008), *Java 2:The Complete Reference*, (6th ed.), Tata Mc Graw Hill

REFERENCES

1. Deitel and Deitel (2011) *C++ How to Program*, (8th ed.), Prentice Hall
2. Balagurusamy, E (2009) *Programming in java*, (4th ed.), Tata Mc Graw Hill
3. Ken Arnold and James Gosling (Reprint 2009) *The Java Programming Language*, (3rd ed.), Pearson Education
4. Stroustrup, B (2004) *The C++ Programming Language*, (3rd ed.), Pearson Education
5. Balagurusamy, E (2008) *Object Oriented Programming with C++*, (4th ed.), Tata Mcgraw Hill



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BMA13007

DISCRETE MATHEMATICS

3 1 0 4

OBJECTIVES:

- The aim of this course is to introduce the students the basic concepts.
- To solve problems on Discrete Mathematical structures.

UNIT I : LOGIC

12 Hrs

Statements – Truth Table – Connectives – Normal Forms – Predicate Calculus – Inference Theory

UNIT II : COMBINATORICS

12 Hrs

Mathematical Induction – Pigeon Hole Principle – Principle of Inclusion and Exclusion – Recurrence Relations – Generating Functions

UNIT III : GROUPS

12 Hrs

Basic Concepts – Groups – Subgroups – Homomorphism – Kernel – Cosets – Lagrange's theorem (simple theorems and problems)

UNIT IV : LATTICES

12 Hrs

Partial ordering – Posets – Hasse Diagram – Lattices – Properties of lattices – Sub lattices – Special lattices – Boolean Algebra (Definition and Simple Problems)

UNIT V : GRAPHS

12 Hrs

Introduction to Graphs – Terminology – Matrix representation of Graphs: Incidence matrix, Adjacency matrix – Graph Isomorphism – Connectivity – Euler and Hamiltonian Paths (simple theorems and problems)

Total No. of Hrs: 60

TEXT BOOKS

1. Veerarajan, T (2006) *Discrete Mathematics*, Tata McGraw Hill Publishing Co
2. Tremblay, J. P. Manohar, R (2004) *Discrete Mathematical structures with applications to Computer science*, Tata McGraw Hill Publishing Co

REFERENCES

1. Kolman. Busby. Ross (2008) *Discrete Mathematical Structures*, (6th ed.), Pearson
2. Kenneth, Rosen (2007) *Discrete Mathematics and its applications* (SIE), Tata McGraw Hill



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BCS13004

COMPUTER GRAPHICS & MULTIMEDIA

3 1 0 4

OBJECTIVES:

- The students will be able to transform geometrical structures
- To apply clipping methods on geometry, analyze a 3D structure, create and evaluate graphic projects.

UNIT I : BASICS

12 Hrs

Overview of graphics system - Video display devices - Raster scan system - Random scan system - Graphics monitor and workstation - Input devices - Hard copied devices - Graphic software

UNIT II : OUTPUT PRIMITIVES

12 Hrs

Output primitives-Line drawing algorithms-Loading the frame buffer-Line function-Circle generation -Ellipse generation curves-Filled area primitives .Attributes of output primitives-Line attributes-Curve attributes-Color and gray scale levels-Area fill attributes-Character attributes-Bundled attributes-Inquiry functions-Antialiasing

UNIT III : TWO DIMENSIONAL TRANSFORMATION & VIEWING

12 Hrs

Two dimensional transformation - Basic transformation - Matrix representations - Composite transformations - Other transformations - Affine transformation - Raster method for transformation Viewing pipeline - Coordinate reference frame - Window to view port transformation - Two dimensional viewing functions - Clipping operations - Point clipping - Line clipping – Cohen - Sutherland line Clipping – Liang - Barsky line Clipping - Polygon clipping: Sutherland - Hodgeman – Curve Clipping - Text Clipping - Exterior Clipping

UNIT IV : THREE DIMENSIONAL CONCEPTS AND TRANSFORMATION

12 Hrs

Three dimensional concepts - Three dimensional concepts - Three Dimensional Transformation - Visible Surface Detection Methods - Back Face Detection - Depth Buffer Method - Scan Line Method

UNIT V : MULTIMEDIA SYSTEM

12 Hrs

Introduction - Multimedia applications - Multimedia system architecture - Objects for multimedia systems - Compression and decompression - Types of compression - Binary image compression schemes - JPEG/MPEG

Total No. of Hrs: 60

TEXT BOOKS

1. Donald, D. Hearn. Pauline, Baker, M. Warren, Carithers. (2010) *Computer graphics with Open GL*, (4th ed.)
2. Koegel, Buford, JFK (2007) *Multimedia Systems*, ACM Press



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BEC13004

ELECTRICAL AND ELECTRONICS DEVICES

3 1 0 4

OBJECTIVES:

- The students will be able to understand the theory of semiconductor materials.
- To understand the basic operation and characteristics of semiconductor devices like Diodes, BJTs, FETs,
- To justify the basic applications of electronic devices like rectifier and amplifier,
- To classify different types of feedback amplifiers, oscillators and power amplifiers
- To understand the fundamentals of Analog and digital circuits, differentiate the AC and DC circuits.

UNIT I : DC CIRCUITS

12 Hrs

Introduction - v-i relationships of circuit parameters – Voltage source and current source - Kirchhoff's laws – Network reduction techniques – Mesh and Node analysis – Superposition theorem – Thevenin's theorem – Norton's Theorem – Maximum power transfer theorem

UNIT II : AC CIRCUITS

12 Hrs

RMS and average values of periodic waves – Form factor – phase and phase difference – RL, RC, RLC circuits – Parallel circuits – power and power factor – Introduction to three phase system – Solution of balanced three phase circuits – Power measurement of 3-phase system

UNIT III : SEMICONDUCTOR DEVICES

12 Hrs

Semiconductor – Materials - PN-Junction diode – BJT – FET - VI Characteristics – Rectifiers - Zener diode - Voltage regulators

UNIT IV : AMPLIFIERS AND OSCILLATORS

12 Hrs

Transistor biasing - CE, CB and CC – Amplifiers - Current gain - Voltage gain - Frequency response - Power amplifiers - Feedback Amplifiers – Oscillators - RC Phaseshift - Wein Bridge – Hartley - Collpit's analysis

UNIT V : ANALOG AND DIGITAL CIRCUITS

12 Hrs

Operational amplifier Ideal characteristics – Applications - Current to voltage - Voltage to current converters – Arithmetic circuit – Adder – Subtractor – Multiplier – Differentiator – Integrator - Inverting and Non-inverting amplifiers - Buffer - 555 Timer - Block diagram - Multivibrators

TEXT BOOKS

Total No. of Hrs: 60

1. Floyd (2005) *Electronic Device*, (7th ed.), Pearson Education
2. David, A. Bell (2009) *Fundamentals of Electronic Devices and Circuits*, (5th ed.), Oxford University Press
3. Sudhakar, Shyammohan (2010) *Circuits & Networks Analysis & Synthesis*, Tata McGraw Hill(unit 1 & 2)

REFERENCES

1. Milman, Halkias (2010) *Integrated Electronic*, TataMcgraw hill publication
2. Boyle stad Nashelsky (2009) *Electronic Devices and Circuit theory* , (10th ed.), PHI
3. Edminister. J. A. (2011) *Theory And Problems On Electric Circuits*, Pearson Education Publications



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BEC13007

DIGITAL ELECTRONICS

3 0 0 3

OBJECTIVES:

- The students will be able to analyze, build, and troubleshoot combinatorial circuits.
- To design sequential logic circuits, able to design adders, subtractors, able to design multiplexers
- To demonstrate the basics of programmable logic devices, will be able to analyze, build, and troubleshoot counters

UNIT I : NUMBER SYSTEMS

9 Hrs

Review of Binary, Octal And Hexadecimal Number Systems – Conversions - Binary - Arithmetic – Signed Magnitude form - 1's, 2's Complement Representation – Codes – BCD – Excess_3 - Grey Codes - ASCII Codes - Error Detecting Codes (hamming code) - Applications of Error Detecting Codes

UNIT II : BOOLEAN ALGEBRA

9 Hrs

Boolean Algebra – De Morgan's Law - Simplifications of Boolean Expression – Sum of Products and Product of Sums – Karnaugh Map(upto 5 variables) – Quince McClusky Method of Simplification (Including Don't care conditions)

UNIT III : COMBINATIONAL LOGIC

9 Hrs

Logic gates – AND – OR – NOT – NOR – NAND - EXOR – Combinational Logic - Arithmetic Circuits – Half adder – Full adder - Half Subtractor - Decimal Adder – Excess 3 Adder – Code Converters – Multiplexer – Demultiplexer - Encoder – Decoder – Design of General Combinational Logic Circuit – PAL – PLA - FPGA

UNIT IV : SEQUENTIAL LOGIC DESIGN

9 Hrs

Building Blocks Of Sequential Logic – RS - JK, Master-Slave – D - T Flip-Flop - Asynchronous - Synchronous Counters - Binary And Bcd Counters - Shift Registers –Basic Models Of Sequential Machines – Concept Of State Diagram - State Table – State Reduction - Design And Implementation Of Synchronous Sequential Circuits

UNIT V : LOGIC FAMILIES

9 Hrs

Characteristics Of RTL – DTL – TTL - Families – Schottky - Clamped TTL – ECL - IIL – Mos Inverters – Complementary Mos Inverters.IC Based Full Adder - IC Based Magnitude Comparator

Total No. of Hrs: 45

TEXT BOOKS

1. Charles H. Roth (2010) *Fundamentals of Logic Design* (6th ed.), Cengage learning
2. Godse. A.P. (2008) *Digital Logic:Application & Design* (1st ed.), Technical Publication

REFERENCES

1. Floyd (2005) *Digital Fundamentals* (8th ed.), Pearson Education Publication
2. Volnei A. P. (2008) *Digital Electronics and Design*, Elsevier Inc.
3. Albert. P., Malvino, Donald, P. L. (2009) *Digital Principles and Applications* (5th ed.) Lencoe Publications



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BCS13L02

DATA STRUCTURE USING C++ LAB

0 0 3 1

OBJECTIVE:

➤ To implement the following list of programs.

1. Implementation of Stack using arrays and pointers
2. Implementation of Queue using arrays and pointers
3. Implementation of Circular Queue (Using Arrays)
4. Single Linked List
5. Circular Linked List
6. Doubly Linked List
7. Evaluation of Expressions (Infix to postfix conversion & Evaluation of postfix expression)
8. Binary Tree Implementations And Traversals
9. Binary Search Trees
10. Quick Sort , Heap Sort and Merge sort
11. Bubble Sort & Radix Sort.
12. Merge & Selection Sort
13. Linear and Binary Search
14. Implementation of Breadth First Search and Depth First Search
15. Implementation of Graph traversals (BFS and DFS)



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BCS13L04

JAVA LAB

0 0 3 1

OBJECTIVE:

- To implement the following list of programs.
1. Basic Constructs – Input , output, Display default value of all primitive data types, use of operators, Control Statements – Write 3 programs for using these.
 2. Array operations.
 3. Concept of Generic class, Inheritance, Interface and Package
 4. To demonstrate static variables, methods, and blocks
 5. Reuse Class, Multiple inheritance in Java
 6. To create a file and write data into it using the methods Output Stream class.
 7. The concept of nested for loops and recursion
 8. Exception Handling
 9. Applets
 10. To accept specified number of characters as input and converts them into uppercase characters
 11. Creation of threads using runnable class.
 12. To check whether the given array size is negative or not.
 13. File Handling using Reader and Writer file.
 14. Application Programs using JAVA
 - a. simulate traffic lights
 - b. calculator using GridbagLayout.
 - c. Creates the Frame and implements MouseListener



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BEC13L21

DIGITAL ELECTRONICS LAB

0 0 3 1

OBJECTIVE:

➤ To implement the following list of programs.

1. Verification of Truth tables of Logic Gates
2. Characteristics of digital Logic families
3. Implementation of Boolean function
4. Adders / Subtractors
5. Multiplexers / Demultiplexers
6. Encoder / Decoders
7. Implementation of any general combinational logic circuit
8. Study of Flip – Flops
9. Study of Registers
10. Study of Counters
11. Implementation of any general sequential logic circuits
12. A to D Converters



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BCS13005

DATABASE MANAGEMENT SYSTEMS

3 0 0 3

OBJECTIVES:

- The students will be able to Select appropriate technique implemented over disks and files to allocate relations and conclude the best among, Develop a good query evaluation plan for evaluating user query, an access path and produce the tuples satisfying the constraints.
- Examine the generic architecture of Parallel and Distributed database systems , Differentiate the properties for concurrent execution of transactions, Illustrate the concepts of Object Database systems and explore the features of R DBMS and ODBMS.

UNIT I : FUNDAMENTALS OF DATABASE

9 Hrs

Introduction - Purpose of database systems – Data Abstraction -Data models – Instances and schemas – Data Independence – DDL – DML – Database user – ER model – Entity sets- keys – ER diagram – relational model – structure – relational algebra- relational calculus- views

UNIT II : SQL

9 Hrs

SQL - QBE - level – Basic Structure – various operations – relational database design – problems in the relational data base design – normalization – normalization using functional – Multivalued join dependence

UNIT III : FILE STRUCTURE, INDEXING & HASHING

9 Hrs

File and system structure – overall system structure – file transaction – data dictionary – indexing and hashing basic concepts and B+ tree Indices - static and dynamic hash functions

UNIT IV : SYSTEM IMPLEMENTATION TECHNIQUES

9 Hrs

Recovery and atomicity - Failures Classification and types – Transaction model and Log based recovery – Schedules - Serial and Non Serial types-Serialization of schedules and views - locks based protocols – time based protocols - Validation techniques

UNIT V : DISTRIBUTED DATABASES

9 Hrs

Distributed databases-Structures of distributed data bases –Tradeoffs in distributed the database –design of distributed the database –design of distributed database-Transparency and autonomy- distributed query proceeding- Recovery in distributed system –commit protocols – security and integrity violations –authorization and views security specifications –Encryption- Statistical databases

Total No. of Hrs: 45

TEXT BOOKS

1. Abraham, Silberschatz. Henry, F. K.. Sudharshan, S. (2010) *Database System Concepts* (6th ed.) Tata McGraw Hill, New Delhi

REFERENCES

1. Ramez, E. Shamkant, B. Navathe (2008) *Fundamentals of database systems* (5th ed.), Pearson Education
2. Date, C. J, (2012) *An Introduction to Database Systems* (8th ed.), Pearson Education



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BCS13006

SOFTWARE ENGINEERING

3 1 0 4

OBJECTIVES:

- The students will be able to identify and build an appropriate process model for a given project, analyze the principles at various phases of software development, translate a specification into a design.
- Identify the components to build the architecture for a given problem, all using an appropriate software engineering methodology.

UNIT I : IMPORTANCE OF SOFTWARE ENGINEERING

12 Hrs

Introduction - Computer Based System Engineering – Emergent System Properties – Systems and their environment – System modeling – The system engineering process – System procurement -Software Process – Software Process Models – Process iteration – Software specification – Software design and implementation – Software validation – Software evolution – Automated process support –Project Management – Management activities - Project planning – Project scheduling – Risk Management

UNIT II : SOFTWARE REQUIREMENTS

12 Hrs

Functional and non-functional requirements – User requirements – System requirements – The software requirements document – Requirements engineering Processes –Feasibility studies – Requirements elicitation and analysis – Requirements validation – Requirements management – System Models – Context models – Behavioral models – Data models – Object Models – CASE Workbenches – Software Prototyping Prototyping in the software process – Rapid prototyping technique – User Interface Prototyping

UNIT III : SOFTWARE DESIGN

12 Hrs

Architectural Design – System structuring – Control models – Modular decomposition – domain Specific architectures – Distributed systems architectures – Multiprocessor architectures – Client-Server Architectures – Distributed object architectures – CORBA Object-Oriented Design – Objects and object classes – Design Evolution – Real-time Software design – System design, Real-time executives –Monitoring and control systems – Data acquisition systems – Design with reuse – Component-based development – Application families – Design patterns – User Interface Design – Principles – User Interaction – Information Presentation – User Support – Interface Evaluation

UNIT IV : SOFTWARE QUALITY

12 Hrs

Quality management - Quality assurance and standards - Quality planning-Quality control - Software measurement and metrics - Process measurement - The SEI Process Capability Maturity Model - Process classification. Dependability – Critical systems – Availability and Reliability – Safety – Security

UNIT V SOFTWARE DEVELOPMENT AND TESTING

12 Hrs

Verification and Validation – Planning – Software inspections – Automated static analysis – Clean room Software Development – Software Testing – Defect Testing – Integration Testing – Object Oriented Testing – Testing Work benches

Total No. of Hrs: 60

TEXT BOOKS

1. Ian Sommerville (2008) *Software Engineering* (8th ed.) Pearson Education Asia

REFERENCES

1. Roger S. Pressman (2010) *Software Engineering: A Practitioner Approach* (7th ed.) McGraw hill Publications
2. Fairley (2001) *Software Engineering Concepts*, McGraw-Hill



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BCS13007

OPERATING SYSTEMS

3 0 0 3

OBJECTIVES:

- The students will be able to analyze the concepts of Operating System and process.
- Illustrate the Scheduling of a processor for a given problem instance, identify the dead lock situation and provide appropriate solution, analyze memory management techniques and implement page replacement Algorithm, understand the implementation of file systems and directories.

UNIT I : OS CONCEPTS

9 Hrs

Mainframe systems - Desktop systems - Multiprocessor systems - Distributed systems - Cluster Systems - Real time systems-Hardware Protection-System Components-Handheld Systems-Operating System Services-System Calls-System Programs-System Structure-Virtual Machines-System Design and Implementation

UNIT II : PROCESS MANAGEMENT

9 Hrs

Process concept-Process Scheduling-Operation on Process-Cooperating Processes- Inter Process Communication-Threads-Overview-Multithreading Models. CPU Scheduling-Basic Concepts-Scheduling Criteria-Scheduling Algorithms-Multiple-Processor Scheduling-Real Time Scheduling-Algorithm Evaluation

UNIT III : SYNCHRONIZATION AND DEADLOCKS

9 Hrs

Process Synchronization-The Critical Section Problem-Synchronization Hardware-Semaphores-Classical Problems Of Synchronization-Deadlocks-System Model-Deadlock Characterization-Methods of Handling Deadlocks-Deadlock Prevention-Deadlock Avoidance-Deadlock Detection-Recovery form Deadlock

UNIT IV : MEMORY MANAGEMENT

9 Hrs

Background-Swapping-Contiguous Memory Allocation - Address Translation - Paging - Segmentation - Segmentation with Paging. - Static Paging Algorithm -Dynamic Paging Algorithm - Virtual Memory management

UNIT V : FILE AND I/O MANAGEMENT

9 Hrs

Files And Secondary Storage Management: File Systems - File Concepts - Access Methods - Directory Structure - File System Mounting - File Sharing - Protection - File System Structure - File System Implementation - Recovery - Disk Structure - Disk Scheduling - Disk Management

Total No. of Hrs: 45

TEXT BOOKS

1. Silberschatz. Galvin. Gagne (2009) *Operating System Concepts* (8th ed.), John Wiley

REFERENCES

1. D.M.Dhamdhare. D. M. (2008) *Operating Systems*, (2nd ed.), Tata McGraw Hill
2. Charles Crowley (2005) *Operating Systems: A Design Oriented Approach*,Tata McGraw Hill
3. William Stallings (2008) *Operating Systems* (6th ed.) Prentice Hall of India



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BMA13012

PROBABILITY & LINEAR PROGRAMMING

3 1 0 4

OBJECTIVES:

- The students will be able to solve real time problems using Linear Programming
- To understand different testing hypothesis

UNIT I : PROBABILITY AND RANDOM VARIABLE

12 Hrs

Axioms of Probability – Conditional probability – Total probability – Baye’s Theorem – Random variable – Probability mass function – Probability density function – Properties – Moments (Definition and simple problems)

UNIT II : STANDARD DISTRIBUTIONS

12 Hrs

Binomial – Poisson – Geometric –Uniform – Exponential –Normal distributions

UNIT III : TESTING OF HYPOTHESIS

12 Hrs

Tests of Significance – Large Sample Tests – Mean – Proportions – Small Sample Tests – t – F – Chi_square Tests - Independence of Attributes - Goodness of Fit

UNIT IV : LINEAR PROGRAMMING

12 Hrs

Formulation of Linear Programming Problem – Standard form of LPP- Graphical Method -Simplex Method – Big M Method – Two Phase method

UNIT V : TRANSPORTATION AND ASSIGNMENT

12 Hrs

Formulation of Transportation Problem – North West Corner Method – Least Cost Method – Vogel’s approximation method – Optimality test – MODI Method – Degeneracy – Assignment problem – Hungarian Method – Travelling Salesman Problem

Total No. of Hrs: 60

TEXT BOOKS

1. Gupta S.C. Kapoor V.K.(2003) *Fundamentals of Mathematical Statistics*, S.Chand & Co
2. Veerarajan, T (2006) *Discrete Mathematics*, Tata McGraw Hill Publishing Co

REFERENCES

1. Singaravelu, (2008), *Probability and Random Processes*, Meenakshi Agency
2. Hamdy A. Taha, (2010) *Operations Research: An Introduction* (9th ed.), Pearson
3. Panneerselvam R. (2011) *Operations Research* (2nd ed.), PHI



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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

BEC13012

COMMUNICATION SYSTEMS

3 0 0 3

OBJECTIVES:

- The students will be able to understand the types of signals and noise in communication, design digital modulation systems, design transmitters and receivers for communication system
- To understand the coding techniques in communications.

