ANDHRA UNIVERSITY: : VISAKHAPATNAM
COMMON SCHEME OF INSTRUCTION & EXAMINATION
**I/IV B.TECH** (FOUR YEAR COURSE) &
**I/IV B.TECH** (SIX YEAR DOUBLE DEGREE COURSE)
(With effect from **2019-2020** admitted batch onwards)

# GROUP – A
# (Civil, Chemical, CSE, IT)

## I-SEMESTER

| SUB. REF | NAME OF THE SUBJECT | PERIODS | | | MAXIMUM MARKS | | | CREDITS |
|---|---|---|---|---|---|---|---|---|
| | | THEORY | TUTORIAL | LAB | EXAM | SESSIONALS | TOTAL | |
| ENG 1101 | ENGLISH | 2 | -- | -- | 70 | 30 | 100 | 2 |
| ENG 1102 | MATHEMATICS – I | 3 | -- | -- | 70 | 30 | 100 | 3 |
| ENG 1103 | MATHEMATICS – II | 3 | -- | -- | 70 | 30 | 100 | 3 |
| ENG 1104 | CHEMISTRY | 3 | 1 | -- | 70 | 30 | 100 | 4 |
| ENG 1106 | COMPUTER PROGRAMMING WITH C AND NUMERICAL METHODS | 3 | -- | -- | 70 | 30 | 100 | 3 |
| ENG 1108 | CHEMISTRY LAB | -- | -- | 3 | 50 | 50 | 100 | 1.5 |
| ENG 1110 | COMPUTER PROGRAMMING WITH NUMERICAL METHODS LAB | -- | -- | 3 | 50 | 50 | 100 | 1.5 |
| ENG 1112 | HISTORY OF SCIENCE & TECHNOLOGY | 2 | -- | -- | 70 | 30 | 100 | 0 |
| | **TOTAL** | **16** | **1** | **6** | | | **800** | **18** |

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# GROUP – A
# (Civil, Chemical, CSE, IT)

## II-SEMESTER

| SUB. REF | NAME OF THE SUBJECT | PERIODS | | | MAXIMUM MARKS | | | CREDITS |
|---|---|---|---|---|---|---|---|---|
| | | THEORY | TUTORIAL | LAB | EXAM | SESSIONALS | TOTAL | |
| ENG 1201 | MATHEMATICS – III | 3 | 1 | -- | 70 | 30 | 100 | 4 |
| ENG 1202 | PHYSICS | 3 | 1 | -- | 70 | 30 | 100 | 4 |
| ENG 1204 | ENGINEERING GRAPHICS | 2 | -- | 4 | 70 | 30 | 100 | 4 |
| ENG 1206 | PROBABILITY, STATISTICS & QUEUING THEORY | 3 | 1 | -- | 70 | 30 | 100 | 4 |
| ENG 1208 | PHYSICS LAB | -- | -- | 3 | 70 | 30 | 100 | 1.5 |
| ENG 1210 | WORK SHOP | -- | -- | 3 | 50 | 50 | 100 | 1.5 |
| ENG 1211 | ENGLISH LANGUAGE LAB | -- | -- | 3 | 50 | 50 | 100 | 1.5 |
| ENG 1209 | PROFESSIONAL ETHICS & MORAL VALUES | 2 | -- | -- | 70 | 30 | 100 | 0 |
| | **TOTAL** | **13** | **3** | **13** | **450** | **250** | **800** | **20.5** |

ANDHRA UNIVERSITY: : VISAKHAPATNAM
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**II/IV B.TECH** (FOUR YEAR COURSE) &
**II/IV B.TECH** (SIX YEAR DOUBLE DEGREE COURSE)
(With effect from **2019-2020** admitted batch onwards)

**B.TECH. (CSE) II YEAR I-SEMESTER SCHEME OF INSTRUCTION AND EXAMINATION**

| SUB. REF | NAME OF THE SUBJECT | PERIODS | | | MAXIMUM MARKS | | | REDITS |
|---|---|---|---|---|---|---|---|---|
| | | THEORY | TUTORIAL | LAB | EXAM | SESSIONALS | TOTAL | |
| CSE211 | ELEMENTS OF ELECTRONICS ENGINEERING | 3 | 0 | -- | 70 | 30 | 100 | 3 |
| CSE212 | DATA STRUCTURES & ALGOTITHMS | 3 | 1 | -- | 70 | 30 | 100 | 4 |
| CSE213 | DIGITAL LOGIC DESIGN | 3 | 0 | -- | 70 | 30 | 100 | 3 |
| CSE214 | OBJECT ORIENTED PROGRAMMING | 3 | 1 | -- | 70 | 30 | 100 | 4 |
| CSE215 | ELEMENTS OF ELECTRICAL ENGINEERING | 3 | 0 | -- | 70 | 30 | 100 | 3 |
| CSE216 | PRINCIPLES OF ECONOMICS & MANAGEMENT | 3 | 0 | -- | 70 | 30 | 100 | 3 |
| CSE217 | DATA STRUCTURES LAB | -- | -- | 3 | 50 | 50 | 100 | 1.5 |
| CSE218 | OBJECT ORIENTED PROGRAMMING LAB | -- | -- | 3 | 50 | 50 | 100 | 1.5 |
| | **TOTAL** | **18** | **2** | **6** | **520** | **280** | **800** | **23** |

| CSE 211 | **ELEMENTS OF ELECTRONICS ENGINEERING**<br>*Common with 6years integrated B.Tech(CSE)+M.Tech and B.Tech(IT)* | |
|---|---|---|
| **Instruction: 3Periods/week**, | **Univ. Exam: 3 Hours** | **Credits: 3** |
| **Internal: 30 Marks** | **University Exam: 70 Marks** | **Total: 100 Marks** |

1. **Introduction to Electronics and Semiconductors:** Energy band theory, Conduction inInsulators, Semiconductors and metals, Electron emission from metals, Classification of semiconductors, Carrier concentration in an intrinsic semiconductor, Properties of intrinsic semiconductor, Drift and diffusion currents.
2. **Semi Conductor Diode:**Theory of PN junction diode, Open circuited PN junction, V-Icharacteristics of a PN diode, Diode current equation, Transition and diffusion capacitances, Break down in PN diode, Applications of PN diodes. Zener diode, Zener regulator, Tunnel diode, Schottky diode.
3. **Rectifying circuits:** Half wave and full wave rectifiers, Bridge rectifiers, Efficiency, Ripple andregulation of each rectifier, Capacitor filters.
4. **Bipolar Junction Transistor** :– Introduction, construction, Operation of PNP and NPNTransistors – Transistor Circuit configurations- Characteristics of a CE configurations – h parameters, low frequency small signal equivalent circuit of a Transistor.
5. **Transistor Biasing and thermal stabilization:** Transistor Biasing, Stabilization, Differentmethods of transistor biasing – Fixed bias, Collector feedback bias – self bias – Bias compensation.
6. **Transistor Amplifiers:** CE, CB, CC amplifier configurations –Multistage amplifier – A Two StageRC coupled amplifier – frequency response curve and bandwidth**.**
7. **Field Effect Transistors:** Junction Field Effect Transistors (JFET) – JFET characteristics, JFETParameters, Small signal equivalent circuit – MOSFETS – Depletion and Enhancement MOSFETS.