UNIT I : SIGNALS & NOISE

9 Hrs

Periodic & Aperiodic Signals – Noise - External Noise – Thermal Agitation – Shot Noise – Noise Figure – Signal to Noise Ratio – Equivalent Noise Resistance

UNIT II : INTRODUCTION TO COMMUNICATION

9 Hrs

Basic Communication Systems – Need for Modulation in Communication Systems – Amplitude Modulation – Double Side Band Amplitude Modulation – Single Side Band and VSB Modulation – Modulators - Noise in Linear Modulators Noise in Linear Modulation Systems - FM Modulation

UNIT III : DETECTORS, TRANSMITTER AND RECEIVER

9 Hrs

AM Demodulators – FM Detector - AM Transmitter - FM Transmitter – SSB Transmitters - Broadband Transmitter and Receiver AM & FM Receivers - Communication Receivers - Integrated Circuit Based AM & FM Transmitter & Receiver

UNIT IV : MODULATION TECHNIQUES AND PULSE MODULATION

9 Hrs

Phase Modulation – Noise Triangle – Pre-Emphasis and De-Emphasis – Stereophonic FM Multiplex System – Comparison of WideBand and Narrow Band FM – AFC - Introduction – Sampling Theorem –Quantization, Quantization Error – PAM – PTM – PM - PCM – Telegraph

UNIT V : DIGITAL MODULATION & INFORMATION THEORY

9 Hrs

Introduction to Digital Modulation System – ASK – FSK – PSK - Transmitter and Receiver - Introduction- Information & Entropy - Source Coding Theor - Data Compaction - Discrete Memoryless Channel - Mutual Information Channel Capacity - Channel Coding Theory

Total No. of Hrs: 45

TEXT BOOKS

1. Roy Blake (2002) *Electronic Communication systems*, (2nd ed.) Thomson Learning
2. Wayne Tomasi (2004) *Electronic communications systems: fundamentals through advanced* (5th ed.), Pearson/Printice Hall
3. Simon Haykins (2008) *Principles of Communications* (3rd ed.) Wiley India Publications

REFERENCES

1. Taub & Schilling (2008) *Principles of Communication* (3rd ed.) Tata McGraw Hill Publications



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BEC13032

MICROPROCESSOR AND MICRO CONTROLLERS

3 0 0 3

OBJECTIVES:

- The students will be able to identify the basic element and functions of microprocessor
- To describe the architecture of microprocessor and its peripheral devices
- To demonstrate fundamental understanding on the operation between the Microprocessor and its interfacing devices

UNIT I : INTEL 16 BIT MICROPROCESSORS

9 Hrs

Register organization of 8086 – architecture - Min and Max Mode - Addressing Modes - physical memory organization – InstructionSet - I/O addressing Capability - special processor activities - Introduction to stack - stack structure of 808 - Interrupt and Interrupt service routines - Interrupt cycle of 8086 - Assembly level Programming

UNIT II : BASIC PERIPHERALS AND THEIR INTERFACING WITH 8086

9 Hrs

Interfacing I/O ports, programmable Peripheral interface – 8255 - Modes of operation of 8255 - Programmable Interval Timer (8253) - Programmable Interrupt controller (8259) - 8237 DMA Controller - USART -825 - Applications of 8085

UNIT III : MICROCONTROLLER

9 Hrs

8051 Microcontroller hardware –I/O pins - ports and circuits - External memory –Counters and Timers - Serial Data I/O –interrupts

UNIT IV : APPLICATIONS

9 Hrs

8051 Instruction set – Addressing Modes –Assembly Language Programming -8051 interfacing Lcd – ADC- Sensors - Stepper motors - Motors - Traffic light controls - Keyboard and DAC

UNIT V : 32 BIT MICROPROCESSORS

9 Hrs

Architecture of 80386 - addressing modes - Data types of 80386 - Real address mode of 80386 - protected mode of 80386 – Segmentation – Paging - Salient features of PENTIUM - Intel MMX Architecture - MMX data types

Total No. of Hrs: 45

TEXT BOOKS

1. Ray A.K. Bhurchandi K.M. (2011) *Advanced Microprocessors Peripherals, Architecture, Programming and Interface* , Tata McGraw Hill
2. Douglas Hall. Rao S. S. S. P. (2012) *Microprocessor and Interfacing* (3rd ed.), Tata McGraw Hill

REFERENCES

1. Ramesh S Gaoankar, (2000) *Microprocessor Architecture , programming and application with 8085* (4th ed.) Penram international publishing , New Delhi
2. Mohammed ali M. Janice Gillispie M.(2003) *The 8051 Microcontroller and Embedded systems*, Pearson Education Asia ,New Delhi



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BCS13L03

DBMS LAB

0 0 3 1

OBJECTIVE:

- To implement the following list of Programs.

I Program to learn DDL and DML commands

1. Creating a database, simple queries
2. Use of select statements for queries
 - A. AND, OR, NOT operations
 - B. Union intersection and join operations
3. Sorting and grouping
4. Nested queries using SQL
5. Built in functions in SQL
6. Update operations using SQL.
7. Use of index, creating views and querying in views

II Program to learn PL/SQL

- a. To create a cursor and work on that.
- b. To create PL/SQL code for Exception.
- c. To create PL/SQL code using control statement.
- d. To create PL/SQL code using sub programs.

III Visual Basic

Program to develop an application for

- a. Pay-roll processing
- b. Student evaluation system.
- c. Computerized quiz
- d. Income tax calculation
- e. Election processing system.



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BCS13L05

OPERATING SYSTEMS LAB

0 0 3 1

OBJECTIVE:

- To implement the following list of Programs.

1. Basic UNIX Commands
2. Shell Programming (such as database accessing)
 - Shell program 1
 - Shell program 2
 - Shell program 3
 - Shell program 4
 - Shell program 5
3. System Calls - Fork, Exec
4. Implementation of Scheduling Algorithms
5. IPC Using Message Queues, Pipes and Signals
6. Shared Memory and Semaphores
7. File Allocation Strategies - Best Fit & Worst Fit
8. Dining Philosopher's Problem
9. Bankers Algorithm
10. Page Replacement Strategies
11. Paging & Segmentation
12. File Systems

Resources Required:

Unix/LINUX, Telnet, C Compiler



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BEC13L22

MICROPROCESSOR AND PERIPHERAL INTERFACING LAB

0 0 3 1

OBJECTIVE:

- To implement the following list of Programs.

8085 Microprocessor:

1. Assembly language Programming for single byte, multibyte, addition and subtraction, multiplication and division

8086 Microprocessor:

2. Searching and sorting
3. Square and square root
4. Block Movement of Data

Interfacing:

5. Wave form generation using 8255 PPI
6. Keyboard Interfacing
7. Matrix display

Micro Controller Applications:

8. Traffic light controller
9. Stepper Motor Controller

PERIPHERALS LAB

10. Seven segment LED Display Routine.
11. Printer Interface.
12. Serial data transfer using COM port.
13. Data Acquisition System.
14. Floppy Disk Drive, Hard Disk Drive Mechanism



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BCS13008

SYSTEM SOFTWARE

3 0 0 3

OBJECTIVES:

- The students will be able to understand the concept of addressing modes in processors
- To understand the functions of loaders, linkers, microprocessors and compilers
- To design assembler, loader and linker

UNIT I : CPU SYSTEM CONCEPTS

9 Hrs

Basic concepts-Machine structure- Instruction formats – Addressing modes –Typical Architectures

UNIT II : ASSEMBLERS

9 Hrs

Functions – features – Machine dependent – Machine independent - Design options –OnePass – Multipass – Implementation – Examples

UNIT III : LOADERS AND LINKERS

9 Hrs

Functions – Features – Relocation – Program Linking – Linking Loader Implementation Automatic library search – Loader option – Linkage editors – Dynamic linking –Bootstrap loaders – Examples

UNIT IV : MACROPROCESSORS

9 Hrs

Functions – Macro parameters – Using labels – conditional macro expansion – Recursive Macro expansion – General purpose macro processors – Examples

UNIT V : COMPILERS AND UTILITIES

9 Hrs

Introduction to Compilers – Different phases of a compiler – Simple One pass Compiler, Code optimization techniques, System software tools, Implementation of editors – Debuggers

Total No. of Hrs: 45

TEXT BOOKS

1. Beck L. (2008) *System Software, An Introduction to System Programming* (3rd ed.), Pearson

REFERENCES

1. John R. L. (2003) *Linkers & Loaders* Morgan Kauffman
2. Aho A. V. Ravi S. Monica S. J. D. Ullman. (2007) *Compilers Principles, Techniques and Tools* (2nd ed.) Addison Wesley



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BCS13009

COMPUTER ARCHITECTURE

3 0 0 3

OBJECTIVES:

- The students will be able to understand the major components of a computer including CPU, memory, I/O and storage, understand the uses for cache memory,
- To understand a wide variety of memory technologies both internal and external,
- To understand the role of the operating system in interfacing with the computer hardware

UNIT I : GENERIC CPU FEATURES

9 Hrs

Basic structure of Computer Hardware-Von-Neumann Architecture-Functional units – Bus Structures - Instruction formats and types-Addressing modes - RISC Vs CISC

UNIT II : ARITHMETIC AND LOGIC UNIT

9 Hrs

Fixed point arithmetic operation-addition – subtraction – multiplication - division Floating point arithmetic operation-Design of ALU

UNIT III : PROCESSOR UNIT

9 Hrs

Data path implementation-Control unit-hardwired control - micro programmed control -, nano programming- Concepts of pipelining - Pipeline hazards

UNIT IV : MEMORY SYSTEM

9 Hrs

Memory hierarchy-Internal organization of RAM – ROM - Interleaved memory-Cache and associative memories-Virtual memory - Memory organization and cache coherence issues

UNIT V : INPUT/OUTPUT AND PERIPHERALS

9 Hrs

Accessing I/O devices – Programmed Input/Output -Interrupts – Direct Memory Access – IO Processor - Buses – Interface circuits – Standard I/O Interfaces (PCI, SCSI, USB) - I/O devices

Total No. of Hrs: 45

TEXT BOOKS

1. Hayes (2004) *Computer Architecture and Organization*, Tata McGraw Hill

REFERENCES

1. Carl Hamacher V. Zvonko G.V. Safwat G. Z. (2002) *Computer organization* (5th ed.),Tata McGraw Hill
2. Morris Mano (2007) *Computer System Architecture* (3rd ed.), Pearson Education



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BMA13018

NUMERICAL METHODS & OPTIMISATION TECHNIQUES

3 1 0 4

OBJECTIVES:

- The students will be able to apply numerical methods for computer applications
- To apply statistical methods to design a computer system
- To apply the probability distribution for computer application.

UNIT I : SOLUTION OF EQUATIONS

12 Hrs

Solution of Algebraic and Transcendental equations – Method of false position – Iteration method – Newton-Raphson method – Solution of Linear system of equations – Gauss Elimination method – Gauss-Jordan method – Iterative methods – Gauss-Jacobi method – Gauss-Seidel method – Matrix Inversion by Gauss-Jordan method

UNIT II : INTERPOLATION

12 Hrs

Newton forward and backward differences – Central differences – Stirling's and Bessel's formulae – Interpolation with Newton's divided differences – Lagrange's method

UNIT III : NUMERICAL DIFFERENTIATION AND INTEGRATION

12 Hrs

Numerical differentiation with interpolation polynomials – Numerical integration by Trapezoidal and Simpson's (both 1/3 rd & 3/8 th) rules – Two and three point Gaussian Quadrature formulae – Double integrals using Trapezoidal and Simpson's rules

UNIT IV : INVENTORY

12 Hrs

Elementary concepts – Static EOQ models: Classic EOQ model – EOQ with price breaks – Dynamic EOQ models: No setup model – Setup model

UNIT V : QUEUING

12 Hrs

Elementary concepts – Pure Birth and Death process – Single server Markovian models with infinite and finite capacity – Multi server Markovian models with infinite and finite capacity

Total No. of Hrs: 60

TEXT BOOKS

1. Veerarajan T. (2005) *Numerical Methods* Tata McGraw Hill Publishing Co
2. Sastry S.S. (2003) *Introductory Methods of Numerical Analysis*, Prentice Hall of India.

REFERENCES

1. Hamdy A. T.(2010) *Operations Research: An Introduction* (9th ed.), Pearson
2. Hillier, Lieberman (2005) *Introduction to Operations Research* (8th ed.) Tata McGraw Hill Publishing Co
3. Panneerselvam R (2011) *Operations Research*, (2nd ed.), PHI



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BCS13010

OBJECT ORIENTED SYSTEM ANALYSIS AND DESIGN

3 0 0 3

OBJECTIVES:

- The students can develop the skills to determine which processes and OOAD techniques should be applied to a given project
- To build use case diagrams by identifying use cases, actors and their relationships for a given application, differentiate Sequence & Collaboration diagrams
- To generate interaction overview diagrams working out the exact time constraints for behavior of the system.

UNIT I : OO CONCEPTS

9 Hrs

Object Orientation – System Development – Review of Objects- Inheritance – Object Relationship-Dynamic Binding –OOSD Life Cycle - Process – Analysis – Design –Prototyping – implementation – Testing – Overview of methodologies

UNIT II : METHODOLOGY AND MODELING

9 Hrs

OMT – Booch Methodology – Jacobson methodology – patterns – unified approach -UML –Use case – Class diagrams –Dynamic modeling

UNIT III : OBJECT ORIENTED ANALYSIS

9 Hrs

Use case model – Creation of Classes – Noun Phrase Approach – Responsibilities –Collaborators – Object Relationships – super Sub classes – Aggregation

UNIT IV : OBJECT ORIENTED DESIGN

9 Hrs

OO Design Axioms – Class Visibility – refining Attributes – Methods – Access layer – OODBMS – Table – Class Mapping view layer

UNIT V : TESTING

9 Hrs

Quality Assurance testing – inheritance & testing – test plan – usability testing –User satisfaction - testing

Total No. of Hrs: 45

TEXT BOOKS

1. Ali Bahrami (2008) *Object Oriented System Development* McGraw Hill international

REFERENCES

1. Craig Larman (2005) *Applying UML and Patterns: An Introduction to Object-Oriented Analysis and Design and Iterative Development* m(3rd ed.), Pearson
2. Grady Booch (2009) *Object oriented Analysis & design* ,Pearson Education India
3. Rambaugh J. Blaha M. P. W., Eddy F. Loresen W.(1997) *Object Oriented Modeling & design*, PHI
4. Joey F. G. Dinesh B. J. Valacich S. Jeffrey A. H. (2006) *OOSAD* (2nd ed.), Pearson



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BCS13011

ARTIFICIAL INTELLIGENCE

3 1 0 4

OBJECTIVES:

- The students will be able to solve problems using AI techniques
- To develop new games using AI techniques
- To guide the process of deducing information in a computational manner.

UNIT I : INTRODUCTION AND PROBLEM SOLVING

12 Hrs

Introduction– Intelligent agent – Types of agents – Agent Structure – Problem solving agents – Problem Formulation - Uninformed search strategies – Breadth first search – Uniform cost search – Depth first search – Depth limited search – Bidirectional search – Searching with partial Information

UNIT II : INFORMED SEARCH AND GAME PLAYING

12 Hrs

Informed search Strategies – A* Heuristic function – Hill Climbing – Simulated Annealing – Constraint Specification problem - Optimal decisions in games – Pruning - Imperfect decisions –Alpha-Beta pruning

UNIT III : KNOWLEDGE AND REASONING

12 Hrs

Knowledge based agent – The Wumpus world environment – First-order logic – Syntax and semantics – Inferences in FOL - Ontology – Forward and backward chaining – Resolution

UNIT IV : STRUCTURED KNOWLEDGE REPRESENTATION AND PLANNING

12 Hrs

Structured Knowledge Representation- Semantic nets- slots- Frames- Conceptual dependency- Scripts- Planning-the planning problem-planning with state space search-partial order planning-planning and acting –simple re-planning agent-fully integrated planning and execution

UNIT V : UNCERTAIN KNOWLEDGE REASONING AND LEARNING

12 Hrs

Non-monotonic reasoning- Probabilistic reasoning- Use of certainty factors- Fuzzy logic- Concept of Learning- Learning automation- Neural networks- Genetic Algorithms

Total No. of Hrs: 60

TEXT BOOKS

1. Stuart R. Peter N. (2010) *Artificial Intelligence A modern Approach*, Prentice Hall
2. Elaine R. Kevin K. (2008) *Artificial Intelligence* Tata McGraw Hill

REFERENCES

1. Tim Jones M. (2008) *Artificial Intelligence, A System Approach(Computer Science)*
2. Ben Coppin (2004) *Artificial intelligence illuminated*, Jones and Bartlett Learning



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BCS13012

COMPUTER NETWORKS

3 0 0 3

OBJECTIVES:

- The students will be able to design a protocol , to solve problems in network
- To understand how communication takes place in various mediums
- To understand how to construct large scale network

UNIT I : INTRODUCTION

9 Hrs

The uses of computer networks - Network hardware - Network software - Reference model - Example of networks - Network standardization - The physical layer - The theoretical basis for data communication - Guided Transmission media - Wireless transmission - Mobile telephone - Communication satellite

UNIT II : DATA LINK LAYER

9 Hrs

Data link layer design issues - Error detection and correction - HDLC –Channel access on links – SDMA – TDMA - FDMA – CDMA -Sliding window protocols - ETHERNET - 802.11, 802.16 - Bridges and Switches-Bluetooth

UNIT III : NETWORK LAYER

9 Hrs

Network layer design issues - Circuit switching – Packet switching – Virtual circuit switching-Routing algorithms – Congestion control algorithms - Internetworking- Network layer in Internet -IPV6

UNIT IV : TRANSPORT LAYER

9 Hrs

Transport layer design issues - Transport protocols - Simple transport protocol - Internet transport protocols UDP, TCP - Flow Control – Congestion control - Congestion avoidance

UNIT V : APPLICATION LAYER

9 Hrs

Domain name system - Electronic mail - World Wide Web - HTTP - SNMP – Telnet – FTP-RTP

Total No. of Hrs: 45

TEXT BOOKS

1. Andrew S. Tanenbaum (2010) *Computer networks* , (5th ed.),PHI

REFERENCES

1. William Stallings(2007) *Data and computer communications*,(8th ed.), Pearson Education India
2. Douglas E. Comer(2006) *Internetworking with TCP/IP-Volume-I*,(5th ed.), PHI
3. Larry L. Peterson, Bruce S. Davie(2011) *Computer Networks: A Systems Approach*,(5th ed.), Morgan Kaufmann Publishers Inc.,
4. Forouzan B. A.(2007) *Data Communications and networking*,(4th ed.), TMH 2007



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BCS13L06

SYSTEM SOFTWARE LAB

0 0 3 1

OBJECTIVE:

- To implement the following list of Programs

USING C:

1. Symbol table and operations.
2. Assembler (Single and Two Pass)
3. Single pass assembler.
4. Macro Processor (Single and Two Pass)
5. Implementation of Absolute loader, Relocating loader.
6. Direct-Linking Loader (Pass one and two)
7. Simple text editor with useful features for text operation
8. Symbol table implementation using hashing.



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BCS13L07

SOFTWARE SYSTEM DEVELOPMENT LAB

0 0 3 1

OBJECTIVE:

- To develop a mini-project following the exercises listed below.
- 1. Develop a problem statement.
- 2. Develop an IEEE standard SRS document.
- 3. Identify Use Cases and develop the Use Case model.
- 4. Identify the business activities and develop an UML Activity diagram.
- 5. Identify the conceptual classes and develop a domain model with UML Class diagram.
- 6. Using the identified scenarios find the interaction between objects and represent them using UML Interaction diagrams.
- 7. Identify the User Interface.
- 8. Implement the system

EXERCISES

- A. Online Railway reservation system
- B. Student Mark Analysis system
- C. Payroll processing application
- D. Inventory system
- E. Quiz system
- F. Automating the Banking process
- G. Course Registration System
- H. Library management system
- I. Passport Automation System

SOFTWARE REQUIRED:

Languages: C/C++/JDK 1.3, JSDK, WEB BROWSER & UML
Any Front End Tools (Like VB, VC++, Developer 2000)
Any Back End Tools (Like Oracle, MS-Access, SQL, DB2)
Modelling and Design : Rational Rose



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BCS13L08

NETWORK PROGRAMMING LAB

0 0 3 1

OBJECTIVE:

- To implement the following list of Programs
1. Socket program for Echo/Ping/Talk commands.
 2. Create a Socket (TCP) between two computers and enable file transfer between them.
 3. To implement remote command execution (two m/c's can be used).
 4. Create a socket (UDP).
 5. Port simulating ARP/RARP.
 6. Create a socket for HTTP for web page upload and download.
 7. File transfer in Client-Server architecture using following methods
 - a) Using RS232C
 - b) Using TCP/IP
 8. To implement RMI (Remote Method Invocation)
 9. Perform a case study about different routing algorithms to select the network path with its optimum and economical during data transfer
 - a) Shortest path routing
 - b) Flooding
 - c) Broadcast /Multicast routing
 10. Demonstration of Network Simulators.