**Text Books:**

1. Electronic Device and Circuits by Sanjeev Guptha.

**Reference Books:**

1. Electronic Device and Circuits Theory by Robert L. Boylested Electronic Device and Circuits by David. A. Bell

| CSE 212 | **DATA STRUCTURES& ALGORITHMS**<br>*Common with 6years integrated B.Tech(CSE)+M.Tech and B.Tech(IT)* | |
|---|---|---|
| **Instruction: 3Periods+1Tut/week,** Univ. Exam: 3 Hours | | **Credits: 4** |
| **Internal: 30 Marks** | **University Exam: 70 Marks** | **Total: 100 Marks** |

1. **IntroductiontoDataStructures**:ReviewofCProgramming, RecursiveDefinitionandProcesses,RecursioninC, Simulationof Recursion, Efficiencyof Recursion, Abstract Data Types, Meaning and Definition of Data Structures, Arrays

2. **Stacks**: Stack as anAbstractDataType, Primitive Operations, ImplementingStack Operations using Arrays, Infix, Postfix and Prefix: Definitions,EvaluationandConversions. **Queues**:Queueas an AbstractDataType, SequentialRepresentation, Typesof Queues, Operations, Implementation using Arrays.

3. **Linked List**:Operations, Implementation of Stacks, QueuesandpriorityQueuesusing Linked Lists+, Circular Lists:Insertion,DeletionandConcatenationOperations, StacksandQueuesas CircularLists, DoublyLinkedLists.

4. **Trees**:Binary Trees - Definitions and Operations, Binary Tree Representation:NodeRepresentation, ImplicitarrayRepresentation, BinaryTreeTraversal, ThreadedBinaryTreesandtheirTraversal, Trees andtheirApplications; Heterogeneous binary trees

5. **Searching**:BasicSearchingTechniques:DictionaryasanAbstract Data Type, Algorithmic Notation, SequentialSearchinganditsEfficiency, Binary Search, Interpolation Search. TreeSearching:InsertionandDeletion of a nodefromaBinarySearchTree, Efficiency of Binary Search Tree operations.

6. **Sorting:**GeneralBackground:Efficiency, Asymptotic Notations, EfficiencyofSorting, Bubble SortandQuickSortandtheirEfficiency, SelectionSorting, BinaryTreeSort, Heap Sort, InsertionSorts, ShellSort, Address calculationSort, Mergeand RadixSorts.

7. **Graphs and Their Application:** Definition of Graphs, RepresentationofGraphs, Transitiveclosure, Linked Representation of Graphs, Topological Ordering of nodes,GraphTraversalandSpanningForests,
   UndirectedGraphsandtheirTraversals,Applications of Graphs, Minimal Spanning Trees.

**Textbooks**:

1. DataStructures UsingCand C++YaddishLangsam, MosheJ.AugensteinandAaronM.Tanenbaum, Prentice HallOf India (2nd Edition)
2. Data Structure and Algorithm, Prof. Maria Rukadikar S

**Reference Books:**

1. Data Structures, Algorithms and Applications withC++, Sahani Mc-GrawHill.

| CSE 213 | **DIGITAL LOGIC DESIGN**<br>*Common with 6years integrated B.Tech(CSE)+M.Tech and B.Tech(IT)* | |
|---|---|---|
| **Instruction: 3Periods/week,** Univ. Exam: 3 Hours | | **Credits: 3** |
| **Internal: 30 Marks** | **University Exam: 70 Marks** | **Total: 100 Marks** |

**Course Objectives:**

To introduce the basic principles for design of combinational circuit and sequential circuits. To learn simple digital circuits in preparation for computer engineering.

**Course Outcomes:**

A student who successfully fulfills the course requirements will have demonstrated:

1. An ability to define different number systems, binary addition and subtraction, 2's complement representation and operations with this representation.
2. An ability to understand the different Boolean algebra theorems and apply them for logic functions.
3. 3. An ability to define the Karnaugh map for a few variables and perform an algorithmic reduction of logic functions.
4. An ability to define the following combinational circuits: multiplexer, de-multiplexers encoders/decoders, comparators, arithmetic-logic units; and to be able to build simple circuits.
5. 5. An ability to understand asynchronous and synchronous sequential circuits, like counters and shift registers.
6. An ability to understand memories like RAM and ROM, Programmable Logic Array and Programmable Array Logic.