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BEN13L01

CAREER & CONFIDENCE BUILDING (SOFT SKILLS - I)

0 2 0 2

OBJECTIVES:

➤ **To Improve:**

1. Behavioural Patterns and Basic Etiquette
2. Value System
3. Inter Personal Skills
4. Behaving in Corporate Culture
5. Self Awareness / Confidence
6. Managing Self and Personality Styles including Body Language
7. International Culture / Cross Cultural Etiquette

UNIT I :

6 Hrs

Creation of awareness of the top companies / different verticals / courses for improving skill set matrix, Industry expectations to enable them to prepare for their career - Development of positive frame of mind - Avoiding inhibitions - Creation of self awareness - Overcoming of inferiority/ superiority complex

UNIT II :

6Hrs

Selection of appropriate field vis-a-vis personality / interest to create awareness of existing industries, Preparation of Curriculum Vitae - Objectives, profiles vis-a-vis companies

UNIT III :

6Hrs

Group discussions - Do's and Don'ts - handling of Group discussions – What evaluators look for! Interpersonal relationships - with colleagues - clients - understanding one's own behaviour - perception by others - How to work with persons whose background, culture, language / work style different from one's, behaviour pattern in multi-national offices

UNIT IV :

6Hrs

Interview - awareness of facing questions - Do's and Don'ts of personal interview / group interview, Enabling students prepare for different procedures / levels to enter into any company - books / websites to help for further preparation, Technical interview - how to prepare to face it, Undergoing employability skills test

UNIT V :

6Hrs

Entrepreneurship development - preparation for tests prior to the interview - Qualities and pre-requisites for launching a firm

Total No. of Hrs: 30



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BCS13013

MODELLING AND SIMULATION FOR ENGINEERS

3 0 0 3

OBJECTIVES:

- The students will be able to demonstrate an in-depth understanding of discrete simulation modelling and its benefits in manufacturing industry
- To build relevant factory simulation models using the latest software system, apply simulation modelling techniques

UNIT I : BASICS OF MODELLING AND SIMULATION

9 Hrs

From Formula to Program - Just Plug It In - Surface Area of a Sphere- Arithmetic expressions – assignment – input - output -Check and Evaluate -Minimum of a Quadratic on an Interval - Boolean expression – conditionals - Limits and Error - Tiling a Disk Summation - for-loop - Inside/Outside Polygons Sequences - while-loop - Approximation with Fractions - Counting, Proximity to P - Nested loops - benchmarking - Fibonacci Quotients and the Golden Ratio

UNIT II : THE DISCRETE VERSUS THE CONTINUOUS

9 Hrs

Plotting continuous Functions- Vectors - elementary graphics - Color Computations. Abstraction - Reshaping Rectangles - Ellipse Perimeter - A Square and a Root - Simple functions - Oval Odometer Ellipse Perimeter Functions with multiple input parameters - Design parameters, The Betsy Ross Problem Design Parameters Randomness -Safety in Numbers - Monte-Carlo Simulation

UNIT III : THE SECOND DIMENSION

9 Hrs

Transition Matrices. Two-dimensional arrays - Contours and Cross Sections-Visualizing F(x,y). Contour plotting-Simulation on a Grid. Reordering: The Perfect Shuffle- Points - Polygons, and CircleS - Distance metrics - Simple structure-Intersection

UNIT IV : SEARCHING

9 Hrs

Linear Search- Character arrays - Binary Search - Cell arrays - Bisecting for Roots Functions as parameters - Text File Processing - Data Acquisition and Conversion - Reading data from a text file - Writing and Representation - Creating .dat and .bin files - The Matrix - Linear Interpolation and Color Mapping – row by row matrix setup-Bilinear Interpolation and Shading - Image Digitization -Cell arrays of matrices - Working with Image Data Files – imread - imwrite

UNIT V : APPLICATIONS USING MATLAB

9 Hrs

Acoustic File Processing Acquisition and Playback, wavread, sound, wavwrite, Frequency and Sampling, Divide and Conquer: Recursive Tiling, Recursive functions, Merge Sort. Optimization - Shortest Route, Constraints and Objective Functions

Total No. of Hrs: 45

TEXT BOOKS

1. Van,, Loan, C. F. Fan, K.Y.D (2009) *Insight Through Computing: A Matlab Introduction to Computational Science and Engineering* SIAM Publication

REFERENCES

1. Brian R. Hunt Ronald L. Lipsman Jonathan M. Rosenberg with Kevin R. C. John E. O., and Garrett, J. S. (2001) *A Guide to MATLAB for Beginners and Experienced Users*, Cambridge University Press
2. Andrew Knight Chapman & Hall (2000) *Basics Of Matlab and Beyond* , CRC Press
3. Kermit S. Timothy A. D. Chapman & Hall, (2002) *MATLAB Primer* (6th ed.), CRC Press Company



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BCS13014

PRINCIPLES OF COMPILER DESIGN

3 0 0 3

OBJECTIVES:

- The students will be able to describe the design of a compiler including its phases and components
- To develop a large, complex, but well-structured software system that implements various phases of a compiler such as the scanner, parser, code generator, and optimizer
- To identify the similarities and differences among various parsing techniques and grammar transformation techniques.

UNIT I : COMPILER ORGANISATION

9 Hrs

Compilers-Analysis of source program-Phases of a Compiler- Cousins of Compiler- Grouping of phases-Computer Language Representation—Compiler Construction Tools

UNIT II : LEXICAL ANALYSIS

9 Hrs

The role of the lexical analyzer-Input Buffering-Token Specification-Design of lexical analyzer-Finite Automata-A language for specifying lexical analyzers-Recognition Machine - Error Recovery-Top down Parsing principles

UNIT III : SYNTAX ANALYSIS

9 Hrs

Parsing-Context Free Grammars-Writing a Grammar-Top-down Parsing- Implementation - Bottom-up Parsing - LR Parsers - Parser Generator(YACC)

UNIT IV : INTERMEDIATE CODE GENERATION

9 Hrs

Intermediate Code generation-Intermediate Languages - Declarations - Flow Control Statements -Backpatching-Procedure Calls – Symbol Table

UNIT V : CODE GENERATION

9 Hrs

Introduction to Code Generation-Issues in the design of a code generator-Run Time storage management-The Dag representation of basic blocks-introduction of Code Optimization-Run Time Environments

Total No. of Hrs: 45

TEXT BOOKS

1. Alfred V.Aho Ravi Sethi, Jefferey D.Ullman,Monica S Lam (2007)*Compiler Principles,Techniques and Tools* (2nd ed.), Pearson Education

REFERENCES

1. Chattopadhyay Santanu, (2007) *Compiler Design* PHI.
2. Allen Holub I. (2007) *Compiler Design in C*, PHI
3. V Raghavan (2009) *Principles of compiler*, Tata Mc Graw Hill
4. Kenneth C Loudon (2003) *Compiler Construction Principles & Practice* Thompson learning



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BCS13015

WEB TECHNOLOGY

3 0 0 3

OBJECTIVES:

- To understand hypertext markup language, specialized commands and tags for WWW documents
- To specify hyperlinks, lists, paragraph and attributes, design web pages for various applications

UNIT I : HTML

9 Hrs

Introduction – Network concepts – Web concepts – Internet addresses – Retrieving data with URL – HTML – Multimedia components – Frames – Form and its objects – Image maps – DHTML – Cascading / Style sheets

UNIT II : XML TECHNOLOGY

9 Hrs

XML – Benefits – Advantages of XML over HTML – XML based standards – Structuring XML document using DTD – Schemas – XML parsers – DOM – SAX presentation technologies – XSL – XFORMS – XHTML – Transformations – XSLT – XLINK – XPATH – Xquery

UNIT III : CLIENT SIDE SCRIPTING

9 Hrs

Java Script – Advantages – Data types – Variables – Operators – Control statements – Functions – Objects and arrays – Windows and frames – Forms.AJAX – XMLHttpRequest (XHR) – Create Object – Request – Response – Ready state. Introduction – jQuery - E4X

UNIT IV : SERVER SIDE SCRIPTING

9 Hrs

ASP – Need for ASP – Introduction to ASP objects – Response – Request – Server – Session – File access – Working with ASP components like Ad rotator – Content linking and Rotator – Displaying browser Capabilities and counters – Sending mails – Accessing database – PHP – Introduction Forms – Sending a mail

UNIT V : WEB APPLICATIONS

9 Hrs

Web Applications – Security – Database access and mapping – Web template system – Web services – SOA – SOAP – WSDL – UDDI

Total No. of Hrs: 45

TEXT BOOKS

1. Paul, J. Deitel. Harvey, M. Deitel. Abbey, Deitel. (2011) *Internet & World Wide Web: How to Program* (5th ed.), Pearson

REFERENCES

1. Heather Williamson (2008) *The Complete Reference XML*, (11th reprint) Tata McGraw Hill
2. Thomas A. Powell (2001) *HTML: The Complete Reference* (3rd ed.) Osborne/McGraw Hill
3. Thomas Powell. Fritz Schneider. (2008) *The Complete Reference – Java Script* (2nd ed. 8th reprint)
4. Eric Ladd. Jim O'Donnell, (2001) *Using HTML 4, XML and Java*, QUE
5. Leon Shklar, Rich Rosen (2004) *Web Application Architecture: Principles, Protocols, and Practices* (2nd ed.) John Wiley & Sons
6. Russell, Jones, A. (2009) *Masteering Active Server Pages 3*, Wiley India Pvt. Limited



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BCS13016

ADVANCED JAVA PROGRAMMING

3 1 0 4

OBJECTIVES:

- The students will be able to demonstrate the breadth knowledge across Java programming
- To develop advanced java programs using JDBC connectivity
- To create projects using java beans, graphics, RMI and struts.

UNIT I : JAVA BASICS REVIEW

12 Hrs

Java Streaming - Components and Events Handling - Threading Concepts –Byte Code Interpretation - Java Native Interfaces - AWT/Swing Programming

UNIT II : ADVANCED NETWORKING AND BEANS

12 Hrs

Networking Features - Client-Server computing – Sockets - secure sockets – custom sockets –UDP datagrams – multicast sockets - URL classes – Reading / Writing Data from the server – writing data -Developing Distributed Applications - RMI - Remote Objects – Object Serialization - Bean Concepts - Events in Bean Box - Bean customization and persistence

UNIT III : JAVA DATABASE PROGRAMMING

12 Hrs

Connecting to Databases - JDBC principles - Databases access - Database Support in Web applications - Using BLOB and CLOB objects – storing Multimedia data into databases – Multimedia streaming applications – Java Media Framework

UNIT IV : WEB BASED JAVA

12 Hrs

Server Side Programming – Servlets – Java Server Pages - Struts – MVC framework, Advanced Java Scripting Techniques

UNIT V : ENTERPRISE APPLICATIONS

12 Hrs

Server Side Component Architecture – Introduction to J2EE – Session Beans – Entity Beans – Persistent Entity Beans – Transactions- JAR File Format and Creation

Total No. of Hrs: 60

TEXT BOOKS

1. Herbert Schildt (2011) *JAVA Complete Reference* (8th ed.) (UNIT I and UNIT II)
2. Herbert Schildt (2007) *J2EE Complete Reference* (UNIT III)
3. McGovern et al (2011) *J2EE 1.4 Bible*, Wiley India(UNIT IV and UNIT V)

REFERENCES

1. Patrick Naughton (2003) *COMPLETE REFERENCE: JAVA2* Tata McGraw-Hill
2. Keogh (2002) *J2EE The Complete Reference*
3. Web reference: <http://java.sun.com>.



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BCS13L09

MODELLING AND SIMULATION LAB

0 0 3 1

OBJECTIVE:

- To model and simulate the following list of programs
- 1. Use built in functions : drawRect, drawDisk, and drawStar
- 2. Calculate Perimeter of Ellipse , Surface area of a sphere
- 3. Draw Different Shapes - Polygons, Circles and rectangles
- 4. Do Calculations:
 - (i) Average 10 numbers from user input
 - (ii) Calculate Each Student total for 6 subjects from user input
- 5. Sort an array of objects using matlab commands and sort algorithms (Merge Sort and Insertion Sort)
- 6. Draw a (i) sequence of nested stars (ii) frame on the edge of a grayscale jpeg image
- 7. Implementation of plot comparison (i).One point at a time, (ii).using vectors of x and y values
- 8. Find min of $q(x)=x^2+bx+c$ given b, c and random L,R
- 9. Simulate a 2D random walk in an $(2N+1)$ -by- $(2N+1)$ grid and animate
- 10. Implement the conversion of a color image to grayscale image
- 11. Estimate the average length of the short piece
- 12. Demonstrate 3 disks fading from yellow to black, White to black
- 13. Draw 1-by-1 black background squares and animate the movement with random
- 14. Demonstrate Linear Interpolation and Color Mapping
- 15. Read data from a text file and print it on screen
- 16. Implement the recursive function



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BCS13L10

COMPILER DESIGN LAB

0 0 3 1

OBJECTIVE:

- To implement the following list of programs
- 1. Lexical analyzer in “C”.
- 2. Constructing NFA from a regular expression
- 3. Constructing DFA from a regular expression
- 4. To eliminate Left Factoring
- 5. Constructing top down parsing table
- 6. Shift-reduce parsing algorithm
- 7. Operator-Precedence parsing algorithm
- 8. Constructing LR-Parsing table
- 9. Generate a code for a given intermediate code
- 10. Generate Machine code.

Software Required: Turbo C



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BCS13L11 VALUE ADDED TRAINING PROGRAMME / THREE TIER APPLICATION PROJECT 0 0 2 1

OBJECTIVE:

- The students are expected to take up an application project for any real life scenario

Having acquired the core competency in the Computer science domain over the last 6 semesters, the students are expected to take up an application project for any real life scenario and provide a solution for the same . The implantation is expected to be based on a 3 tier architecture design.

For the award of the 1 credit the students are expected to demonstrate the project. The evaluation for this credit will be carried out in the first week of 7th Semester so that the students can do detailed work utilizing the end semester holidays of 6th semester.

The allotted faculty can provide guidelines and consultation on a weekly basis.

Any Value adding training Program of Industry Standard can be considered in lieu of project for awarding credits



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BCS13L12

WEB TECHNOLOGY LAB

0 0 3 1

OBJECTIVE:

- To implement the following list of programs
1. Basic HTML Coding
 - a. Create a website using basic HTML Codes
 - b. Create a Web page using Cascading Style Sheet
 2. Program using JavaScript and DHTML to validate the following in a form.
 - a. Email, user profile, user login, registration, age, Date, payment options, Password, mobile number
 3. Write a Java Program to get Date and Time from the server using TCP/UDP.
 4. Write an XML file which will display information about a Book. The information includes:
1) Title of the book 2) Author Name 3) ISBN number 4) Publisher name 5) Edition 6) Price
 5. Write a java program to create applets with the following features.
Create a color palette with matrix of buttons.
 - a) Set background and foreground of the control text area by selecting a color from color palette.
 - b) In order to select foreground or background use checkbox controls as radio buttons.
 - c) To set background images.
 6. Install TOMCAT Web Server and APPACHE
 - a. To write java servlet program to conduct online examination and to display student mark list available in a database.
 - b. Publish Examinations Result in web.
 7. Write a JSP program to create an online shopping cart. (Online book store)
 8. Create a website using the following ASP components
ASP AdRotator
ASP BrowserCap
ASP Content Linking
ASP Content Rotator



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BEN13L02

QUALITATIVE/ QUANTITATIVE SKILLS (SOFT SKILLS-II) 0 1 1 2

PURPOSE

The purpose of this course is to build confidence and inculcate various Soft skills and to help Students to identify and achieve their personal potential at the end of this training program the participant will be able to, explain the concept of problem solving

- Outline the basic steps in problem solving
- List out the key elements
- Explain the use of tools and techniques in problem solving
- Discuss the personality types and problem solving techniques.
- By adapting different thinking styles in group and lean environment.
- Recognizing and removing barriers to thinking in challenging situations.
- Make better decision through critical thinking and creative problem solving.

METHODOLOGY

The entire program is designed in such a way that every student will participate in the class room activities. The activities are planned to bring out the skills and talents of the students which they will be employing during various occasions in their real life.

1. Group activities + individual activities
2. Collaborative learning
3. Interactive sessions
4. Ensure Participation
5. Empirical Learning

UNIT I :

Self Introduction- Narration – Current News Update – Numbers – Height & Distance – Square & Cube Roots

UNIT II :

Current Tech Update – Verbal Aptitude Test 1 – GD – 1 Odd man out series – Permutation & Combination – Problems on ages

UNIT III :

GD –II – Resume Writing – Mock Interview I / reading comprehension

UNIT IV :

Mock Interview II / reading comprehension – Mock Interview III / reading comprehension – GD – III – Ratio & Proportion – Clocks – H.C.F. & L.C.M

UNIT V :

GD – IV – Verbal Aptitude Test II – Review – Partnership – Puzzles – Test

Total No. of Hrs: 30

REFERENCES

1. Pushplata, Sanjay Kumar (2007) *Communicate or Collapse: A Handbook of Effective Public Speaking Group Discussions and Interview*, Prentice – Hall, Delhi
2. Thorpe, Edgar (2003) *Course in Mental Ability and Quantitative Aptitude*, TMHI
3. Thorpe, Edgar (2003) *Test of Reasoning*, Tata McGraw-Hill
4. Prasad, H.M (2001) *How to prepare for Group Discussion and Interview*, TMH
5. Career Press Editors (2003) *101 Great Resumes*, Jaico Publishing House
6. Agarwal, R. S.(2004) *A Modern Approach to Verbal and Non- Verbal Reasoning*, S. Chand & Co.
7. Mishra Sunita and Muralikrishna (2004) *Communication Skills for Engineers* (1st ed.) Pearson



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BCS13018

DATA WAREHOUSING AND DATA MINING

3 1 0 4

OBJECTIVES:

- The students will be able to characterize a data mining system to examine the given database with an architecture
- To improve the data quality by performing data preprocessing routines, conclude patterns, associations and correlations among real world data instances

UNIT I : DATA WAREHOUSING

12 Hrs

Introduction to Data Warehousing- Advantages- What makes Data Warehousing a reality- Data warehousing Components-Building a Data Warehouse-mapping Data Warehouse to a Multiprocessor-Architecture-DBMS Schemas for Design Support

UNIT II : ETL AND BUSINESS TOOLS

12 Hrs

Data Extraction-Cleaning and Transferring tools- Meta data. Reporting and Query tools and Application-OLAP- Patterns and Models- Statistics

UNIT III : DATA MINING

12 Hrs

Introduction – Data – Types of Data – Data Mining Functionalities – Interestingness of Patterns – Classification of Data Mining Systems – Data Mining Task Primitives – Integration of a Data Mining System with a Data Warehouse – Issues –Data Preprocessing.- Data Cleaning –Missing Values-Noisy Data-Inconsistent Data-Data Integration and Transformation-Data Reduction -Dimensionality Reduction – Evaluation criteria of Various Mining Techniques

UNIT IV : ASSOCIATION RULE MINING AND CLASSIFICATION

12 Hrs

Mining Frequent Patterns, Associations and Correlations – Mining Methods – Mining Various Kinds of Association Rules – Constraint Based Association Mining – Classification and Prediction - Decision Tree Induction - Entropy and Classification Algorithms -Bayesian Classification – Rule Based Classification

UNIT V : CLUSTERING TECHNIQUES

12 Hrs

Cluster Analysis - Types of Data – Categorization of Major Clustering Methods - Kmeans – Partitioning Methods – Hierarchical Methods - Density-Based Methods –Grid Based Methods – Model-Based Clustering Methods – Clustering High Dimensional Data - Constraint – Based Cluster Analysis – Outlier Analysis –Genetic Algorithm For Mining - Data Mining Applications

Total No. of Hrs: 60

TEXT BOOKS

1. Alex Berson-Stephen. J.Smith, (2006) *Data warehousing-Data Mining & OLAP*, TMH
2. Jiawei Han and Micheline Kamber (2011) *Data mining concepts and techniques*, Morgan Kaufmann Publishers

REFERENCES

1. Arun K Pujari (2002) *Data Mining Techniques*, Universities Press (India) Ltd.
2. Sam Anahory, Dennis Murry (2004) *Data Warehousing in the real world*, Pearson Education
3. Margaret H. Dunham (2006) *Data Mining: Introductory and Advanced Topics*, Pearson



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BMG13003

PRINCIPLES OF MANAGEMENT

3 1 0 4

OBJECTIVES:

- The students will have a clear understanding of the managerial functions like planning, organizing, staffing, leading and controlling
- To gain some basic knowledge on international aspect of management , Understand and discuss Business case studies and characterization

UNIT I : FOUNDATIONS OF MANAGEMENT

12 Hrs

Definition, Principles of Management – Nature, Scope, Functions of Management, Management – Science /Art/Profession. Managers Vs Entrepreneurs – Managers Vs Leaders, Types of Business Organization, Guidelines for Managerial Excellence and Success

UNIT II : PLANNING

12 Hrs

Management Practice –Steps involved in Planning, Planning Premises, Strategy and Tactics –Implementation - Organizing, Co – ordination, Controlling – Management process, Decision-making

UNIT III : ORGANIZING

12 Hrs

Nature and purpose-Formal and informal organization-Resistance – Standards – Budget – Program – MBO/SWOT – MBE –Organizational Structure and Design – Authority & Responsibility , Relationship – Delegation –Line and Staff authority-Staffing- Selection Process- HRD – Conflicts

UNIT IV : DIRECTING AND CONTROLLING

12 Hrs

Nature of Evaluation, Designs of problems – Appraising Techniques – Compensation plans – Direction – Leadership-Types of Leadership Motivation-Hierarchy of needs-Co-Ordination – Quantitative and Qualitative measures of Control – Feedback of Management. System and process of Controlling - Requirements for effective control - Control of Overall Performance - Direct and Preventive Control – Reporting

UNIT V : CONTEMPORARY MANAGEMENT ISSUES

12 Hrs

The Global Environment - Globalization and Liberalization - International Management and Global theory of Management. Enhanced Technology Management – Social Responsibility – Managing Innovation – Stress Management

Total No. of Hrs: 60

TEXT BOOKS

1. Harold Kooritz & Heinz Weihrich (2006) *Essentials of Management*, Tata McGraw-Hill
2. Tripathy PC And Reddy PN (2008) *Principles of Management*,(4th ed.) Tata McGraw-Hill

REFERENCES

1. Stephen P. R.(2012) *Fundamentals of Management : Essential Concepts and Applications*, (8thed.) Prentice Hall
2. L. M. Prasad (2008) *Principles and Practice of Management*, Sultan Chand & Sons
3. Koontz (2004) *Principles of Management*, McGraw Hill Education



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BCS13L13

DOT NET LAB

0 0 3 1

OBJECTIVE:

- To implement the following list of programs

C# .NET

1. Implementation of Operator Overloading
 - a. Complex Number
 - b. Matrix
 - c. Time(+,-)
2. Implementation of Multiple Inheritance
 - a. Employee
 - b. Area of an Object
3. Implementing Multithreading

VB .NET

4. Designing a Calculator
5. Implement File Handling(Read,Delete,Modify)
6. Implement Exception Handling
 - a. Voter problem
 - b. Student Status
7. Event Handling – Mouse Click,Button click

ASP .NET

8. Super Market
9. Hotel Management System

ADO. NET

10. Student Attendance Calculation
11. Hospital management System

WEB SERVICE

11. Income tax calculation



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BCS13L14

COMPREHENSION / FOREIGN LANGUAGE CERTIFICATION

0 0 3 1

OBJECTIVES:

- The objective of comprehension is to provide opportunity for the student to apply the knowledge acquired during the academic program to real – life problems which he/she may have to face in future as an engineer.

Therefore the students are to be guided for objective and Technical interview for prospective placement or higher studies. This may be carried out through practice problems based on various subjects. Weekly 2 hours may be allotted for this purpose.

The end semester examination be conducted as objective type for 100 marks , inclusive of core subjects and technologies .

Any Foreign Language Certification obtained on languages like French,German , Japanese etc can also be considered for awarding the 2 credits.



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BCS13L15

PROJECT (PHASE – I)

0 1 3 2

OBJECTIVES:

- Able to do main projects in their respective domain

B.Tech CSE Project carries 8 credits of which , Phase I carries 2 credit. In Phase I ,Students are expected to

- (i) Identify a Problem.
- (ii) Have the feasibility explored.
- (iii) Freeze the Requirement specification (both user and system).
- (iv) Construct the architectural model(as many as required).
- (v) Design the solution.



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BCS13L16 FREE AND OPEN SOURCE SOFTWARE (FOSS) LAB

0 1 3 1

OBJECTIVE:

- To implement the following list of programs

S.NO NAME OF THE EXPERIMENT

1. LINUX INSTALLATION AND BASIC OPERATION
2. MYSQL INSTALLATION AND BASIC COMMANDS
3. PHP –DESIGN A WEBPAGE
4. PHP AND MYSQL CONNECTIVITY
5. PYTHON PROGRAMMING

1. Getting started with Linux, learn basic Commands and directory structure, execute file and directory operation. (1 session)
2. Learn the basic commands to execute the operation. (2 sessions)
3. MY SQL Installation and basic commands to execute the operation. (2 session)
4. To Create Login Page using PHP for Conference Announced (2 sessions)
5. To create a login form and test the connectivity with MYSQL for a application like registration for a conference organizer. (3 sessions)
6. Get started with Python, learn the basic types and control flow statements.

Python Programs (4 sessions)

- a. String Concatenation in python programming
- b. Write a python program to perform function in Lists
- c. Write a python program to perform functions in tuples
- d. Write a python program to perform functions in Dictionary.
- e. Write a python Program to select odd number from the lists
- f. Conditional statement in Python
- g. For Statement in Python
- h. Prime Number using Python.



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BMG13004

ENTREPRENEURSHIP DEVELOPMENT

3 1 0 4

OBJECTIVES:

- The students will be able to plan business, financial control, marketing skills, joint ventures
- To demonstrate an understanding of the functional areas of accounting, marketing, finance, management, and economics
- To demonstrate an understanding of the legal and social environment of business
- To demonstrate an understanding of the global environment of business

UNIT I

12 Hrs

Entrepreneur – Traits and types, Creating and starting the venture – Sources of new ideas, Methods of generating ideas, Product planning and development process and establishing evaluation criteria

UNIT II

12 Hrs

Business plan – Marketing plan - Marketing research for the new venture, Marketing mix, steps in preparing marketing plan. Financial plan – Proforma of income statements, Cash flow, Balance sheet, Break even Analysis, Application of funds. Organizational plan-legal forms of Business, Tax attributes, Role of Board of Directors, Advisors, Designing the organization. Risk assessment, Sources of finance-equity, Financial Institutions and Commercial banks

UNIT III

12 Hrs

Record keeping-Meaning, Methods, Types, Hiring-concept, Procedure for hiring, Motivation – Entrepreneurial theories of motivation, Leadership - Styles of leadership

UNIT IV

12 Hrs

Financial control - Managing cash flow, managing inventory, fixed assets, Managing cost and profits, Taxes. Entrepreneurial skills – Marketing skills, Strategic planning, Time Management skills, Negotiation skills

UNIT V

12 Hrs

Other routes for success - Joint venture – Meaning, Types, Advantages Acquisition – Meaning, Importance advantages merger - Advantages, Disadvantages franchising – Advantages of franchising entrepreneur's point of view, Types going public – Raising funds from the market

Total No. of Hrs: 60

TEXT BOOKS

1. Robert Hisrich, Michael Peters, Dean Shepherd, (2011) *Entrepreneurship* (6th ed.), Tata McGraw-Hill

REFERENCES

1. Donald F. Kuratko, Richard M. Hodgetts (2008) *Entrepreneurship theory, Process and Practice* (8th ed.) Cengage learning
2. Prasana Chandra (2009) *Projects-planning, analysis, selection, implementation and reviews*, (7th ed.) Tata McGraw-Hill



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BCS13019

INFORMATION STORAGE MANAGEMENT

3 0 0 3

OBJECTIVES:

- The students will be able to understand the overview of Information Storage Systems
- To learn and implements the process of indexing and Information storage
- To learn and implement with various data structures, understand the concepts of term clustering and Information Visualization, acquire knowledge in various storage security systems.

UNIT I : STORAGE SYSTEMS

9 Hrs

Information Storage - Evolution of Storage Technology and Architecture – Data Centre – Infrastructure – ILM – Components of Storage System Environment – Logical Components of Host RAID: Implementation, levels & comparison – ISS components, Intelligent Storage Array

UNIT II : STORAGE TECHNOLOGIES

9 Hrs

Storage Networking Technologies & Virtualization DAS – SCSI – SAN – NAS –IPSAN – CAS – Forms of Virtualization

UNIT III : BUSINESS CONTINUITY

9 Hrs

Information availability – BC Planning Life Cycle failure analysis – Backup & Recovery – Local Replication – Remote Replication

UNIT IV : STORAGE SECURITY

9 Hrs

Storage Security Framework – Risk Triad – Storage Security Domains – Security Implementation in Storage Networking

UNIT V : MANAGING STORAGE INFRASTRUCTURE

9 Hrs

Monitoring the Storage Infrastructure – Storage Management Activities and Challenges – Developing an Ideal solution

Total No. of Hrs: 45

TEXT BOOKS

1. EMC Corporation (2010) *Information Storage and Management*, Wiley, India

REFERENCES

1. Robert Spalding (2003) *Storage Networks: The Complete Reference*, Tata McGraw Hill , Osborne
2. Marc Farley (2001) *Building Storage Networks*, Tata McGraw Hill ,Osborne



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BCS13L17

PROJECT (PHASE – II)

0 0 12 6

OBJECTIVES:

- Able to do main projects in their respective domain

Students are expected to carry out the following :

- (i) Implement the Design using suitable technologies.
- (ii) Generate the test cases.
- (iii) Demonstrate the solution with suitable user interface.
- (iv) Prepare a project report consolidating the phase-I and II activities.

Total No. of Hrs: 45



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BCS13E02

ADVANCED KNOWLEDGE MANAGEMENT

3 0 0 3

OBJECTIVES:

- The students will be able to develop knowledge models and systems
- To develop a knowledge model and understand the knowledge Engineering basics.

UNIT I : BASICS OF KNOWLEDGE MANAGEMENT

9 Hrs

The value of Knowledge – Knowledge Engineering Basics – Knowledge Economy – The Task and Organizational Content – Knowledge Management – Knowledge Management Ontology

UNIT II : KNOWLEDGE MODELS

9 Hrs

Knowledge Model Components – Template Knowledge Models – Reflective Knowledge Models – Knowledge Model Construction – Types of Knowledge Models

UNIT III : TECHNIQUES OF KNOWLEDGE MANAGEMENT

9 Hrs

Knowledge Elicitation Techniques – Modeling Communication Aspects – Knowledge Management and Organizational Learning

UNIT IV : KNOWLEDGE SYSTEM IMPLEMENTATION

9 Hrs

Case Studies – Designing Knowledge Systems – Knowledge Codification – Testing and Deployment – Knowledge Transfer and Knowledge Sharing – Knowledge System Implementation

UNIT V : KNOWLEDGE MANAGEMENT APPLICATIONS

9 Hrs

Advanced Knowledge Modeling – Value Networks – Business Models for Knowledge Economy – UML Notations – Project Management

Total No. of Hrs: 45

TEXT BOOKS

1. Guus Schreiber, Hans Akkermans, Anjo Anjewierden, Robert de Hoog, Nigel Shadbolt, Walter Van de Velde and Bob Wielinga (2003) *Knowledge Engineering and Management*, Universities Press
2. Elias M.Awad & Hassan M. Ghaziri (2010) *Knowledge Management* (2nd ed.) PHI Learning

REFERENCES

1. C.W. Holsapple (2003) *Handbooks on Knowledge Management* (vol.1 & 2) International Handbooks on Information Systems, Springer
2. Shelda Debowsks (2007) *Knowledge Management*, Wiley
3. <http://www.epistemics.co.uk>
4. http://depts.washington.edu/pett/papers/WIN_poster_text.pdf



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BCS13E03

INFOMETRICS

3 0 0 3

OBJECTIVES:

- The students will be able to measure, estimate and manage software metrics, can do software estimation, in terms of reliability
- To understand the management of knowledge for future.

UNIT I : IT ORGANIZATION

9 Hrs

Metrics that matter - Interpreting the metrics – Collecting the data – Managing the data – Obstacles to acquiring IT metrics information – Old data versus new graphical analysis – Core of software planning –Measuring the core metrics (Product, Quality, Process, Productivity, Time, Effort) – Estimating and controlling with the core metrics – Work output measurements

UNIT II : MEASUREMENT PROGRAM APPROACHES

9 Hrs

EDS Brazil metrics program – Measurement program implementation approaches – Bench marking – Data definition framework for defining software measurements

UNIT III : SOFTWARE METRICS

9 Hrs

Functional points as part of measurement program – Estimation of software reliability – Establishing central support for software sizing activities – Using metrics to manage projects – Tracking software progress – Effectively utilizing software metrics

UNIT IV : SOFTWARE ESTIMATION

9 Hrs

Problems with measurements – Avoiding obstacles and common pitfalls – Unreported and unpaid overtime – Using software metrics for effective estimating – Estimating software development projects – Enhanced estimation on time within budget – Metrics in outsourcing – Lifigaton – The product of non practicing function point metrics – Applying statistical process central to software – Metrics in E-Commerce

UNIT V : KNOWLEDGE MANAGEMENT

9 Hrs

Quality information and knowledge – Need for quality information and knowledge – Define information quality – Create organizational knowledge – Manage knowledge as assets – Create customized solution – Network knowledge infrastructure

Total No. of Hrs: 45

TEXT BOOKS

1. Stephen H. Kan (2004) *Metrics and Models In Software Quality Engineering* (2nd ed.)Pearson Education
2. Norman Fenton, James Bieman (2013) *Software Metrics: A Rigorous and Practical Approach* (3rd ed.) CRC Press INC.

REFERENCES

1. International Function Point Users Group (2002) *IT Measurement – A Practical Advice from the Experts*”, Addison-Wesley Professional 2002



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BCS13E04

ENTERPRISE APPLICATION INTEGRATION

3 0 0 3

OBJECTIVES:

- The students will be able to integrate business enterprises, with web through service oriented architecture
- To explore the synergy between information and communication systems and how this synergy can be best exploited for EAI and B2B integration

UNIT I : ENTERPRISE INTEGRATION OVERVIEW

9 Hrs

Business Imperative for Enterprise Integration – Business agility – ROI of Enterprise Integration – Challenges – Business drivers – Defining Requirements – Enterprise Integration strategy

UNIT II : ENTERPRISE INTEGRATION ARCHITECTURE

9 Hrs

Overview – Business case – Components of EIA – Organizational Structure – Architectural Governance - Understanding Integration Technology – Current Integration Architecture – Technical Integration Architecture specification

UNIT III : SERVICE AND INFORMATION INTEGRATION ARCHITECTURE

9 Hrs

Service Oriented Architecture – Benefits – Defining Services – Event driven service design –specification – Understanding Metadata – Metadata Architecture – standards – Information Integration Patterns – Architecture Specification

UNIT IV : PROCESS AND APPLICATION INTEGRATION ARCHITECTURE

9 Hrs

Process to Business – Process Integration Technology – Process Standards – Architecture Specification - Choosing Technology - Application Integration Technology – Implementation Specification – Composite Application – Composite integration specification

UNIT V : CASE STUDY

9 Hrs

Promoting Business -driven by SOA, Strategic Use of IT(using SOA to integrate IT management systems) – A case study on an Indian refinery(BPR) – Report on BPR for e-Governance projects

Total No. of Hrs: 45

TEXT BOOKS

1. David S.Linthicum (2006) *Enterprise Application Integration*, Addison – Wesley Information Technology Services
2. Martin Fowler (2011) *Patterns of Enterprise Application Architecture*, Addison-Wesley Signature Series



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BCS13E05

WEB DATA DESIGN & MANAGEMENT

3 0 0 3

OBJECTIVES:

- The students will be able to create web pages using DHTML
- To design web pages using ASP and JSP ,understand the scripting language
- To create web page using them.

UNIT I : SITE ORGANIZATION AND NAVIGATION

9 Hrs

User centered design – Web medium – Web design process – Evaluating process – Site types and architectures – Navigation theory – Basic navigation practices – Search – Site maps

UNIT II : ELEMENTS OF PAGE DESIGN

9 Hrs

Browser compatible design issues - Pages and Layout – Templates – Text – Color – Images – Graphics and Multimedia - GUI Widgets and Forms – Web Design patterns

UNIT III : SCRIPTING LANGUAGES

9 Hrs

Client side scripting: XHTML – DHTML– JavaScript– XML Server side scripting: Perl – PHP – ASP/JSP
Designing a Simple web application

UNIT IV : PRE-PRODUCTION MANAGEMENT

9 Hrs

Principles of Project Management – Web Project Method – Project Road Map – Project Clarification – Solution Definition – Project Specification – Content – Writing and Managing content

UNIT V : PRODUCTION, MAINTENANCE AND EVALUATION

9 Hrs

Design and Construction – Testing, Launch and Handover – Maintenance – Review and Evaluation – Case Study

Total No. of Hrs: 45

TEXT BOOKS

1. Thomas A. Powell (2003) *The Complete Reference – Web Design* (3rd ed.), Tata McGraw Hill
2. Ashley Friedlein (2001) *Web Project Management*, Morgan Kaufmann Publishers
3. H. M. Deitel, P. J. Deitel, A. B. Goldberg (2004) *Internet and World Wide Web – How to Program* (3rd ed.) Pearson Education

REFERENCES

1. Joel Sklar (2001) *Principles of Web Design*, Thomson Learning
2. Van Duyne, Landay, and Hong (2006) *The Design of Sites: Patterns for creating winning websites* (2nd edition.) Prentice Hall
3. Lynch, Horton and Rosenfeld (2002) *Web Style Guide: Basic Design Principles for Creating Web Sites* (2nd edition.) Yale University Press.



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BCS13E06

ADVANCED DATABASES

3 0 0 3

OBJECTIVES:

- The students will be able to create ER model for a given application
- To understand enhanced data models, understand the special purpose databases.

UNIT I : RELATIONAL DATABASE ISSUES

9 Hrs

ER Model – Normalization – Query processing – Query optimization – Advanced Transaction processing – Concurrency control – Recovery – Database tuning

UNIT II : DISTRIBUTED DATABASES

9 Hrs

Parallel databases – Inter and intra query parallelism – Distributed database features – Distributed database architecture – Fragmentation – Distributed query processing – Distributed transactions processing – Concurrency control – Recovery – Commit protocols

UNIT III : OBJECT ORIENTED DATABASES

9 Hrs

Introduction to object oriented databases – Approaches – Modeling and design – Persistence – Versioning-Query languages – Transaction – Concurrency – Multi version locks – Recovery – ODMG model

UNIT IV : ENHANCED DATA MODELS

9 Hrs

Enhanced data models – Client/Server model – Very large databases – Web databases – XML and web databases

UNIT V : SPECIAL PURPOSE DATABASES

9 Hrs

Active and deductive databases – Multimedia databases – Multimedia query languages – Mobile databases-Genome databases – Spatial databases- Temporal databases

Total No. of Hrs: 45

TEXT BOOKS

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan (2010) *Database System Concepts*, McGraw Hill
2. M.Tamer Ozsu, Patrick Valduriez (2011) *Principles of Distributed Database Systems* (3rd ed.), Springer
3. R. Elmasri, S.B.Navathe, “Fundamentals of Database Systems”, 5/e, Pearson Education, 2008.

REFERENCES

- 1.Thomas Connolly and Carlolyn Begg, (2008) *Database Systems, A Practical Approach to Design, Implementation and Management* (4th ed.) Pearson Education
2. C.J.Date, A.Kannan, S.Swamynathan (2006) *An Introduction to Database Systems* (8th ed.), Pearson Education



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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
NETWORKING SPECIALISATION

BCS13E07

MOBILE AND WIRELESS NETWORKS

3 0 0 3

OBJECTIVES:

- The students will be able to understand working, characteristics and limitations of mobile hardware devices
- To understand and learn frequency band, spectrum, air interface and channel structure for telecommunication

UNIT I COMMUNICATION FUNDAMENTALS

9 Hrs

Introduction - Wireless Transmission - Frequencies for Radio Transmission - Signals - Antennas - Signal propagation - Multiplexing Modulation - Spread spectrum - Cellular systems.

UNIT II MAC AND COMMUNICATION SYSTEMS

9 Hrs

Medium access control - Motivation for a specialized MAC-SDMA-FDMA-TDMA-CDMA. Telecommunication systems -GSM-DECT-TETRA-UMTS and IMT-2000, Satellite systems - Broadcast systems - Data Digital Audio Broadcasting - Digital Video Broadcasting.

UNIT III WIRELESS STANDARDS

9 Hrs

Wireless LAN - Infrared vs. Radio Transmission - Infra structure and ad hoc Networks - IEEE 802.11 - HIPERLAN - Bluetooth. Wireless ATM - WATM Services - Reference Model - Functions - Radio Access Layer - Handover - Location Management - Addressing - Mobile Quality of Service - Access Point Control Protocol.

UNIT IV MOBILE NETWORK ISSUES

9 Hrs

Mobile network layer - Mobile IP - Dynamic host configuration protocol - Ad hoc networks-Routing Algorithm-Mobile transport layer - Traditional TCP - Indirect TCP - Snooping TCP, Mobile TCP - Fast Retransmit /Fast Recovery - Transmission/Timeout Freezing, Selective Retransmission - Transaction Oriented TCP.

UNIT V MOBILE APPLICATIONS

9 Hrs

Support for Mobility - File systems - Consistency - World wide web - Hyper Text Transfer Protocol - Hypertext markup language –Next generation- Wireless Application Protocol.

Total: 45 Hrs

TEXT BOOKS:

1. Jochen Schiller, (2008) *Mobile Communications* (2nd ed.), Pearson Education
2. Blake (2002) *Wireless Communication Technology*, Thomson Learning

REFERENCES:

1. Theodore S.Rappaport (2010) *Wireless Communication: Principles and practice*, Prentice Hall



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BCS13E08

TCP/IP DESIGN AND IMPLEMENTATION

3 0 0 3

OBJECTIVES:

- The students will be able to design, analyse and implement TCP/IP protocol
- To understand the fundamentals of TCP/IP networks layer
- To discuss major trends in industry and current research activities within the TCP/IP design.

UNIT I : INTERNETWORKING

9 Hrs

Inter networking issues- Architectural model-routing-internet addressing-address resolution protocol (ARP)-reverse address resolution protocol (RARP)-packet format- IP Routing -ICMP - Ipv6

UNIT II: TCP

9 Hrs

TCP data structures. Services - header - connection establishment and termination- interactive data flow- bulk data flow- timeout and retransmission - persist timer - keepalive timer- futures and performance

UNIT III: IP IMPLEMENTATION

9 Hrs

IP global software organization - routing table- routing algorithms-fragmentation and reassembly- error processing (ICMP) -Multicast Processing (IGMP)

UNIT IV: TCP IMPLEMENTATION I

9 Hrs

Data structure and input processing - transmission control blocks- segment format- comparison-finite state machine implementation-Output processing- mutual exclusion-computing the TCP data length

UNIT V: TCP IMPLEMENTATION II

9 Hrs

Timers-events and messages- timer process- deleting and inserting timer event- flow control and adaptive retransmission-congestion avoidance and control - urgent data processing and push function.

Total: 45 Hrs

TEXT BOOKS:

1. Douglas E.Comer (2003) *Internetworking with TCP/IP Principles, Protocols and Architecture*, Vol. 1 & 2 (4th ed.), Pearson Education Asia
(Unit I in Comer Vol. I, Units II, IV & V - Comer Vol. II)
2. Kevin R. Fall, W. Richard Stevens (2011), *TCP/IP Illustrated, Volume 1: The Protocols* Addison-Wesley Professional

REFERENCES:

1. Forouzan(2005), *TCP/IP protocol suite*, (3rd ed.), TMH
2. W.Richard Stevens(2003) *TCP/IP illustrated Volume 2*, Pearson Education



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BCS13E10

3G – NETWORKING

3 0 0 3

OBJECTIVES:

- The students will be able to understand 2G and 3G networking concepts
- To understand concepts required to carry out routine maintenance of equipment in GSM mobile networks

UNIT I : COMMUNICATION CONCEPTS

6 Hrs

Wireless communication , History of wireless communication, mobile communication fundamentals, Basic Network Architecture, roaming, handover, GSM ,IMT, CDMA2000.