**Syllabus:**

1. **Binary Systems:** Digital Systems. Binary Numbers. Number Base Conversions. Octaland Hexadecimal Numbers. Complements. Signed Binary Numbers. Binary Codes. Binary Storage and Registers. Binary Logic

2. **Boolean Algebra and Logic Gates:** Basic Definitions. Axiomatic Definition of Boolean Algebra.Basic Theorems and Properties of Boolean Algebra. Boolean Functions. Canonical and Standard Forms. OtherLogicOperations.Digital Logic Gates. Integrated Circuits.

3. **Combinational Logic Design, Gate-Level Minimization:** The Map Method. Four-Variable Map.Five-Variable Map. Product of Sums Simplification. Don't-Care Conditions. NAND and NOR Implementation. Other Two- Level Implementations. Exclusive-OR Function. HardwareDescriptionLanguage(HDL).

4. **Combinational Logic:** Combinational Circuits. Analysis Procedure. Design Procedure. BinaryAdder- Subtractor.DecimalAdder.BinaryMultiplier.MagnitudeComparator.Decoders. Encoders. Multiplexers. HDL For Combinational Circuits.

5. **Sequential Logic Design, Synchronous Sequential Logic**: Sequential Circuits .Latches .Flip-Flops.Analysis of Clocked Sequential Circuits.HDLForSequentialCircuits.StateReductionandAssignment.DesignProcedure.

6. **Registers ad Counters:** Registers. Shift Registers. Ripple Counters. Synchronous Counters. OtherCounters. HDL for Registers and Counters.
7. **Memory and Programmable Logic**: Introduction. Random-Access Memory. Memory Decoding,Error Detection and Correction. Read-Only Memory. Programmable Logic Array. Programmable Array Logic. Sequential Programmable Devices.

**Textbooks**:


1. Digital Design, 3rdEdition, M.Morris Mano, Pearson Education.
2. Digital Logic Design, Lokesh Chaudhary & Sunil S. Chaudhary Hardeep Singh


**Reference Books:**


1. Digital Logic Design Principles, Norman Balabanian & Bradley Carlson, John Wiley & Sons(Asia) Pvt.Ltd.,2002
2. Fundamentals of Digital Logic with VHDL Design, Stephen Brown and Zvonko Vranesic, Tata McGraw-Hill Edition,2002

| CSE 214 | **OBJECT ORIENTED PROGRAMMING**<br>*Common with 6years integrated B.Tech(CSE)+M.Tech and B.Tech(IT)* | |
|---|---|---|
| **Instruction: 3Periods+1Tut/week,** Univ. Exam: 3 Hours | | **Credits: 4** |
| **Internal: 30 Marks** | **University Exam: 70 Marks** | **Total: 100 Marks** |

**Course Objectives:**

On completing this course student will be able to

1. Understand the syntax and principles of Object oriented programming language, and to programs using control statements, classes and interfaces.
2. Design and development of secure and extendable C++ applications.
3. Understanding the concepts of oops, different predefined classes and packages
4. Understand the concepts of polymorphism

**Course Outcomes:**

1. Students will be able to handle I/O streams and Run time errors.
2. Students will be able to construct applications and Identify where data structures are appearing in them

**Syllabus:**

1. **Basic Concepts of OOP:** Procedural Paradigms, Object Oriented Paradigm, OOP Principles andTerminology, OOP benefits, Procedure and Object Oriented programming languages, advantages and disadvantages. Introduction to U.M.L: Description of various U.M.L. Diagrams with examples.

2. **Introduction to C++ :** Basic Structure C++ Program, variable and Constants, Symbolic Constants ,basic data types and derived data type, variable declaration, dynamic initialization, type modifiers, type casting, i/o statements in C++, operators and example programs**,** Control Structures- Programs using all control structures and statements, Functions: Function Prototypes, Function Components, Returning values from functions, actual and formal arguments, parameter passing methods, Inline functions,

3. **Classes and Objects:** Introduction to class, class definition, class specification, Memberfunctions, data members, access specifiers, scope resolution operator, Object definition and creation, array of objects, pointers, Pointers to objects, this pointer, dynamic allocation operator, friend functions, const and volatile functions, static members, nested classes, local classes,

4. **Constructors and destructors:** Definition of constructor and destructor, default constructor,parameterized constructor, copy constructor, constructor with dynamic allocation, explicit constructor.