UNIT II: 2G ARCHITECTURES

12 Hrs

First generation architecture, MTSSO configuration, call setup, handoff, frequency reuse, channel band plan , 2G – GSM ,TDMA , CDMA architecture , traffic scenario , location update.

UNIT III: SYSTEM DESIGN

12 Hrs

Mobile oriented voice call , digital voice channel, control channel , MAHO , Forward CDMA, Reverse CDMA , iDEN , CDPD. UMTS , migration path , services , air interface, WCDMA .

UNIT IV: ADVANCED 3G ARCHITECTURES

7 Hrs

Basics , 3GPP network architecture , CDMA 2000 architecture ,Uplink and down link – spreading, scrambling and modulation , UTRAN architecture , functional role of RNC, protocol.

UNIT V: VOICE OVER IP TECHNOLOGY

8 Hrs

Voice over IP , basics ,H-323 , architecture , reuse, SIP , SDP , MEGACO protocol , 3G system RF design , methodology , propagation , RF guide lines.

Total: 45 Hrs

TEXT BOOKS:

1. Clint Smith (2006), *3G wireless Network* , PE, (2nd ed.), McGraw Hill
2. Sanjiv Nanda (2006), *Third Generation Information Network*, Kluwer Academic Publisher



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BCS13E11

NETWORK SECURITY AND CRYPTOGRAPHY

3 0 0 3

OBJECTIVES:

- The students will be able to design, analyse and implement different network security protocols, identify the major types of threats to Network security and the associated attacks
- To develop strategies to protect organization information assets from common attacks, understand how security policies, standards and practices are developed

UNIT I SYMMETRIC CIPHERS

9 Hrs

Overview - Classical Encryption Techniques – Block Ciphers and the Data Encryption Standard – Introduction to Finite Fields – Advanced Encryption Standard – More on Symmetric Ciphers – Confidentiality using Symmetric Encryption.

UNIT II PUBLIC-KEY ENCRYPTION AND HASH FUNCTIONS

9 Hrs

Introduction to Number Theory – Public-Key Cryptography and RSA – Key Management - Diffie-Hellman Key Exchange – Elliptic Curve Cryptography – Message Authentication and Hash Functions – Hash and MAC Algorithms – Digital Signatures and Authentication Protocols.

UNIT III NETWORK SECURITY PRACTICE

9 Hrs

Authentication Applications – Kerberos – X.509 Authentication Service – Electronic mail Security – Pretty Good Privacy – S/MIME – IP Security – Web Security.

UNIT IV SYSTEM SECURITY

9 Hrs

Intruders – Intrusion Detection – Password Management – Malicious Software – Viruses and Related Threats - Viruses Countermeasures – Distributed Denial of Service Attacks - Firewalls – Firewall Design Principles – Trusted Systems.

UNIT V WIRELESS SECURITY

9 Hrs

Introduction to Wireless LAN Security Standards – Technology Comparisons – Wireless LAN Security Factors – Issues in Wireless Security.

Total: 45 Hrs

TEXT BOOKS:

1. William Stallings (2011) *Cryptography And Network Security – Principles and Practices*, (5th ed.) Pearson Education
2. Stewart S. Miller (2003) *Wi-Fi Security*, McGraw-Hill

REFERENCES:

1. Atul Kahate (2008) *Cryptography and Network Security* Tata McGraw Hill
2. Bruce Schneier (2007) *Applied Cryptography*, John Wiley & Sons Inc.
3. Charles B. Pfleeger, Shari Lawrence Pfleeger (2007) *Security in Computing* (4th ed.), Pearson Education



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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

BCS13E12

PERVASIVE COMPUTING

3 0 0 3

OBJECTIVES:

- The students will be able to understand and work on operating systems for mobile devices
- To identify the Gateways for mobile application, develop projects suitable for pervasive application
- To understand how security policies, standards and practices are developed

UNIT I BASICS

9 Hrs

What Pervasive Computing is all About: Times are Changing-Decentralization continues- Applied Pervasive computing-Pervasive computing principles-Pervasive Information Technology. Devices: Information Access Devices-Handheld Computers-Sub-Notebooks- Phones. Smart Identification: Smart Cards-Smart Labels. Embedded Controls: Smart sensors and Actuators-Smart Appliances-Appliances and Home Networking-Automotive Computing. (Chapters: 1 - 4)

UNIT II ENTERTAINMENT SYSTEMS

9 Hrs

Television Systems-Game Consoles. Operating Systems: Windows CEPalm OS-Symbian EPOC-Java Card-Windows for Smart Cards. Middleware Components: Programming Consumer Devices-Smart Card Programming-Messaging Components-Database Components. (Chapters: 5, 7, 8)

UNIT III WAP

9 Hrs

The WAP Architecture-Wireless Application Environment. Connectivity: Wireless Wide Area Networks-Short Range Wireless Communication-Home Networks. Service Discovery: Universal Plug and Play-Jini-Salutation. (Chapters: 11 - 13)

UNIT IV GATEWAYS

9 Hrs

Connectivity Gateway-Wireless Gateway-Transcoding-Residential Gateway. Web Application Servers: Architecture and Components-WebSphere Application Server- WebSphere Everyplace Suite-Oracle Portal-to-Go. Device Management: Tasks of Device Management Systems-Tivoli Device Support Infrastructure-User Profiles and Directory Services. Synchronization: What Synchronization is all About-The Challenge of Synchronizing Data-Industry Data Synchronization Standards-Today's Synchronization Solution. (Chapters: 14 - 17)

UNIT V PORTALS AND ACCESS SERVICES

9 Hrs

Internet Portals-Wireless Portal-Broadcasting Portal. Home Services: The System View-Communication Services-Home Automation-Energy Services- Security Services-Remote Home Healthcare Services. Travel and Business Services: Travel Services-Business Services. Consumer Services: Interactive Advertisement-Loyalty-Shopping-Payment Services. (Chapters: 18 - 21)

Total: 45 Hrs

TEXT BOOK:

1. Uwe Hansmann, Lothar Merk, Martin S. Nicklous, Thomas Stober (2003), *Pervasive Computing Handbook*, Springer, ISBN 3-540-6712



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OS SPECIALISATION

BCS13E13

UNIX INTERNALS

3 0 0 3

OBJECTIVES:

- The students will be able to implement shell programs, analyse UNIX OS memory management
- To design a new communication methodology for UNIX.

UNIT I UNIX OVERVIEW

9 Hrs

UNIX Operating System – History – Commands – System Structure – Shell Programming – System/call – UNIX Communication – Architecture – File Sub System and Process – Sub – System – User – Kernel Modes – Process States and Transition – Sleep and Wakeup.

UNIT II FILE SYSTEM

9 Hrs

Buffers- Structures and Representator – Implementation of System Calls.

UNIT III PROCESS MANAGEMENT

9 Hrs

Structure – Context – Address Space – Creation – Scheduling – Thread implementation of System Call.

UNIT IV MEMORY MANAGEMENT

9 Hrs

Swapping – Segmentation – Demand Paging - implementation of System Call.

UNIT V DRIVERS & STREAMS

9 Hrs

Drivers – Streams – Implementation of IPC Mechanism.

Total: 45 Hrs

TEXT BOOK:

1. M.J.Bach (2007) *The Design of the UNIX OS*, Prentice Hall

REFERENCES:

1. W. Richard Stevens (2008) *UNIX-Network Programming Volume1*, (2nd ed.), Pearson Education
2. Das Sumitabha (2006), *UNIX concepts and Applications*, (4th ed.), TMH
3. W. Richard Stevens (1999/6) *UNIX-Network Programming Volume2* (2nd ed.), Pearson Education,.
4. Kay A, Robbins and Steven Robbins (2009), *Practical UNIX Programming*, PHI



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BCS13E14

DISTRIBUTED COMPUTING

3 0 0 3

OBJECTIVES:

- The students will be able to understand the design of distributed systems
- To understand communication concepts of distributed systems
- To apply the memory management design of distributed systems to design a new memory

UNIT I FUNDAMENTALS:

9 Hrs

Introduction to distributed computing system, Evolution, Different models, Gaining popularity, Definition, Issues in design, DCE, Message passing-Introduction, Desirable features of a good message passing system, Issues in IPC, Synchronization, Buffering, Multidatagram, Process addressing, Failure handling, Group communication.

UNIT II REMOTE PROCEDURE CALL

9 Hrs

Introduction, RPC model, transparency of RPC, Implementing RPC mechanism, Stub generation, RPC messages, Marshalling arguments and results, Server management, parameter-passing semantics, Call semantics, Communication protocols for RPCs, Complicated RPC, Client-server binding, exceptional handling, security, Lightweight RPC.

UNIT III DISTRIBUTED SHARED MEMORY AND SYNCHRONIZATION

9 Hrs

Introduction, General architecture of DSM systems, Design and implementation issues of DSM, Granularity, Structure of shared memory space, Consistency model, Replacement strategy, Thrashing, Different approaches to DSM, Advantages of DSM, Clock synchronization, Event ordering, Mutual exclusion, Deadlock, Election algorithm.

UNIT IV RESOURCE AND PROCESS MANAGEMENT

9 Hrs

Introduction, Desirable features of a good global scheduling algorithm, Task assignment approach, Load-balancing approach, Load sharing approach, Process migration, Threads.

UNIT V DFS/DCE SECURITY

9 Hrs

Desirable features of good DFS, File models, File accessing, models, File sharing semantics, File caching schemes, File replication, Fault tolerance, Atomic Transaction, Design principles, Authentication, Access control, Digital signatures, DCE security service.

Total: 45 Hrs

TEXT BOOK:

1. Pradeep K. Sinha (2012 Reprint) , *Distributed Operating System Concepts and Design* PHI

REFERENCES:

1. Andrew S. Tenenbaum (2012), *Modern Operating System* (3rd ed.) PHI
2. Ajay D. Kshemkalyani , Mukesh Singhal (2008), *Distributed computing : principles, algorithms and systems* – Cambridge University Press
3. Andrew S. Tenenbaum &Maatren Vansteen (2012) *Distributed systems: Principles & Paradigms* (2nd ed.), PHI
4. Hagit Attiya And Jennifer Welch (2004) *Distributed computing fundamentals, simulations and Advanced Topics* (Digitized in 2007) (2nd ed.), Wiley
5. Jean Dollimore, Tim Kindberg, And George Coulouris (2005) *Distributed Systems: Concepts and Design* (4th ed.) Pearson Education



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BCS13E15

REALTIME SYSTEM DESIGN

3 0 0 3

OBJECTIVES:

- The students will be able to understand the design of real time system with task management
- To understand the scheduling tools for real time systems
- To understand the reliability and synchronization concepts in real time systems.

| | | |
|-----------------|---|--------------|
| UNIT I | RTS OVERVIEW | 9 Hrs |
| | Architecture of real time systems/embedded systems-operating systems issues-performance measures-estimating program run times. | |
| Unit II | TASK ASSIGNMENT AND SCHEDULING | 9 Hrs |
| | Uniprocessor scheduling-IRIS tasks-task assignment mode changes -fault tolerance Scheduling | |
| Unit III | PROGRAMMING LANGUAGES AND TOOLS | 9 Hrs |
| | Desired characteristics based on ADA-data typing-control structures-packages-exception handling-overloading-multitasking-timing specification-task scheduling-just in time compilation-run time support. | |
| Unit IV | REAL TIME DATABASES | 9 Hrs |
| | Basic networking principles-real time databases -transaction processing-concurrency control disk scheduling algorithms-serialization and consistency. | |
| Unit V | FAULT TOLERANCE, RELIABILITY AND SYNCHRONIZATION | 9 Hrs |
| | Fault types-fault detection and containment-redundancy-data diversity-reversal checksobtaining parameter values-reliability models for hardware redundancy-software error models-clocks-fault tolerance synchronization-synchronization and software. | |

Total: 45 Hrs

TEXT BOOK:

1. C.M.Krishna, Kang.G.Shin (1997), *Realtime Systems*, McGraw Hill

REFERENCES:

1. Raymond j.a. Buhr (1999) *An Introduction To Real Time Systems From Design To Networking C And C++*, Prentice Hall
2. Albert .m.k.cheng (2002) *Real Time Systems- Scheduling, Analysis And Verification*. wiley interscience
3. Jane.W.S.Liu (2006) *Real-Time System* Prentice Hall
4. Philip.a.laplante, (2004)" *real-time system design and analysis*", Wiley-ieee press
5. Alan burns and andy wellings, (2009)"*Real time systems and prog. Languages*", (4th ed.),pearson



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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

BCS13E16

ADVANCED OPERATING SYSTEM

3 0 0 3

OBJECTIVES:

- The students will be able to design operating systems
- To understand the design and implementation of different types of OS
- To understand and hence improve the performance of designed OS.

| | | |
|--|---|--------------|
| Unit I | MULTIPROCESSOR OPERATING SYSTEMS | 9 Hrs |
| Threads –Process synchronization –Processor scheduling-Memory management-Reliability-Fault tolerance. | | |
| Unit II | NETWORK OPERATING SYSTEMS | 9 Hrs |
| Types of NOS –NOS to LANs-Choosing and NOS-multiple NOS on a single network-NOS and network management –future trends | | |
| Unit III | DISTRIBUTED OPERATING SYSTEMS | 9 Hrs |
| Issues-Communication primitives-remote procedure call-Logical clocks-Vector clocks-distributed mutual exclusion-non token based algorithms-token based algorithms-issues in deadlock detection and resolution-centralized and distributed deadlock detection algorithms-election algorithms, classification of agreements problems-solutions to the Byzantine time agreement problem-impossibility result. Issues in load distributing –load distributing algorithms-performance comparison. Distributed file system design issues-mechanisms for building DFS-case studies. | | |
| Unit IV | DATABASE OPERATING SYSTEMS | 9 Hrs |
| Requirements-concurrency control model-serializability theory-distributed database systems-synchronization primitives-lock based and time stamp based algorithms-Fully replicated database systems. | | |
| Unit V | REAL TIME OPERATING SYSTEMS | 9 Hrs |
| Architecture of real time systems-OS issues-Performance measures-estimating program run times – uniprocessor scheduling-IRIS tasks-task assignment mode changes-fault –tolerance scheduling. | | |

Total: 45 Hrs

Text Books:

1. Mukesh singhal,Niranjan.G.Shivarathiri (2001) -*Advanced Concepts And Operating Systems*,Mcgraw Hill, New York, (I,III,IV unit).
2. C.M.Krishna,Kang .G. Shin (1997) *Real Time Systems*, ,Mcgraw Hill, (v unit)
Philip Hunter (Digitized in 2007), *Network Operating Systems-Making Right Choices*, Addison Wesley 1995(II unit)

References:

1. Andrew S. Tanenbaum (2008)-*Modern Operating Systems*, 3rd ed., Prentice Hall, (sec. 9-13 only).
2. Gary Nutt(2009) *Operating Systems* (3rd ed.), Pearson



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BCS13E18

FAULT TOLERANCE SYSTEMS

3 0 0 3

OBJECTIVES:

- The students will be able to understand the design of fault tolerance systems with architecture and coding,
- Understand the error models for fault tolerant systems,
- Design fault tolerant systems by applying the theoretical concepts,
- Create own fault tolerant software.

UNIT I: FAULT TOLERANCE

9 Hrs

System structuring - Recovery blocks - Early implementations and experiments - Extensions and applications of basic recovery blocks- Recovery in concurrent systems - Linguistic support for software fault tolerance.

UNIT II : N-VERSION PROGRAMMING & ARCHITECTURAL ISSUES

9 Hrs

Fault-tolerant software: Models and techniques - Building n-version software –Experimental investigations - A design paradigm for n-version software -The system context for fault -Tolerant software - Approaches to software-fault tolerance - Analysis of software fault tolerance Definition and analysis of hardware software fault tolerant architectures.

Unit III: DEPENDABILITY MODELING FOR FAULT-TOLERANT SOFTWARE

9 Hrs

System Descriptions- Modeling Assumptions And Parameter Definitions-System Level Modeling Experimental Data Analysis- Quantitative System-Level Analysis-Sensitivity Analysis-Decider Failure Probability

Unit IV: DISTRIBUTED RECOVERY BLOCK SCHEME

9 Hrs

Non-Negligible Fault Sources And Desirable Recovery Capabilities-Basic Principles Of The DRB Scheme- Implementation Techniques-Experimental Validations Of Real-Time Recovery

Unit V: FAULT TOLERANCE ACCOMPLISHMENT

9 Hrs

Hardware Fault Tolerance - Fault types-fault detection and containment-redundancy-data diversity-reversal checks obtaining parameter values-reliability models for hardware redundancy - **Storage Fault Tolerance** - Backup & Recovery – Local Replication – Remote Replication, **Software Fault Tolerance** - Testing fault tolerance using software fault insertion- Fault manager-Categorization of software faults, errors, and failures- sfit methodology-Sample sfit test plans-Application and results.

Total: 45 Hrs

TEXT BOOK:

1. Michael R. Lyu (1995, Digitized in 2007), *Software Fault Tolerance*, John Wiley & Sons Ltd

REFERENCES:

1. Hoang Pharm (1992, Digitized in 2010), *Fault Tolerant Software Systems Techniques & Applications*
2. Laura L. Pullam (2001) , *Software Fault Tolerance Techniques And Implementations*, Artech House



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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
COMPUTATIONAL THEORY SPECIALISATION

BCS13E19

DESIGN OF ALGORITHMS

3 0 0 3

OBJECTIVES:

- The students will be able to understand the design of advanced algorithms
- Create problems by applying Greedy methods and understand the dynamic programming
- Apply the graph coloring techniques to solve the real time problems.

UNIT I: BASIC ALGORITHMS

9 Hrs

Introduction- Fundamental characteristics of an algorithm. Basic algorithm analysis –Asymptotic analysis of complexity bounds – best, average and worst-case behaviour, standard notations for expressing algorithmic complexity. Empirical measurements of performance, time and space trade-offs in algorithms. Using recurrence relations to analyze recursive algorithms – illustrations using recursive algorithms.

UNIT II: FUNDAMENTAL ALGORITHMIC STRATEGIES:

9 Hrs

Fundamental Algorithmic Strategies: Brute-Force, Greedy, Branch-and-Bound, Backtracking and Dynamic Programming methodologies as techniques for design of algorithms – Illustrations of these techniques for Problem-Solving. Heuristics – characteristics and their domains of applicability. Design of algorithms for String / Text matching problems, Huffman Code and Data compression problems, Subset-sum and Knapsack problems.

UNIT III: GRAPH AND TREE ALGORITHMS

9 Hrs

Graph and Tree Algorithms: Depth- and Breadth- First traversals. Shortest path algorithms, Transitive closure, Minimum Spanning Tree, Topological sort, Network Flow problems.

UNIT IV: TRACTABLE AND INTRACTABLE PROBLEMS:

9 Hrs

Tractable and Intractable Problems: Computability. The Halting problem. Computability classes –P, NP, NP - complete and NP-hard. Cook's theorem. Standard NP complete problems Reduction techniques.

UNIT V: ADVANCED TOPICS:

9 Hrs

Advanced Topics: Approximation algorithms, Randomized algorithms, Class of problems beyond NP – PSPACE.

Total : 45 hrs

TEXT BOOKS:

1. T.H. Corman et. al , (2009) *Introduction to Algorithms* Mit Press
2. Jon Kleinberg and Eva Tardos (2006) *Algorithm Design*, Pearson Education India

REFERENCES:

1. E. Horowitz et al (2008) *Fundamentals of Algorithms* –, **Prentice Hall of India**
2. Anany Levitin,(2003) "*Introduction to the Design and Analysis of Algorithm*", Pearson Education Asia



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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

BMA13E31

OPTIMISATION TECHNIQUES

3 0 0 3

OBJECTIVES:

- The students will be able to understand inventory model and business replacement problems
- Finding best method for solving linear programming, Optimization of transport problems,
- Finding solution to convex programming problem, quadratic programming problem,

UNIT I: UNCONSTRAINED OPTIMIZATION

6Hrs

Optimizing Single-Variable Functions, conditions for Local Minimum and Maximum, Optimizing Multi-Variable Functions.

UNIT-II: CONSTRAINED OPTIMIZATION

10Hrs

Optimizing Multivariable Functions with Equality Constraint: Direct Search Method, Lagrange Multipliers Method, Constrained Multivariable Optimization with inequality constrained: Kuhn-Tucker Necessary conditions, Kuhn – Tucker Sufficient Conditions.

UNIT-III: OPTIMIZATION

10Hrs

Quasi-Newton Methods and line search, least squares optimization, Gauss-Newton, Levenberg- Marquardt, Extensions of LP to Mixed Integer Linear Programming (MILP), Non-Linear Programming, The Newton Algorithm, Non-Linear Least Squares, Sequential Quadratics Programming (SQP), Constrained Optimization, SQP Implementation, Multi-Objective Optimization, Branch and Bound Approaches, Genetic Algorithms and Genetic Programming, Singular Based Optimization, On-Line Real-Time Optimization, Optimization in Econometrics Approaches – Blue.

**UNIT IV: OPTIMIZATION AND FUNCTIONS OF A COMPLEX
VARIABLE AND NUMERICAL ANALYSIS**

10Hrs

The Finite Difference Method for Poisson's Equation in two Dimensions and for the Transient Heat Equation, Eulers Method, The Modified Euler Method and the Runge-Kutta Method for Ordinary Differential Equations, Gaussian Quadrature Trapezoidal Rule and Simpson's 1/3 and 3/8 Rules, the Newton Raphson in one and two Dimensions, Jacobi's Iteration Method.

UNITV: OPTIMIZATION IN OPERATION RESEARCH

8Hrs

Dynamic Programming, Transportation – Linear Optimization Simplex and Hitchcock Algorithms, Algorithms, Minimax and Maximum Algorithm, Discrete Simulation, Integer Programming – Cutting Plane Methods, Separable Programming, Stochastic Programming, Goal Programming, Integer Linear Programming, Pure and Mixed Strategy in theory of Games, Transshipment Problems, Heuristic Methods.

Total: 45 Hrs

TEXT BOOKS

1. Winston W L: (01-Jan-2008) *Operations Research: Applications and Algorithms*, Thomson Business Press
2. Singiresu S. Rao, S. S. Rao(2009), *Engineering Optimization: Theory and Practice*, (4th ed.0, John Wiley & Sons

REFERENCES:

1. Williams H.P. (2013): *Model Building in Mathematics Programming*, (5th ed.), John Wiley



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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

BCS13E21

ALGORITHMIC GRAPH THEORY

3 0 0 3

OBJECTIVES:

- The students will be able to design and apply the algorithmic graph theory
- To calculate the real time problems such as shortest path,
- To understand the properties of graphs and trees,
- create a problem which applies algorithmic graph theory.

UNIT I GRAPH THEORY BASICS

9 Hrs

Graphs and Graph Theory - Typical Applications- Labeled and Unlabeled Graphs - Invariants of a Graph- Order, Size, Degree-Computer representation of graphs/digraphs-Adjacency and incidence matrices - Adjacency and incidence lists -Graphical Sequence-A characterization of graphical sequences-Walks, Trails, Paths, Cycles-Subgraphs of a Graph-Induced Subgraphs-Spanning Subgraphs

UNIT II TYPES OF GRAPHS

9 Hrs

Connected and Disconnected Graphs/Digraphs-Trees and Forests-Complete Graphs & Tournaments-Bipartite Graphs- Characterization of bipartite graphs-Hamiltonian Graphs-Eulerian Graphs/Digraphs-Characterization of Eulerian graphs-Iterative Graphs-Random Graphs-Other Special Graphs

UNIT III SPANNING TREES

9 Hrs

Some Properties of Trees-Spanning Trees of a Graph-Optimal Spanning Trees-Different Optimality Criteria-Finding Optimal Spanning Trees-Some Applications

UNIT IV DIRECTED TREES

9 Hrs

Directed Trees- Properties of Directed Trees-Counting Trees-Counting Spanning Trees of a Labeled Graph-Maximum Flow-Problem Description-Evolution of Maximum-Flow Algorithms-Ford-Fulkerson Results-Edmond-Karp Algorithm-MPM Algorithm-Other MFAs

UNIT V APPLICATIONS

9 Hrs

Applications Of Maximum-Flow-Finding Arc-Disjoint paths-Finding edge-disjoint Paths-Finding vertex-disjoint paths-Graph Connectivities-Problem Description-Evolution of Connectivity Algorithms-Computing χ of a Graph-Computing χ of a Digraph Connectivity-Generalizations-Problem Description-Conditional Connectivities-Restricted Connectivities-Some Applications Matchings-Problem Description-Matching Algorithms-Some Application

Total : 45 hrs

TEXT BOOK:

- 1.Charles Golumpic (2004) “*Algorithmic Graph Theory and Perfect Graphs*” (2nd edition, Elsevier publication)

REFERENCES:

1. Narsingh Deo(2004), *Graph theory with applications to Engineering and Computer Science*, Prentice Hall of India (P)Ltd.,
2. Alan M Gibbons (2005), *Algorithmic Graph Theory*, electronic edition, Cambridge University press
3. Martin Charles Golumbic(2004) , *Algorithmic Graph Theory and Perfect Graphs*,(2nd ed.) Elsevier
4. Dieter Jungnickel(2005) , *Graphs, networks and algorithms* (2nd ed.), Springer publication.



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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

BCS13E22

PRINCIPLES OF PROGRAMMING LANGUAGES

3 0 0 3

OBJECTIVES:

- The students will be able to understand the concepts of programming languages,
- Understand the object orientation concepts and apply it to real time problems,
- Develop a new object oriented language.

UNIT I: PRELIMINARIES

9 Hrs

Programming domains, language evaluation criteria, language design - categories-tradeoffs, implementation methods, programming environments. Syntax and Semantics: Problem describing syntax-formal methods for describing syntax-recursive descent parsing, attribute grammar, dynamic semantics. Names, Bindings, Type Checking and Scopes: Names -variables-concept of binding-strong typing –type compatibility-scope and lifetime.

UNIT II: DATA TYPES

9 Hrs

Primitive - character string –user- defined -array-associative array-record -unions -set-pointers-abstract data types.Expression and Assignment Statement: Arithmetic expressions-overloaded operators-type conversions-relational and Boolean expressions-assignment statements-mixed mode assignment.

UNIT III: STATEMENT - LEVEL CONTROL STRUCTURES

9 Hrs

Compound-selective-iterative statements, unconditional branching and guarded commands. Subprograms: Fundamentals -design issues-local referencing-parameter passing-overload subprograms-design issues of functions-accessing non-local environment-user defined overloaded operators-implementing sub programs.

UNIT IV: ABSTRACT DATA TYPES

9 Hrs

Concepts of abstraction, encapsulation, data abstraction, language examples- parameterized abstract data type Support for Object Oriented Programming: Object oriented programming-design issue. Smalltalk -Example programs- features- evaluation. Support for object oriented programming in c++-java-Ada 95-eiffel, implementation of object oriented constructs.

UNIT V: CONCURRENCY

9 Hrs

Subprogram level concurrency-semaphores-monitors-message passing-concurrency in Ada 95.java threads, statements level concurrency.Exception Handling: Exception handling in PL/1-ADA-C++-JAVA.

Total : 45 hrs

TEXT BOOK:

1. Robert. W.Sebesta. (2012) "*Concepts of programming languages*"- (10th ed.), Addison Wesley. ISBN 0131395319

REFERENCES:

1. Pratt, Zelkowitz(2009), "*Programming Languages: Design and Implementation*", (4th ed.) Pearson Education
2. Ravi Sethi (2007), "*Programming languages – concepts and constructs*", (2nd ed.)
3. Doris Appleby & Julius J Vande Kopple (2003), "*Programming Languages Paradigm and Practice*". (2nd ed.) Tata McGraw Hill
4. Kenneth C. Louden (2003)*Programming Languages Principles and Practice* (2nd ed.)



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BCS13E23

NATURAL LANGUAGE PROCESSING

3 0 0 3

OBJECTIVES:

- The students will be able to apply the NLP to real time problems,
- To create a parser for any language, Generate an own natural language system.

UNIT I: UNDERSTANDING NLP

9 Hrs

Introduction - Issues and difficulties in natural language processing - Linguistics and computational linguistics - Language understanding and generation - Understanding of spoken, written and textual information.

UNIT II: PARSING

9 Hrs

Syntactic Parsing - English grammar - Structure of the sentence - Words and organization of the lexicon - Context free and context sensitive grammar - Transformational grammar - Role of syntax analysis in semantics ATN's - Definite clause grammar and WASP Parsers.

UNIT III: SEMANTIC INTERPRETATION

9 Hrs

Semantic interpretation - Conceptual dependency model for semantic representation - semantic networks - Frames and scripts - Semantics in the lexicon.

UNIT IV: DISCOURSE INTERPRETATION

9 Hrs

Discourse interpretation - The interconnections between pragmatics - Pragmatics in discourse analysis - Speech acts plan - Theory of speech acts - Semantic network Frame and scripts - Semantics in the lexicon.

UNIT V: NATURAL LANGUAGE GENERATION SYSTEMS

9 Hrs

Generation - Strategies for generation - Planning English referring expressions- KING, a Natural language generation systems. Typical systems -ELIZA - Baseball - GUS - PARRY - LADDER - SOPHILE & POET current trends in NLP.

Total : 45 hrs

Text Book:

1. James Allen Benjamin Cummings (2007), "*Natural language understanding*", Pearson Education-

References:

1. Grosz, Jones & Webber 2005, *Readings in Natural Language Processing*, Morgan Kaufmann Publishers
2. Daniel Jurafsky and James H. Martin 2008, *Speech-Language-Processing* PHI,.
- 3., Tanveer Siddiqui (2008) *Natural Language Processing and Information Retrieval*, Oxford



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VLSI & EMBEDDED SPECIALISATION

BEC13E31

VLSI TECHNOLOGY

3 0 0 3

OBJECTIVES:

- The students will be able to design and develop VLSI circuits
- To understand the testability of integrated systems-VLSI for Fuzzy logic systems,
- Able to design Adder circuit using VLSI technique.

Unit I VLSI DESIGN FLOW

9 Hrs

Design hierarchy concepts of regularity, modularity & locality VLSI Design styles – CMOS fabrication Technology- Fabrication Process flow- basic steps, CMOS n-well process, Advanced CMOS fabrication technologies, layout design rules- Full – custom Mask Layout design –CMOS Layout design rules – CMOS inverter Layout design – Layout of CMOS NAND & NOR gates – Complex CMOS Logic gates.

Unit II Parasitic Extraction & Performance Estimation from Physical Structure

9 Hrs

Introduction – Reality with inter-connection –MOSFET capacitances-interconnect capacitance estimation – interconnect resistance estimation.

Unit III CLOCK SIGNALS & SYSTEM TIMING

9 Hrs

On chip clock generation & distribution using ring & pierce crystal oscillator – non – overlapping clock signals and gate level implementation – H-tree clock distribution N/W – clock skew reduction – Zero – Skew clock routing N/W- Clock distribution N/W for DEC alpha Op chips.

Unit IV TESTABILITY OF INTEGRATED SYSTEMS-VLSI FOR FUZZY LOGIC SYSTEMS

9 Hrs

Design constraints – Testing – The rule of ten – terminology – Failures in CMOS – Combinational Logic Testing – Practical Ad-Hoc DFT guidelines –Scan design techniques- Integrated implementations of FLC, Digital implementation of FLC's, Analog implementation of FLC's, Mixed digital /analog implementations of Fuzzy systems, CAD automation for FLC DESIGN, NN implementing fuzzy systems.

Unit V ARITHMETIC FOR DIGITAL SYSTEMS

9 Hrs

Introduction – notation systems – Principles of generation & propagation – 1 bit full adder – Enhancement Techniques for Adders – multi operand –Adders – Multiplication – Addition and Multiplication in Galois Fields GF(2n).

Total: 45 Hrs

Text Books:

1. CY Cheng., S.M SZE., (1996). Digi 2007 “*ULSI Technology*”, McGraw-Hill International Editions,.
2. Douglas A. Pucknell and Kamran Eshraghian (1994), “*Basic VLSI Design Systems and circuits*”, (3rd ed.) Prentice Hall of India Pvt Ltd.
3. Randall .L.Geiger and P.E.Allen (2010 Reprint), *VLSI Design Techniques for Analog and Digital Circuits*, McGraw Hill.
4. Horspool., Gorman. (2001), Digitized in 2007, “*The Asic Handbook*” Prentice Hall.



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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

BEC13E32

**SYSTEM MODELING USING HARDWARE
DESCRIPTION LANGUAGES**

3 0 0 3

OBJECTIVES:

- The students will be able to design and develop RTL and VERILOG codes,
- Able to use test benches for RTL verilog language,
- Able to design synchronous receivers and NAND latches.

UNIT I: HARDWARE DEFINITION LANGUAGES

9 Hrs

VHDL & VERILOG Introduction and abridgment Date flow decryption – Structural-connected Blow.

UNIT II : OPERATORS & STATEMENTS

9 Hrs

Behaviour Description using Standard library – operators in VHDL Vector and scalar operations – Delay model – sequential statement – signal and process.

UNIT III: IMPLEMENTATION

9 Hrs

Implementation of combinational and sequential circuit using VHDL package.

UNIT IV: VERILOG DESIGN

9 Hrs

Verilog and - Design function using Verilog –Levels of synthesizing Verilog Designing N!W using Verilog – Simple design – wires – wire assignments – Design.

UNIT V: TESTING & CASE STUDIES

9 Hrs

Test Benches –Response capture – RTL Verilog – If statement – Synthesis latches.

CASE STUDY

Design of universal asynchronous Receivers – Implementation of NAND – Latch. 16 bit counting, D type Edge triggered flip flop clock for counter –Fibonacci number generator- programmer using hand notation spice modeling of circuit.

Total: 45 Hrs

REFERENCE BOOKS:

1. Mohammed Ismail. 1998, Digitised in 2007, “*Analog VLSI Integrated Circuits*”, PHI.,
2. Peter J.Ashenden (2010), “*The Designer’s guide to VHDL*”, (3rd ed.) Morgan Kaufmann
3. Grey, Hurst Luwis, Mayer (2009)., “*Analysis and Design of Analog Integrated Circuits*”, (5th ed.), John Willey
4. J.Bhaskar 2004, “*A VHDL Primer*”,(3rd ed.), PHI
5. Charles.H,Roth (2005), ”*Digital system design using VHDL*”,(2nd ed.), PWS Publishing Co.



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BEC13E34

COMPUTER AIDED DESIGN OF VLSI

3 0 0 3

OBJECTIVES:

- The students will be able to design and develop VLSI circuits using automation tools.
- Ability to synthesize static and dynamic logic cells based on knowledge of MOS device physics, modeling, and circuit topologies.
- Designing and implementing combinational and sequential CMOS, digital circuits and optimize them with respect to different constraints.
- Capable of implementing a complete design verification process using computer-automated tools for layout, extraction, simulation, and timing analysis.

Unit I VLSI Methodologies **9 Hrs**

VLSI Methodologies – VLSI Physical Design Automation – Design and Fabrication of VLSI Devices – Fabrication process and its impact on Physical Design.

Unit II VLSI Design Automation Tools & Algorithms **9 Hrs**

VLSI Design Automation Tools - Data structures and Basic Algorithms – Algorithms Graph Theory and computational complexity – Tractable and Intractable problems

Unit III General purpose methods **9 Hrs**

General purpose methods for combinational optimization – Partitioning – Floor planning and pin assignment – placement – Routing Clock Routing Algorithms - Compaction

Unit IV Simulation **9 Hrs**

Simulation – Logic synthesis – Verification – High-level synthesis – compaction.

Unit V Automation & Case studies **9 Hrs**

Physical Design Automation of FPGAs, MCMS

CASE STUDY

Floor planning billion-gate design. Test vector generation design for testing fan out coverage

Total: 45 Hrs

Text Books:

1. N.A. Sherwani (Digitized in 2007), “*Algorithms for VLSI Physical Design Automation* (3rd ed.)

References:

1. S.H.Gerez (2006), “*Algorithms for VLSI Design Automation*”, , Wiley(I), (2nd ed.), Reprint 2008



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BCS13E24

EMBEDDED SYSTEM DESIGN

3 0 0 3

OBJECTIVES:

- The students will be able to design and develop embedded programs for simple applications,
- To understand devices and buses for different I/O,
- Able to understand real time OS and implement simple programs in RTOS.

Unit I: Introduction To Embedded Systems

9 Hrs

Definition and Classification – Overview of Processors and hardware units in an embedded system- Software embedded into the system – Exemplary Embedded systems-Embedded Systems on a Chip (SoC) and the use of VLSI designed circuits.

Unit II: Devices And Buses For Devices Network

9 Hrs

I/O Devices – Device I/O Types and examples – Synchronous – ISO – Synchronous and Asynchronous Communications from serial Devices – Examples of Internal Serial – Communication Devices – UART and HDLC – Parallel Port Devices – Sophisticated interfacing features in Devices / Ports – Timer and Counting Devices - ‘12C’, ‘USB’, ‘CAN’ and advanced I/O Serial high speed buses – ISA, PCI, PCI-X, cPCI and advanced buses

Unit III: Programming Concepts And Embedded Programming In C, C++

9 Hrs

Programming in assembly language (ALP) vs. High level language – C Program Elements, Macros and functions – Use of Pointers – NULL pointers – Use of Function calls – Multiple function calls in a Cyclic order in the Main function pointers – Function Queues and Interrupt Service Routines Queues, Pointers – Concepts of EMBEDDED PROGRAMMING IN C++ - Object Oriented Programming – Embedded Programming in C++, ‘C’ Program compilers – Cross compiler – Optimization of memory codes.

Unit IV: Real Time Operating Systems – Part – 1

9 Hrs

Definitions of process , tasks and threads – Clear cut distinction between functions – ISRs and tasks by their characteristics – Operating System Services – Goals – Structures – Kernel – Process Management – Memory Management – Device Management – File System Organization and Implementation – I/O Subsystems – Interrupt Routines Handling in RTOS, REAL TIME OPERATING SYSTEMS: RTOS Task Scheduling models – Handling of task scheduling and latency and deadlines as performance metrics – Co operative Round Robin Scheduling–Cyclic Scheduling with Time slicing (Rate Monotonics Co operative Scheduling)– Preemptive scheduling model strategy by a scheduler – critical section service by a Preemptive scheduler – Fixed (Static) Real time scheduling of tasks – INTER PROCESS COMMUNICATION AND SYNCHRONIZATION – Shared data problem – Use of semaphore(s) – Priority inversion problem and Deadlock situations – Inter process communications using signals – semaphore Flag or mutex as Resource key–Message Queues –Mail boxes – Pipes – Virtual (Logical) Sockets – Remote Procedure Calls (RPCs).

Unit V: Real Time Operating Systems – Part – 2

9 Hrs

Study of Micro C/OS-II or Vx works or any other popular RTOS – RTOS system level functions – Task service functions – Time Delay Functions – Memory Allocation Related Functions – Semaphore related functions – Mailbox related functions – Queue related functions – Case studies of programming with RTOS – Understanding case definition – multiple tasks and their functions – creating a list of tasks – Function and IPCs – Exemplary Coding steps.

Total No of periods: 45hrs

TEXT BOOK:

1. Rajkamal, (2008) Embedded Systems Architecture, Programming and Design, (2nd ed.) TMH

REFERENCES:

1. Steve Heath- (2003 Newnes), *Embedded Systems Design*, Second Edition
2. Wayne Wolf, (First Indian Reprint 2001)*Computers as Components: Principles of embedded computing system design* – Harcourt India, Morgan Kaufman Publishers.
3. Frank Vahid and Tony Givargis (2002), *Embedded Systems Design – A unified Hardware / Software Introduction*, John Wiley.
4. Marilyn wolf (2012),” *computers as components:principle of embedded computing systems design*, 3rd Edit



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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

BEC13E35

**MICRO CONTROLLER ARCHITECTURE &
DESIGN**

3 0 0 3

OBJECTIVES:

- The students will be able to design and develop programs for 8051 microcontroller,
- The ability to understand the interfacing of devices with 8051
- Able to understand ARM processors and implement simple programs in it.

Unit I Microcontroller Organization & Architecture

9 Hrs

Elements of a computer – Microprocessor – Microcontroller – Instruction sets, formats, addressing modes – Microcontroller software development process – Real Time programming requirements – Interfacing C and assembly language.

Unit II 8051 Microcontroller Architecture & Programming

9 Hrs

8051 Architecture – Pin Diagram – I/O ports – Instruction set of 8051 – Addressing modes – Data transfer instructions – Arithmetic and logical instructions – Jump and Call instructions – Interrupts handling – Timers & Counters.

Unit III Fundamentals of Interfacing

9 Hrs

Fundamentals of interfacing- Input/output ports (i/o) ports (serial i/o ports, parallel i/o ports), analog to digital (a/d) and digital to analog (D/A) conversion, programmable timers, interrupt handling, serial I/O, synchronous vs. asynchronous serial I/O, asynchronous transmission format, synchronous transmission format (SDLC), RS-232, terminal interfacing, modem interfacing, bit banging.

Unit IV Introduction to ARM

9 Hrs

ARM Processor Architecture and Pipelining – Data Paths – Instruction Decoding – Instruction Set – Addressing Modes – Thumb Instruction Set – Code Sequences.

Unit V Advanced Microcontroller

9 Hrs

ARM7TDM1 – ARM9TDM1 – Advanced Microcontroller Bus Architecture – ARM9E – SARM10 – StrongARM - XScale

Total = 45hrs

Text Books:

1. K.Kenneth Hintz, Daniel Tabak (2005), “*Microcontrollers – Architecture, Implementation & Programming*” TataMcGraw Hill
2. David Seal (2007), “*ARM Architecture Reference Manual*”, 2nd Edition, Addison Wesley,.

Reference Books:

1. Mohammed Ali Mazidi, Janice Gillispie Mazidi (2005) “*The 8051 Microcontroller and Embedded System*”, 2nd Edition, Pearson Education



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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
BIOINFORMATICS SPECIALISATION

BBT13E31

BIO INFORMATICS

3 0 0 3

OBJECTIVES:

- The students will be able to design and develop protein structures
- Ability to understand human genomes.

| | | |
|--|---|----------------------|
| Unit I | Basics | 9 Hrs |
| Life in Space and Time – Dogmas – Data Archives – WWW – Computers – Biological Classification – Use of Sequences – Protein Structure – Clinical Implications. | | |
| Unit II | Genome Organization | 9 Hrs |
| Genomics and Proteomics – Eavesdropping on transmission of genetic information – Genomes of Prokaryotes – Genomes of Prokaryotes – Genomes of Eukaryotes – Human Genome – SNPs, Genetic Diversity – Evolution of Genomes. | | |
| Unit III | Archives and Information Retrieval | 9 Hrs |
| Introduction – The archives – Gateways to Archives | | |
| Unit IV | Alignments and Phylogenetic Trees | 9 Hrs |
| Introduction to Sequence Alignment – The dotplot – Dotplots and Sequence Alignments – Measures of sequence similarity – Computing the Alignment – The dynamic programming algorithm – Significance of alignments – Multiple sequence alignment – Applications, Phylogeny – Phylogenetic trees. | | |
| Unit V | Protein Structure and Drug Discovery | 9 Hrs |
| Protein Stability and Folding – Applications of Hydrophobicity – Superposition of structures – DALI, Evolution of Protein Structures – Classification of Protein Structures – Protein Structure prediction and modeling – Assignment of protein structures to genomes – Prediction of protein function – Drug discovery and development. | | |
| | | Total : 45hrs |

Text Book:

1. Arthur M Lesk (2008), “*Introduction to Bioinformatics*”, Oxford University Press, India

Reference:

1. Attwood T K and Parry – Smith D J (2001), “*Introduction to Bioinformatics*”, Pearson Education India, New Delhi,.



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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

BBT13E32 BIOLOGICAL DATABASE AND DATA ANALYSIS

3 0 0 3

OBJECTIVES:

- The students will be able to design and develop Biological Databases.
- Ability to understand Protein Sequence Databases
- Able to understand exploring and querying the biological database.