5. **Inheritance:** Definition, base class, derived class, using access specifiers in inheritance, Types ofInheritance, protected data with private inheritance, constructor in derived and base class, abstract classes,

6. **Virtual functions and Polymorphism:** Function overloading, arrays and strings, Operatoroverloading through unary and binary operator, Friend functions, Assignment operator, Stream operator overloading and type conversion; Virtual functions, Pure Virtual function, Dynamic polymorphism, Virtual destructor, Virtual base class, Dynamic casting, Cross casting, Down casting, Program development.

7. **Streams and Files in C++:** Stream Classes, Formatted and unformatted data, manipulators, userdefined manipulators, file streams, file pointer manipulation; file open and close, file handling, random access, object serialization, name spaces, std namespaces, ANSI string objects and standard template library.

8. **Templates, Exception handling:** Class templates, Function templates, Member functiontemplates, Exception handling - try-catch-throw paradigm, exception specification, terminate and un expected functions- uncaught exception, exception handling mechanism, multiple catch, nested try, Rethrowing the exceptions

**Text Books:**


1. Object Oriented Programming through C++ by Robat Laphore.
2. Object oriented Programming using C++: E. Balagurusamy, PHI.


**Reference Books:**


1. Object Oriented Programming in C++: N. Barkakati, PHI
2. The Complete reference in C++ by Herbert Shieldt, TMH
3. The C++ Programming Language by B. Stroustrup, Pearson Education

| CSE 215 | ELEMENTS OF ELECTRICAL ENGINEERING | |
|---|---|---|
| **Instruction: 3Periods/week,** Univ. Exam: 3 Hours | | **Credits: 3** |
| **Internal: 30 Marks** | **University Exam: 70 Marks** | **Total: 100 Marks** |

**Course Objectives:**

**1.** To provide exposure to basic electrical engineering concepts to non-major students.

**Course Outcomes:**

1. An ability to define and explain the meaning/function of charge, current, voltage, power, energy, resistors (R), and the fundamental principles of Ohm's law, KVL and KCL including an understanding of electrical safety.
2. An understanding of the behavior of inductances (L) and capacitances (C).
3. An ability to write the differential equations for a given RLC network and solve them analytically for the transient and steady state responses to a step input.
4. An ability to analyze resistive op amp circuits and design inverting, non-inverting, summing, and differential amplifier circuits using op amps.
5. An ability to qualitatively and quantitatively predict and compute the steady state AC responses of basic circuits using the phasor method

**Syllabus:**

1. **Introduction to Electrical Energy**:Definitionsofmagneticcircuit,Reluctance,Magneto-motiveforce), magnetic flux, Simple problems on magnetic circuits, Hysterisis, Characters and loss calculations, Faraday's laws of Electromagnetic Induction, Induced E.M.F., Dynamically induced E.M.F., Statistically Induced EMF,SelfInductance, MutualInductance.

2. **D.C. Generators**: D.C. Generatorprinciple,Constructional details, E.M.F equation,Types and classification,Characteristics,Efficiency,Applications.

3. **D.C. Motors:D.C.** Principle and Operation,Significanceofback E.M.F.,Torqueequation,Types,Speed controlmethodsofD.C.Motors,ApplicationsofD.C.Motor.Testingof D.C.Machines: LossesandEfficiency,Directloadtest and Swinburne's test.

4. **A.C. Circuits**: IntroductiontoSteadyStateAnalysisofA.C.Circuits,Series and Parallel R. l. and R.C. Circuits, Balanced3PhaseCircuits, Star and delta connection

5. **Transformers:**Transformerprinciple,EMFequationoftransformer,Transformeron load,EquivalentcircuitofTransformer,VoltageregulationofTransformer,Lossesina Transformer,CalculationofEfficiencyandRegulationbyOpencircuitandShortcircuit Tests.