Unit I Introduction to Bioinformatics

9 Hrs

Nature of biological data - Overview of available Bioinformatics resources on the web NCBI/EBI/EXPASY etc- Biological Databases: Nucleic acid sequence databases GenBank/EMBL/DDBJ - Biological Databases: Protein sequence databases - PIR-PSD, SwissProt, UniProtKB Database search engines Entrez SRS

Unit II Overview/concepts in sequence analysis

9 Hrs

Overview/concepts in sequence analysis - Pairwise sequence alignment algorithms - Needleman & Wunsch -Smith & waterman -Scoring matrices for Nucleic acids & proteins:MDM ,BLOSUM, CSW Database Similarity Searches:BLAST, FASTA

Unit III Multiple sequence alignment :

9 Hrs

Multiple sequence alignment :PRAS,CLUSTALW - Biological databases: Genome & genetic Disorders,Genome databases: Human, model organisms, microbes & viral ,OMIM- Biological databases: structural databases-PDB, NDB,CCSD - Derived databases: Prosite, BLOCKS, Pfam/Prodom, Exporting GI list, Batch retrieval

Unit IV Exploring & querying the Database

9 Hrs

Exploring the integrated database system at EBI server and searching the EMBL Nucleotide database using the SRS search engine- Exploring & querying SWISSPROT & UniProtKB - Exploring and querying the PIR database - Pair-wise global alignments of protein and DNA sequences usingNeedleman-Wunsch algorithm & interpretation of results to deduce homology between the sequences, use of scoring matrices - Pair-wise local alignments of protein and DNA sequences using Smith-Waterman algorithm and interpretation of results

Unit V Study & Visualisation of Databases

9 Hrs

Database (homology) searches using different versions of BLAST and interpretation of the results to derive the biologically significant relationships of the query sequences (proteins/DNA) with the database sequences- Database (homology) searches using different versions of FASTA & interpretation of the results to derive the biologically significant relationships of the query sequences (proteins/DNA) with the database sequences - Multiple sequence alignments of sets of sequences using web-based and stand-alone version of CLUSTAL. Interpretation of results to identify conserved and variable regions and correlate them with physico-chemical & structural properties - Exploring and using the derived databases: PROSITE, PRINTS, BLOCKS, Pfam and Prodom for pattern searching, domain searches etc - Search & retrieval: genomic and OMIM data at NCBI server -Studying the format & content of structural databases & visualization of structures using Rasmol, Cn3D and other utilities

Total: 45 Hrs

Text Book:

1. Andreas D. Baxevanis, B. F. Francis Ouellette (2005), *Bioinformatics: A Practical Guide to the analysis of Genes and Proteins* (2nd ed.), New York, published by John Wiley & Sons, Inc. Publications

References:

1. Attwood, T.K. & Parry-Smith, D.J. Delhi (1999), *Introduction to Bioinformatics*, Pearson Education Ptd.Ltd.,
2. David W.Mount (2004), *Bioinformatics: Sequence and Genome Analysis*,(2nd ed.) New York, Cold Spring Harbor Laboratory Press
3. Baxevanis, A.D., Davison, D.B., Page, R. D. M. & Petsko, G.A. (2003), *Current Protocols in Bioinformatics*, New York, by John Wiley & Sons Inc.



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BBT13E33

CELL BIOLOGY AND GENETICS

3 0 0 3

OBJECTIVES:

- The students will be able to design and develop genetics of viruses.
- Ability to understand prokaryotic cells.

Unit I Prokaryotic and eukaryotic cells

9 Hrs

membranes and cellular compartmentation; An overview of organelles, (mitochondria, chloroplasts, ER, Golgi, lysosomes and peroxisomes; nucleus and nucleolus) and organelle genetic systems - Cellular membranes: Structure, transport, channels, carriers, receptors, endocytosis, membranepotentials.

Unit II Cell motility and shape

15 Hrs

cytoskeletal elements, cilia and flagella; motor proteins - Cell-cell interactions and signal transduction: Intercellular junctions, signaling by hormones and neurotransmitters; receptors, G-proteins, protein kinases and second messengers - Protein traffic in cells: Protein sorting and signal sequences; protein translocation in ER and vesicular transport to Golgi, lysosomes and plasma membrane; protein import into nuclei, mitochondria, chloroplasts and peroxisomes - Cell cycle and its regulation; events during mitosis and meiosis

Unit III Science of genetics

7 Hrs

– objectives, terminologies, methods - Mendelian principles of inheritance, sex linked inheritance - Chromosomes, linkage, linkage maps and recombination

Unit IV Mutations

7 Hrs

– molecular, gene/point and chromosomal - Genetics of viruses and bacteria - Phenotype and genotype relationships, role of environment, from gene to phenotype, gene interactions

Unit V Study of quantitative traits

7 Hrs

- Genetics of populations, genetics and evolution - Genetics and diseases, cancer

Total: 45 Hrs

Text Books:

1. B. Alberts, D. Bary, K. Hopkin, A. Johnson, J. Lewis, M. Raff, K. Roberts & P. Walter (2004) *Essential Cell Biology* (2nd ed.), Garland Scienc
2. E. J. Gardner, M. J. Simmons & D. P. Snustad (2002) *Principles of Genetics* (8th ed.) John Wiley & Sons

Reference Books:

1. W. S. Klug & M. R. Cummings (2003) *Concepts in Genetics* (7th ed.) by, Pearson Education
2. B. A. Pierce, W. H. Freeman & Company (2003) *Genetics: A Conceptual Approach*
3. B. Alberts, A. Johnson, J. Lewis, M. Raff, K. Roberts & P. Walter Garland Science (2002) *Molecular Biology of the Cell* (4th ed.)
4. G. M. Cooper (2000) *The Cell: A Molecular Approach*, A. S. M. Press
5. H. Lodish, A. Berk, P. Matsudaira, C.A. Kaiser, M. Krieger, M. P. Scott, S. L. Zipursky & J. Darnel, (, 2004) *Molecular Cell Biology* (5th ed.) W. H. Freeman & Company.



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BCS13E25

PROGRAMMING IN PERL

3 0 0 3

OBJECTIVES:

- The students will be able to develop open source programs, to identify and exploit regular expressions, formats and process management for Open source programs
- To design and implement advanced data base procedures.

Unit I Introduction

9 Hrs

PERL, Perl in Bioinformatics, History of Perl, Availability, Support, Basic Concepts- Scalar Data, Scalar Operators, Scalar Variables, Scalar Operators and Functions - Arrays and List Data, Literal Representation, Variables, Array Operators and Functions, Scalar and List Context- Control Structures: Statement Blocks – Hashes, Hash Variables, Literal Representation of a Hash, Hash Functions, Hash Slices - BasicI/O

Unit II Regular Expressions

6 Hrs

Concepts About Regular Expressions, Simple Uses of Regular Expressions, Patterns, More on the Matching Operator, Substitutions, The split and join Functions - Subroutines: System and User Functions, The local Operator, Variable-length Parameter Lists, Notes on Lexical Variables - Miscellaneous Control Structures - File handles and File Tests, Opening and Closing a File handle, Using Pathnames and Filenames, A Slight Diversion: die, Using File handles, The -x File Tests, The stat Function

Unit III Formats

6 Hrs

Defining a Format, Invoking a Format - Directory Access: Moving Around the Directory Tree, Globbing, Directory Handles, Opening and Closing a Directory Handle, Reading a Directory Handle - File and Directory Manipulation

Unit IV Process Management

6 Hrs

Using system and exec, Using Back-quotes - Other Data Transformation: Finding a Substring, Extracting and Replacing a Substring - Formatting Data: Sorting, Transliteration System Information: Getting User and Machine Information, Packing and Unpacking Binary Data

Unit V Database Manipulation

9 Hrs

DBM Databases and DBM Hashes, Opening and Closing DBM Hashes, Fixed-Length Random-Access Databases, Variable-Length (Text) Databases, Win32 Database Interfaces (1) - CGI Programming: The CGI.pm Module, Your CGI Program in Context, Simplest CGI Program, Passing Parameters via CGI, Perl and the Web Object oriented perl: Introduction to modules, Creating Objects - Bioperl: Introduction, Installation procedures, Architecture, Uses of bioperl

Total: 45 Hrs

Text Books:

1. James Tisdall, O-Reilly (2007) *Beginning Perl for Bioinformatics*

Reference Books:

2. Cynthia Gibas, Per Jambeck, O-Reilly (2001) *Developing Bioinformatics Computer Skills*
3. Randal L. Schwartz, Tom Phoenix, O-Reilly (2011)
4. Larry Wall, Tom Christiansen, Jon Orwant, O-Reilly, (2012) *Programming Perl*
5. Alligator Descartes, Tim Bunce, O-Reilly, (2011) *Programming the Perl DBI: Database programming with Perl*
6. Sriram Srinivasan (1997) *Advanced Perl Programming: Foundations and techniques for Perl*



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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

BBT13E35

**ADVANCE TECHNIQUES FOR
SEQUENCE AND STRUCTURE ANALYSIS**

3 0 0 3

OBJECTIVES:

- The students will be able to develop 3D applications using models and tools
- To create a model for molecular dynamics, and to acquire knowledge in simulated annealing techniques.

Unit I Advanced Techniques for Sequence Analysis

9 Hrs

Sequence Profiles: Derivation, Databases, Application, Gapped BLAST, PSI-BLAST, PHI-BLAST -
Advanced Techniques for Structure Analysis: Molecular replacement method, Direct method & Fiber diffraction, Methods for Comparison of 3D structures

Unit II Optimization techniques in Sequence Alignments

9 Hrs

Application of the optimization techniques in Sequence Alignments, Prediction of Protein Structure Docking Simulations

Unit III Advance techniques in Prediction of 3D Structure

9 Hrs

Hidden Markov Model, Neural networks Rossetta Stone

Unit IV Molecular Dynamics Simulations & Monte Carlo Methods

9 Hrs

Electrostatics of biomolecules, Simulations of Bio-macromolecular Structures in Water & membrane, Free energy perturbation method

Unit V Simulated Annealing

9 Hrs

Multiple Sequence Alignments, Simulations of Bio-macromolecular Structures Designing of molecules like drug, inhibitors using Structure based & ligand based docking Methods, Different Scoring schemes

Total: 45 Hrs

Text Books:

1. Koski, T, Dordrecht (2001) *Hidden markov models for Bioinformatics* Kluwer, Academic Publishers
2. Goldberg, D.E (2002), *Genetic algorithms in search, optimization an machine learning* , Pearson Education Pte. Ltd.,
3. Durbin, R., Eddy, S., Krogh, A. & Mitchison, G (1998) *Biological Sequence Analysis: probabilistic models of proteins and nucleic acids* , Cambridge Univ. Press, Cambridge

References:

1. Devillers, J., Ed, 1996. *Genetic algorithms in molecular modeling*
2. Ingvar Eidhammer, Inge Jonassen, William R. (2003) *Protein Bioinformatics: An Algorithmic Approach to Sequence and Structure Analysis* Taylor John Wiley.



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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

BCS13E27

**PATTERN RECOGNITION AND NEURAL
NETWORKS**

3 0 0 3

OBJECTIVES:

- The students will be able to describe the relation between real brains and simple artificial neural network models
- To evaluate the practical considerations in applying neural networks to real classification and regression problems

Unit I BASICS OF PATTERN RECOGNITION

9 Hrs

Introduction to pattern recognition – Features, Feature Vectors and Classifiers - Supervised versus Unsupervised Pattern Recognition - Classifiers Based on Bayes Decision Theory

Unit II - LINEAR CLASSIFIERS AND NON LINEAR CLASSIFIERS

9 Hrs

Linear Discriminant Functions and Decision Hyperplanes - The Perceptron Algorithm - Least Squares Methods - Sum of Error Squares Estimation - The XOR Problem - Three Layer Perceptrons - The Backpropagation Algorithm - Networks with Weight Sharing

Unit III FEATURE SELECTION AND TEMPLATE MATCHING

9 Hrs

Preprocessing - Feature Selection Based on Statistical Hypothesis Testing - Class Separability Measures - Feature Subset selection - Similarity Measures Based on Optimal Path Searching Techniques - Measures Based on Correlations

Unit IV NEURAL NETWORKS

9 Hrs

Artificial neurons, Neural networks and architectures – Supervised Learning I – Supervised Learning II

Unit V ANN:PATTERN RECOGNITION PERSPECTIVE

9 Hrs

Neural Networks: A Statistical Pattern Recognition Perspective – Support Vector Machines and Radial Basis Function Networks.

Total : 45Hrs

Text Books:

1. Sergios theodoridis, Konstantinos koutroumbas 2008, *Pattern Recognition*, (4th ed.), Academic Press,.

Reference Books:

2. B.Yegnanarayana2004, *Artificial Neural Networks*, PHI Learning Pvt. Ltd.,
3. Sathish Kumar, 2008, *Neural Networks – A Class Room Approach*, Tata McGraw Hill



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BCS13E30

INTELLIGENT IMAGE DATABASES

3 0 0 3

OBJECTIVES:

- The students will be able to design and analyze image databases, develop a new access method for multimedia data bases
- To adapt the partitioning and indexing strategies for new data base application.

Unit I The Multimedia Revolution

9 Hrs

Multimedia Environment- Multimedia Data Types - Multimedia and Imaging Databases Evolution of Database Technologies - Multimedia Databases - Various Definitions of Multimedia Databases - Multimedia and Object-Oriented Databases - Other Basic Multimedia Database Management System Features - Integrating Conventional DBMSs with IR and Hierarchical Storage Systems

Unit II Object Orientation for Multimedia Databases

9 Hrs

Relationship between Object Orientation and Multimedia - Abstract Data Types Advantages of Abstract Data typing for Multimedia Database - Inheritance - Advantages of Inheritance for Multimedia database application Development - Advantages of Object Identity in multimedia Database Application Development - Schema Development, Modeling, and Design for Multimedia Databases - OO Analysis and Design for Multimedia Database Applications - Development Life Cycle - Integrity Constraints for Multimedia Database Applications.

Unit III Database Management Systems for Multimedia Databases

9 Hrs

Taxonomy of Multimedia Databases - Multimedia Objects in Relational Databases - OODatabases and Multimedia Database Applications - Integrating Object-Oriented and Database Capabilities - Extending a Database Language with OO Capabilities - Extending an Existing Object-Oriented Programming Language with Database Capabilities

Unit IV Operations and issues with Multimedia Databases

9 Hrs

Extracting Attributes and Key Features- Objects as Attributes versus Attributes as Objects - Searching Multimedia Objects - Multikey Searching of Multimedia Objects - Spatial Databases and Data Types - Iconic Indexing - Content Searching - Content Retrieval for Text Documents - Content Retrieval for Images - Indexing and Retrieval for Electronic video Libraries - Database Querying: Virtual-Reality Interfaces Transactions, Concurrency, and Recovery in Multimedia Databases - Transactions - ACID Test - Transactions for MMDBMS Applications - Transactions Involving the Three Subsystems of an MMDBMS - Concurrency Control - Recovery - Versioning

Unit V Access Methods and Clustering for Multimedia Object Storage

9 Hrs

Introduction - Partitioning search spaces -Indexing strategies and data structures for indexing - Single-Key Index Structures - Index structures for BLOBs positional access- Multi attribute and spatial indexing of Multimedia objects - Indexing for Content - Retrieval- Clustering - Alternative storage strategies

Total : 45 hrs

Text Book:

1. Strag Khoshafian, A. Brad Baker (1996), *Multimedia and imaging databases*, Morgan Kaufmann

References:

1. Yihong Gong, (1998) *Intelligent Image Databases: towards advanced image retrieval*, Springer
2. Oge Marques, Borivoje Furht (2002) *Content based Image and Video Retrieval* Springer



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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

BCS13E33

GEOGRAPHICAL INFORMATION SYSTEMS

3 0 0 3

OBJECTIVES:

- The students will be able to design, explore, interpolate and analyze GIS models
- To create a new geo coding technique and apply the learnt GIS modeling for a real time case study.

Unit I Basic Concepts

9 Hrs

Introduction - Coordinate Systems - Vector Data Model - Raster Data Model

Unit II Data Acquisition & Manipulation

9 Hrs

GIS Data Acquisition - Geometric Transformation - Spatial Data Editing - Attribute Data Input and Management - Data Display and Cartography

Unit III Data Analysis

9 Hrs

Data Exploration - Vector Data Analysis - Raster Data Analysis - Terrain Mapping and Analysis - Viewsheds and Watersheds

Unit IV Interpolation & Applications

9 Hrs

Spatial Interpolation - Geocoding and Dynamic Segmentation - Path Analysis and Network Applications

Unit V Modeling

9 Hrs

GIS Model and Modeling

Total : 45 hrs

Text Book:

1. Kang-tsung Chang (2008), *Introduction to Geographic Information Systems*, (5th ed.), Mcgrawhill

References:

1. Prithvish Nag And Smita Sengupta, *Introduction To Geographical Information Systems, Concept Publishing Company*, 2007, ISBN 8180694399, 9788180694394
2. Paul Longley, *Geographical information systems*, 2/e, Wiley, 1999, Digitised 2007, ISBN - 0471321826, 9780471321828



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BCS13E36

PARALLEL ALGORITHMS

3 0 0 3

OBJECTIVES:

- The students will be able to analyze and design parallel algorithms
- To understand the advanced architectural models
- To design and develop a new parallel architecture model.

Unit I Parallel Random Access Machines

9 Hrs

PRAM Model – PRAM Algorithms – Parallel Reduction – Prefix Sums – List Ranking – Preorder Tree Traversal – Merging Two Sorted Lists – Graph Coloring – Reducing Number of Processors – NC Class.

Unit II Parallel Processing Models

9 Hrs

Classifying MIMD Algorithms – Hypercube SIMD Model – Shuffle Exchange SIMD Model – 2D Mesh SIMD Model – UMA Multiprocessor Model – Broadcast – Prefix Sums.

Unit III Parallel Sorting methods

9 Hrs

Enumeration Sort – Lower Bound on Parallel Sorting – Odd-Even Transposition Sort – Bitonic Merge – Parallel Quick Sort – Complexity of Parallel Search – Searching on Multiprocessors.

Unit IV Parallel Search Methods

9 Hrs

P-Depth Search – Breadth Depth Search – Breadth First Search – Connected Components – All pair Shortest Path – Single Source Shortest Path – Minimum Cost Spanning Tree.

Unit V Algorithms for Parallel Architecture

9 Hrs

Matrix Multiplication on 2-D Mesh, Hypercube and Shuffle Exchange SIMD Models – Algorithms for Multiprocessors – Algorithms for Multicomputers – Mapping Data to Processors.

Total: 45 Hrs

Text Books:

1. Michael Quinn (2002), *Parallel Computing : Theory & Practice*, Tata McGraw Hill Edition
2. Anath Grama, Anshul Gupta, George Karpis, Vipin Kumar, (2009) *Introduction to Parallel Computing, Design and analysis of Algorithms*, (2nd ed.) Pearson

References:

1. Henri Casanova, Arnaud Legrand, Yves Robert, *Parallel algorithms*, CRC Press, 2009 Digitized



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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

BCS13E37

SPEECH PROCESSING

3 0 0 3

OBJECTIVES:

- The students will be able to understand and develop speech recognition algorithms
- To understand the functionalities of different types of speech coders and develop a new speech processing technique.

| | | |
|----------------------|--|--------------|
| Unit I | BASICS Spoken Language System Architecture and Structure – Sound and Human Speech System – Phonetics and Phonology – Syllables and Words – Syntax and Semantics – Probability Theory – Estimation Theory – Significance Testing. | 9 Hrs |
| Unit II | SPEECH SIGNAL REPRESENTATION AND CODING Short Time Fourier Analysis – Acoustic Model of Speech Production - Linear Predictive Coding – Cepstral Processing – Perceptual Motivated Representations – Formant Frequencies – Role of Pitch – Scalar Waveform Coders – Scalar Frequency Domain Coders – Code excited linear Prediction – Low – Bit rate Speech coders. | 9 Hrs |
| Unit III | SPEECH RECOGNITION Hidden Markov Models (HMM) – Practical Issues in Using HMMs – HMM Limitations Acoustic Modeling – Phonetic Modeling – Language Modeling - Speaker Recognition Algorithms – Signal Enhancement for Mismatched Conditions. | 9 Hrs |
| Unit IV | SPEECH SYNTHESIS Formant Speech Synthesis – Concatenative Speech Synthesis – Prosodic Modification Of Speech – Source Filter Models For Prosody Modification – Evaluation Of Text To Speech System. | 9 Hrs |
| Unit V | SPOKEN LANGUAGE UNDERSTANDING Dialog Structure – Semantic Representation – Sentence Interpretation – Discourse Analysis – Dialog Management – Response Generation And Rendition – Case Study. | 9 Hrs |
| Total: 45 Hrs | | |

Text Books:

1. Xuedong Huang, Alex Acero, Hsiad, Wuen Hon, “ *Spoken Language Processing*”, Prentice Hall, 2001. Digitized in 2007
2. B.Gold and N.Morgan (2011), “*Speech and Audio Signal Processing*”, (2nd ed.) Wiley

References:

1. Thomas F.Quatieri (2008), “*Discrete-Time Speech Signal Processing*”, Pearson Education,.
2. M.R.Schroeder, (2004) “*Computer Speech – Recognition, Compression, Synthesis*”, Springer Series in Information Sciences.
3. A Brief Introduction to Speech Analysis and Recognition, An Internet Tutorial - <http://www.mor.itesm.mx/~omayora/Tutorial/tutorial.html>
4. Daniel Jurafsky & James H.Martin (2009), “*Speech and Language Processing*”, PHI



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BCS13E38

SOFT COMPUTING

3 0 0 3

OBJECTIVE:

- The students will be able to design and develop neuro fuzzy modeling and will have the ability to understand Neural Network.

Unit I Neuro – Fuzzy and Soft Computing Fuzzy Systems 9 Hrs

Introduction to Fuzzy Sets – Fuzzy Rules and - - Fuzzy Reasoning and - Inference- Fuzzy Inference Systems - Compositional Rules of Inference in Fuzzy System – Defuzzification Strategies , Fuzzy Models– System Identification – Several Least Square Methods – Optimization Techniques- Derivative-based Optimization, Derivative and Free Optimization.

Unit II Regression and Optimization 9 Hrs

System Identification – Several Least Square Methods – Optimization Techniques- Derivative-based Optimization, Derivative and Free Optimization.

Unit III Neural Network 9 Hrs

Neural Network Architecture -Network Inputs and Outputs – Feed back Inter Connections and Network Stability – Feed Forward Networks –Back Propagation Networks- Learning Methods- Adaptive Networks – Supervised Learning Neural Networks –RBFN – Unsupervised Learning Networks - Self Organizing maps, Adaptive Resonance Architectures, Radial Basis Networks- LVQM , Principle Component Analysis.

Unit IV Neuro Fuzzy Modelling 9 Hrs

Neural Component of a Fuzzy System – Fuzzy neural Network Controllers – Adaptive Neuro Fuzzy Inference System(ANFIS) – CANFIS – Neural Networks based Fuzzy Inference System - Classification and Regression Tests – data Clustering Techniques and Algorithms – Rule base Structure Identification

Unit V Artificial Neural networks hardware 9 Hrs

Implementation Issues – Evaluation of Neural network Architectures – Hardware Realization – VLSI approach – Optical techniques.

Total: 45 Hrs

Text Book:

1. Jyh-shing roger Jang, Chnesy-tasi sur, Eiji Miziltazui,“ *Neuro and Soft Computing: A Computational Approach to Learning and machine Intelligence*”, Pearson Education 2004, Digitized in 2007

References:

1. Timothy J.rass (2011), “ *Fuzzy Logic with Engineering Application*”, (3rd ed.)Wiley India,
2. S.Rajasekaran , G.A.Vijayalakshmi Pai , *Neural N/Ws, Fuzzy Logic and Genetic Algorithm Synthesis and Applications*, PHI (2004)



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BCS13E39

MACHINE LEARNING

3 0 0 3

OBJECTIVES:

- The students will be able to understand the Implementation of genetic algorithms
- To gain knowledge about Q-Learning for various applications and create a new machine learning technique.

Unit I

BASICS

9 Hrs

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

Unit II : NEURAL NETWORKS AND GENETIC ALGORITHMS

9 Hrs

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

Unit III: BAYESIAN AND COMPUTATIONAL LEARNING

9 Hrs

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

Unit IV INSTANT BASED LEARNING

9 Hrs

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

Unit V

ADVANCED LEARNING

9 Hrs

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

Total: 45 Hrs

Text Book:

1. Tom M. Mitchell, “Machine Learning”, McGraw-Hill, 2010

References:

1. Ethem Alpaydin, (2004) “*Introduction to Machine Learning (Adaptive Computation and Machine Learning)*”, The MIT Press
2. T. Hastie, R. Tibshirani, J. H. Friedman, “*The Elements of Statistical Learning*”, Springer(2nd ed.), 2009



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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

BCS13E40

ADVANCED COMPUTER ARCHITECTURE

3 0 0 3

OBJECTIVES:

- The students will be able to design and develop simple pipeline processor
- To understand Multiprocessor Issues, and able to understand embedded systems.

UNIT I RISC ARCHITECTURE

9 Hrs

Basis and Principles of RISC Design, RISC Architecture, Instruction Format , Instruction set, Addressing Modes, Efficiency of RISC CPU, Simplicity of Datapath and Control Unit Design

Unit II Trends in Parallel processing

9 Hrs

Parallelism in uni processor systems, parallel computer structures, architectural classification schemes, parallel processing applications, memory hierarchy in parallel processing systems, addressing schemes. Pipeline concept, linear pipelining and space time diagram, classification of pipeline processors, nonlinear pipeline and reservation table, interleaved memory organization, arithmetic pipelines, principles of designing pipeline processors, vector processing.

Unit III SIMD

9 Hrs

SIMD array processors, organization, masking and routing mechanisms, inter PE communications, SIMD inter connection networks, single stage and multi stage networks, mesh connected Illiac networks, parallel shifter, shuffle exchange and omega networks, parallel algorithms for array processors, matrix multiplication, polynomial evaluation, parallel sorting , fast fourier transform computation, associative array processor.

Unit IV Multiprocessor Issues

9 Hrs

Multiprocessor architecture, loosely coupled and tightly coupled multiprocessor systems, processor characteristics, inter connection networks crossbar switch and multi port memories, multi stage networks, banyan and delta networks parallel memory organization, multiprocessing operating systems, classification and requirements, software requirements for MPS, language features to exploit parallelism, multi processor scheduling strategies, parallel algorithms.

Unit V Data flow & VLSI

9 Hrs

Data flow computers, control flow versus data flow, data flow computer architectures, data flow graphs, data flow languages, Dennis and Irvine machines, dataflow design alternatives, dependence driven and multi level event driven approaches, VLSI computing structures, systolic array architecture, VLSI matrix arithmetic processor.

Total: 45 Hrs

Text Books:

1. Wang K. Briggs F.A “*Computer Architecture and parallel processing*”, McGrawHill, 1984, Digitized in 2007.
2. Hesham EL- Riwini ,John Wiley and sons, (2005)*Advance Computer Architecture and Parallel Processing*



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BCS13E41

ROBOTICS

3 0 0 3

OBJECTIVES:

- The students will be able to design different types of robots for different kinds of applications, program different types of ROBOTS
- To understand the concept of industrial robots thoroughly.

Unit I ROBOTICS Concepts

9 Hrs

Robotics and programmable automation, Historical background, Laws of Robotics , Robot definitions – Robotics system and Robot anatomy – Specifications of Robots, robot configuration, degrees of freedom, Work Volume – Precision of Movement – Safety measures in Robotics.

Unit II Robot drives, actuators and control

9 Hrs

– Functions of drive systems – Hydraulic systems – Pneumatic systems – Electrical drives –Open loop and Closed loop control system- pick and place control- point to point control, continuous path control system . Robot end effectors – Classification – Drive system for grippers – Mechanical grippers – Magnetic grippers – Vacuum grippers – Adhesive grippers – Gripper force analysis and gripper design.

Unit III Sensors

9 Hrs

Need for sensing systems – Sensory device – Types of sensors – Tactile sensor, Proximity Sensors, Range sensors, Navigation sensors, Vision sensors, Miscellaneous sensors, Robot vision systems – Low level vision and high level vision.

Unit IV Robot language and programming

9 Hrs

Methods, Robot language – Classification of Robot languages – Computer control and robot software – VAL system and language. Application of Robots: Capabilities of Robots – Robotics applications – Obstacle avoidance.

Unit V Artificial intelligence and automated manufacturing

9 Hrs

– AI and robotics Robot intelligence and task planning – State space search problem reduction – Use of predicate logic – Means and Ends analysis – Problem solving – Robot learning – Robot task planning – Basic problems in task planning.

Total: 45 hrs

Text Books:

1. Deb, “*Robotics Technology and Flexible Automation*”, Tata McGraw,Hill, New Delhi, 2010.
2. Mikell P.Groover (2008), “*Automation Production System and Computer Integrated Manufacturing*” Prentice Hall of India, New Delhi,
3. Mikell P. Groover, M. Weiss, R. N. Nagal, N. G. Odrey (2008), *Industrial Robotics*, McGraw Hill International,

References:

1. K. S. Fu,Ralph Gonzalez,C.S.G. Lee “*Robotics : Control Sensing. Vision and Intelligence*”, Tata Mc Graw,Hill, New Delhi, 2008.
2. S K Saha, “*Introduction to Robotics*”, 1/e,Tata Mc Graw,Hill, 2008



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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

BCS13E42

MULTI CORE ARCHITECTURE AND PROGRAMMING

3 0 0 3

OBJECTIVES:

- The students will have a systematic understanding of modern multi-core processor micro-architectures and interconnect technologies
- To explain their evolution and be able to critically evaluate their design decisions, understand the memory hierarchy

Unit I Introduction

9 Hrs

Evolution of Computer Architecture - Trends; Fundamentals of Parallel Computers; Need for multi-core architectures

Unit II Parallel Programming

9 Hrs

Overview, Parallel programming design patterns, Multithreading goals and issues, OpenMP Directives – Parallel, work sharing, task, synchronization constructs & other directives, Exercises on Multithreading with OpenMP

Unit III Software Optimization & Performance Analysis

9 Hrs

Processor Architecture basics, Need for software optimization, Algorithms analysis, Performance analysis - Hot spots, Branching, Memory, Loops

Unit IV Benchmarking multi-core architecture

9 Hrs

Bench marking of processors. Comparison of processor performance for specific application domains

Unit V Case Studies & Lab Experiments

9 Hrs

will be the content for asking questions in the SEE

Total Hours : 45hrs

Text Books:

1. Gerber, Aart J.C. Bik, Kevin B. Smith and Xinmin Tian, *The Software Optimization Cookbook*; Richard ,Intel Press, 2002
2. Shameem Akhter and Jason Roberts, *Multi-Core Programming: Increasing Performance Through Software Multithreading*, Intel Press, 2006

References:

1. OpenMP Spec 3.0 handbook available on the Web



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BMG13E02

PROFESSIONAL ETHICS

3 0 0 3

OBJECTIVES:

- The students will be able to design and develop pollution Control Charts,
- To understand environmental ethics and able to understand ethics in IT industry.

Unit I ENGINEERING ETHICS

9 Hrs

Senses of 'Engineering Ethics' - Variety of moral issues - Types of inquiry - Moral dilemmas - Moral autonomy - Kohlberg's theory - Gilligan's theory - Consensus and controversy - Professions and professionalism – Professional ideals and virtues - Theories about right action - Self-interest-Customs and religion - Uses of ethical theories

Unit II ENVIRONMENTAL ETHICS

9 Hrs

Environmental Preservation – Role of stakeholders – International issues – Sustainable Development – Industrial pollution – Environment Reputation – Environment performance – Engineering Management in India – Pollution control charts.

Unit III RESPONSIBILITIES AND RIGHTS

9 Hrs

Collegiality and loyalty - Respect for authority - Collective bargaining - Confidentiality – Conflicts of interest - Occupational crime - Professional rights - Employee rights – Intellectual Property Rights (IPR)- Discrimination.

Unit IV GLOBAL ISSUES

9 Hrs

Multinational corporations - Environmental ethics-Computer ethics-Weapons development-Engineers as managers-Consulting engineers-Engineers as expert witnesses and advisors-Moral leadership-Sample codes of conduct- Case study's with reference to Indian scenario.

Unit V ETHICS In IT INDUSTRY

9 Hrs

Structure of IT – ITES industry, Unique characteristics, Ethical perspective, Case studies – Credit Card Fraud, Cyber crime.

Total : 45 hrs

Text Books:

1. Mike Martin and Roland Schinzinger (2009), "Introduction to Engineering Ethics", McGraw Hill
2. A.C. Fernando, "Business Ethics : An Indian Perspective", pearson 2009 (II – V)

References:

1. Charles D.Fleddermann, "Engineering Ethics", (4th ed.) prentice Hall, 2011,
2. David Ermanu and Michale S Shauf, (2003), "Computers, Ethics and Society", (3rd ed.) Oxford University, Press.



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BMG13E03

ECONOMICS FOR ENGINEERS

3 0 0 3

OBJECTIVES:

- The students will be able to design and develop cost control techniques
- To understand Investment Analysis and be able to understand Business Economics.

Unit - I Basic Principles and Methodology of Economics

12 Hrs

Demand/Supply – elasticity – Theory of the Firm and Market Structure, Basic Macro-economic Concepts and Identities for both closed and open economies, Aggregate demand and Supply (IS/LM), Price Indices (WPI/CPI), Interest rates, Direct and Indirect Taxes

Unit - II Public Sector Economics

11 Hrs

Welfare, Externalities, Labour Market, Components of Monetary and Financial System, Central Bank, Monetary Aggregates; Commercial Banks & their functions; Capital and Debt Markets. Monetary and Fiscal Policy Tools & their impact on the economy, Inflation and Phillips Curve.

Unit - III Elements of Business Economics

6 Hrs

Cost & Cost Control – Techniques, Types of Costs, Budgets, Break even Analysis, Capital Budgeting, Application of Linear Programming,

Unit - IV Investment Analysis

6 Hrs

NPV, ROI, IRR, Payback Period, Depreciation, Time value of money, Business Forecasting, Elementary techniques Statements, Cash flow, Financial..

Unit V Indian economy

10 Hrs

Post independence period - reform Growth, Structure of productive activity, Issues of Inclusion – Sectors, States/Regions, Groups of people (M/F), Urbanization, Employment – Informal, Organized, Unorganized, Public, Private Challenges and Policy Debates in Monetary, Fiscal, Social, External sectors.

Total Hrs : 45

Text / Reference Books:

1. Mankiw Gregory N. (2002), *Principles of Economics*, Thompson Asia
2. V. Mote, S. Paul, G. Gupta (2004), *Managerial Economics*, Tata McGraw Hill
3. Misra, S.K. and Puri (2009), *Indian Economy*, Himalaya
4. Pareek Saroj (2003), *Textbook of Business Economics*, Sunrise Publishers



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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

BCS13E43

SOCIAL COMPUTING (WEB 2.0)

3 0 0 3

OBJECTIVES:

- The students will be able to design and develop applications in Ajax
- To understand Web Services and be able to understand and create Web Applications.

| | | |
|----------------------|---|--------------|
| Unit I | Basic Concepts | 9 Hrs |
| | Web 2.0 Introduction – Advantages & Disadvantages of Web2.0 – Business Aspects of Web2.0 – Web2.0 Principles – Characteristics – design aspects – Introduction to Web services. | |
| Unit II | WEB2.0 SERVICES | 9 Hrs |
| | Web2.0 Services – Applications –Communication - Blogs – Topic, Event, Marketing, Learning , Scholarly - Wiki – Wikia, Wetpaint, Pbwiki, Wikispaces -Podcasting , Vodcasting - 21 st century skills -Social Networking- Social Bookmarking – RSS & Syndication –Newer Web2.0 services and Applications. | |
| Unit III | TECHNOLOGY | 9 Hrs |
| | Ajax – Alternatives to Ajax – Open APIs –SOAP –REST - Microformats – Client side technologies – Web gateway - Security Challenges with Web2.0 – Content Management System(CMS) | |
| UNIT IV | APPLICATION CREATION | 9 Hrs |
| | DOJO toolkit - Creation of Application with DOJO, JSON ,Adobe Flex, Cloud computing, Hadoop – Building Offline Applications using Adobe AIR. | |
| UNIT V | CASE STUDIES | 9 Hrs |
| | Teaching & Learning Issues – Research – Academic Publishing –Library –Repositories –Archiving – Future of Web2.0 – Web2.0 & Semantic Web –Emergence of Web Science. | |
| Total: 45 Hrs | | |

References:

1. “Web2.0- concepts & Applications”, shelly / Frydenberg, 2011, Cengage Learning.
2. “Web 2.0 – new tools, new schools” , Gwen Solomon, Lynne Schrum, 2007, ISTE Publication.
3. www.jisc.ac.uk - JISC Technology and Standards Watch, Feb. 2007 Web 2.0(PDF)
4. Web2.0 Tutorials(from web)
5. Mastering Web2.0 Technologies(from web)
6. www.dojotoolkit.org



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BMG13E04

GLOBAL STRATEGY AND TECHNOLOGY

3 0 0 3

OBJECTIVES:

- The students will be able to develop a simple Global Strategy,
- Ability to understand productivity and Diffusions
- Able to do Research and Development in investment.

| | | |
|-----------------|--|-----------------------|
| Unit I | Introduction to Global Strategy | 9 Hrs |
| | Motivations to Global Strategy ,demands of global integration, local responsiveness and worldwide learning, global MNCs , Internationalization of Corporate Capitalism | |
| Unit II | Location and Global Strategy | 9 Hrs |
| | Home-Country Effects: global leadership in the watch industry,decline of the Swiss watch industry, Distance and Global Strategy, Host Country Choices: The Globalization of CEMEX , benefits , Challenges, advantages, Industry Characteristics and Global Strategy, Design of a competitive strategy, Haier’s current global strategy ,Good rationale for Haier. | |
| Unit III | International Corporate Governance | 9 Hrs |
| | Corporate Governance with Chinese Characteristics, China’s capital market, Corporate governance model in China, model Conditions for Petro China’s corporate governance system Cross-cultural Negotiation: MOUSE negotiation Issues, negotiation outcome Issues, Negotiators attitudes and culture , role of information acquisition in negotiation, Foreign Market Entry Strategies: Issues in geographic market diversification,different strategies of internationalization, different entry modes into a foreign market,Stages of internationalization,International operations,Tensions of an enterprise going international. | |
| Unit IV | Technology: Productivity and Diffusion | 9 Hrs |
| | Productivity Impact and Managing Diffusion Science, Technology and Productivity, Technology, Markets and Competition Incumbents and Entrants Commercialization Intellectual Property and Complementary Assets. | |
| Unit V | Investing in R&D Capabilities | 9 Hrs |
| | Incentives to Innovate Investing in basic/applied research, Real options and other approaches, Applying the Concepts and Frameworks, R&D Investment Decisions, Applying the NPV, Real Options and Scenario,Planning Frameworks. | |
| | | Total : 45 hrs |

References

1. Pankaj Ghemawat (2007), *Redifing Global Strategy*, Harvard business School Press
2. A.Larker and B.Tayan (2011), *Corporate Governance Matters* , FT Press,.
3. Noel Capon, James M. Hulbert(2007), *Managing Marketing in the Twenty-first Century*, Wessex Publishing
4. Sumantra Ghoshal, Gita Piramal, Christopher A. Bartlett (2002), *Managing Radical Change*, (2nd ed.) Penguin Books India,
5. Nancy J. Adler, Allison Gundersen, 2008, *International Dimensions of Organizational Behavior*, (5th ed.), Cengage Learning.



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BMG13E05

HUMAN VALUES AND HUMAN RIGHTS

3 0 0 3

OBJECTIVES:

- The students will be able to improve the confidence, Concentration and Professional behavior
- To understand Human Rights.

UNIT I: VALUE EDUCATION

9 Hrs

Values and Self Development-Social values and individual attitudes, Work ethics, Indian vision of humanism, Moral and non moral valuation, Standards and principles, Value judgments. Importance of cultivation of values, Sense of duty, Devotion, Self reliance, Confidence, Concentration, Truthfulness, Cleanliness, Honesty, Humanity, Power of faith, National unity, Patriotism, Love for nature, Discipline.

UNIT II: SELF DEVELOPMENT & PERSONALITY DEVELOPMENT

9 Hrs

Self Leadership & Self Management -3P's – Perseverance – Personality Theories – Stages of Personality Development – Emotional Stress – Handling of Conflicts – Personality for Face value –Positive attitude – Aware of self destructive habits, Association and cooperation,.

UNIT III: BEHAVIOR DEVELOPMENT

9 Hrs

Meaning of Professionalism – Guiding Ethics – Developmental Framework –Professional Behaviors: Dependability, Initiative ,Empathy, Clinical Reasoning, Verbal & Write Communication, Developing Professionalism in the next generation.

UNIT IV: HUMAN RIGHTS

9 Hrs

The United Nations - The International Bill of Human Rights - Regional protection of human rights- Europe - American States- The right to liberty of person - Equality before the law - the right to a fair trial - The right to selfdetermination - Freedom of expression - The right to work - The right to education and human rights education - Equality and nondiscrimination - The right to life

UNIT V: CONSTITUTION OF INDIA

9 Hrs

Framing of Constitution –Features of Constitution – Federal System – Formation of States – Citizenship – Fundamental Rights – Fundamental Duties – Union Legislature – State Legislature – Judiciary – Courts – Public Service Commission – Elections – Amendments of the Constitutions – Natural Justice.

Total : 45Hrs

Reference Books:

1. R.S. Naagarazan, (2007) *Textbook on Professional Ethics and Human Values*, New Age International, (Unit 1)
2. R.C.Bhatia, Ane Books Pvt Ltd, (2010) “*Personality Development*“, (unit 2)
3. Jack Kasar, E.Nelson Clark “*Developing Professional Behaviors*”, , Slack Incorporated Copyright, 2000. (Unit 3)
4. Rhona K. M. Smith (2007), *Textbook on International Human Rights*, (3rd ed.), Oxford Univ Press.(Unit 4)
5. Brij Krishore Sharma (2007), “*Introduction to Constitution of India*” (4th ed.) ,PHI.(Unit 5).