6. **ThreephaseInductanceMotor**:Constructionof3 Phase induction Motor, Principle of operation. Types of 3 phase induction Motor, TorqueEquationofInductionMotor.,slip – Torquecharacteristics.,StartingTorque, Torqueunderrunningcondition.,MaximumTorqueEquation.,PowerstagesofInduction Motor., Efficiency Calculation of InductionMotorbydirectloading.
7. **Alternator**:Principle of Operation,EMFequationofAlternator, Calculation of Voltage

RegulationbySync, Impedancemethod, SynchronousMotor:PrincipleofOperation,Construction.,Methods of starting of Synchronous Motor.

8. **Earthing:** Causes of High currents, Current diversion, Earthing principle, Types of Earthing, Earthing Process.

**TextBooks**:

1. "ElementsofElectricalEngineeringandElectronics" by V.K.Mehta, S. Chand & Co

2. "A First Course in Electrical Engineering" by Kothari.

| CSE 216 | PRINCIPLES OF ECONOMICS AND MANAGEMEENT<br>*Common with 6years integrated B.Tech(CSE)+M.Tech and B.Tech(IT)* | |
|---|---|---|
| **Instruction: 3Periods/week,** Univ. Exam: 3 Hours | | **Credits: 3** |
| **Internal: 30 Marks** | **University Exam: 70 Marks** | **Total: 100 Marks** |

**Course Objectives:**

1. Apply economic reasoning to the analysis of selected contemporary economicproblems.
2. Understand how households (demand) and businesses (supply) interact in various market structures to determine price and quantity of goods and services produced andconsumed.
3. Analyze the efficiency and equity implications of government interference inmarkets.
4. Recognize and identify situations leading to market failures and governmentfailures.
5. Evaluate the intent and outcomes of government stabilization policies designed to correct macroeconomicproblems.
6. Use economic problem solving skills to discuss the opportunities and challenges of the increasing globalization of the worldeconomy.

**Course Outcomes:**

1. Understand the links between production costs and the economic models ofsupply.
2. Represent supply, in graphical form, including the upward slope of the supply curve and what shifts the supplycurve.
3. Understand the efficiency and equity implications of market interference, including government policy.
4. Understand how different degrees of competition in a market affect pricing andoutput.
5. Apply economic reasoning to individual and firmbehavior.

**Syllabus:**

1. **Introduction to Managerial Economics:** Wealth, Welfare and Scarce Definitions of Economics; micro and Macro Economics; Demand- Law of Demand, Elasticity of Demand, types of Elasticity and factors of determining price elasticity of Demand: utility- Law of Diminishing Marginal Utility and itslimitations.

2. **Conditions of Different Market Structures:** Perfect Competition, Monopolistic Competition, Monopoly, Oligopoly, andDuopoly.

3. **Forms of Business Organizations:** Sole Proprietorship, Partnership, Joint Stock Company- Private Limited and Public Limited Companies, Public Enterprises and theirtypes.

4. **Introduction to Management:** Functions of Management- Taylor's Scientific management; Henry Fayol's Principle of Management; Human Resource Management- basic Functions of HR Manager; Man Power Planning, Recruitment, Selection, Training, Development, Placement, Compensation and performance Appraisal( inbrief).

5. **Production Management:** Production Planning and Control, plant Location, Break- Even

Analysis, assumptions andapplications.

6. **Financial Management:** Types of Capital: Fixed and Working Capital and Methods of Raining Finance; Depreciation: Straight Line and DiminishingBalance Methods.Marketing Management: Functions of marketing andDistribution Channels.

7. **Entrepreneurship:** EntrepreneurialFunctions, Entrepreneurial Development: Objectives, Training, Benefits: Phases of Installing aproject

**Text Books:**


1. K.K.DEWETT, **Modern Economic Theory**, S.Chand and Company, NewDelhi-55.
2. S.C. Sharma and Banga T. R., Industrial Organization & Engineering Economics, khanna Publications,Delhi-6.


**Reference Books:**


1. A.R. AryaSri, Management Science, TMH publications, NewDelhi-20.
2. A.R. AryaSri, Managerial Economics and Financial Analysis, TMH Publications, new

| CSE 217 | **DATA STRUCTURES LAB**<br>*Common with 6years integrated B.Tech(CSE)+M.Tech and B.Tech(IT)* | |
|---|---|---|
| **Instruction: 3Periods/week, Univ. Exam: 3 Hours** | | **Credits: 1.5** |
| **Internal: 50 Marks** | **University Exam: 50 Marks** | **Total: 100 Marks** |

**Course Objectives:**

1. To implement stacks and queues using arrays and linked lists.
2. To develop programs for searching and sorting algorithms.
3. To write programs using concepts of various trees.
4. To implement programs using graphs.

**Course Outcomes:**

1. Student will be able to write programs to implement stacks and queues.
2. Ability to implement various searching and sorting techniques.
3. Ability to implement programs using trees and graphs.

**List of Programs:**

1. Write a C program for sorting a list using Bubble sort and then apply binary search.
2. Write a C program to implement the operations on stacks.
3. Write a C program to implement the operations on circular queues.
4. Write a C program for evaluating a given postfix expression using stack.
5. Write a C program for converting a given infix expression to postfix form using stack.
6. Write a C program for implementing the operations of a dequeue
7. Write a C program for the representation of polynomials using circular linked list and for the addition of two such polynomials
8. Write a C program for quick sort
9. Write a C program for Merge sort.
10. Write a C program for Heap sort
11. Write a C program to create a binary search tree and for implementing the in order, preorder, post order traversal using recursion
12. a)Write a C program for finding the transitive closure of a digraph
    b)Write a C program for finding the shortest path from a given source to any vertex in a digraph using Dijkstra's algorithm
13. a)Write a C program for finding the Depth First Search of a graph.
    b)Write a C program for finding the Breadth First Search of a graph.

| CSE 218 | **OBJECT ORIENTED PROGRAMMINGLAB**<br>*Common with 6years integrated B.Tech(CSE)+M.Tech and B.Tech(IT)* | |
|---|---|---|
| **Instruction: 3Periods/week,** | **Univ. Exam: 3 Hours** | **Credits: 1.5** |
| **Internal: 50 Marks** | **University Exam: 50 Marks** | **Total: 100 Marks** |

**Course Objectives:**

1. To develop programs using basic OOPS concepts such as classes and objects.
2. To implement programs using Inheritance concepts.
3. To implement programs using Exception handling.
4. To develop programs using operator overloading concepts.

**Course Outcomes:**

1. Student will be able to use OOPs concepts.
2. Ability to apply Inheritance concepts to several problems.
3. Ability to use Exception Handling concepts.

**List of Programs:**

1. WriteaPrograminC++thatimplementsstackoperationsusingclassesandobjects.
2. WriteaPrograminC++performingcomplexnumberadditionusingfriendfunctions.
3. WriteaPrograminC++forcomplexnumberadditionusingoperatoroverloading.
4. WriteaPrograminC++toperformstringoperationsbyoverloadingoperators.
5. WriteaPrograminC++onhierarchicalinheritanceshowingpublic,privateandpr otectedinheritances.
6. WriteaPrograminC++forcomputationofstudent'sresultusinghybridinheritance.
7. Write a Program in C++ implementing bubble-sort usingtemplates.
8. WriteaPrograminC++onvirtualfunctions.
9. WriteaPrograminC++forhandlingPushOnFullandPopOnEmptyExceptionsforaStack.
10. WriteaPrograminC++forcopyingone filetoanotherfileusing streams.
11. WriteaPrograminC++forwritingandreadingaclassobjecttoafile.
12. Write program in C++ toimplement
    a) One catch block and allExceptions
    b) using Multiple Catchblocks.
13. Write a program in C++ to implement the finallyblock.
14. WriteaprograminC++toimplementpointerstoaderivedclassandvirtualbaseclasses.
15. WriteaprogramtinC++to

implementconversionofobjectsbetweendifferentclassesusing conversionfunctions.

16. Write a program in C++ to implement function overloading- with various data types,with different number ofarguments.
17. WriteaprograminC++to evaluatemixedmodeexpressionsandimplicittypeconversions.
18. WriteaprograminC++toshowthatthereisambiguityinMultipleInheritance.
19. Write a program in C++ to implement a virtualdestructor.
20. WriteaprograminC++to mimicabankmanagementsystem(userlogins,requestsfor withdraw/credit, system verifies whether enough balance is available, update theaccount summary,etc.)

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(With effect from **2019-2020** admitted batch onwards)

**B.TECH. (CSE) II YEAR II-SEMESTER SCHEME OF INSTRUCTION AND EXAMINATION**

| SUB. REF | NAME OF THE SUBJECT | PERIODS | | | MAXIMUM MARKS | | | CREDITS |
|---|---|---|---|---|---|---|---|---|
| | | THEORY | TUTORIAL | LAB | EXAM | SESSIONALS | TOTAL | |
| CSE221 | DISCRETE MATHEMATICS | 3 | -- | -- | 70 | 30 | 100 | 3 |
| CSE222 | COMPUTER ORGANAIZATION & ARCHITECTURE | 3 | -- | -- | 70 | 30 | 100 | 3 |
| CSE223 | DATABASE MANAGMENT SYSTEMS | 3 | -- | -- | 70 | 30 | 100 | 3 |
| CSE224 | DESIGN AND ANALYSIS OF ALGORITHMS | 3 | -- | -- | 70 | 30 | 100 | 3 |
| CSE225 | ORGANIZATIONAL BEHAVIOUR | 3 | -- | -- | 70 | 30 | 100 | 3 |
| CSE226 | ENVIRONMENTAL STUDIES | 3 | -- | -- | 70 | 30 | 100 | 0 |
| CSE227 | DBMS LAB | -- | -- | 3 | 50 | 50 | 100 | 1.5 |
| CSE228 | DIGITAL ELECTRONICS &MICROPROCESSORS LAB | -- | -- | 3 | 50 | 50 | 100 | 1.5 |
| | **TOTAL** | **18** | **0** | **6** | **520** | **280** | **800** | **18** |

| CSE 221 | **DISCRETE MATHEMATICS**<br>*Common with 6years integrated B.Tech(CSE)+M.Tech and B.Tech(IT)* | |
|---|---|---|
| **Instruction: 3Periods/week,** Univ. Exam: 3 Hours | | **Credits: 3** |
| **Internal: 30 Marks** | **University Exam: 70 Marks** | **Total: 100 Marks** |

**Course Objectives:**

1. To understand mathematical arguments using logical connectives and quantifiers and verify the validity of logical flow of arguments using propositional ,predicate logic and truth tables.
2. To understand about permutations and combinations.
3. To understand various types of relations and discuss various properties of the relations.
4. To study the graphs, graph isomorphism and spanning trees.
5. To study about Boolean algebra and Finite State Machines.

**Course Outcomes:**

At the end of the course student will be able to

1. Rewrite mathematical arguments using logical connectives and quantifiers and verify the validity of logical flow of arguments using propositional, predicate logic.
2. Identify and give examples of various types of relations and describe various properties of the relations.
3. Ability to solve problems using permutations and combinations.
4. Determine isomorphism of graphs and spanning tree of a given graph using BFS/DFS algorithms. Also determine minimal spanning tree of a given graph.

**Syllabus:**

1. **The Foundations-Logic and Proofs:** Propositional Logic, Propositional Equivalences, Predicatesand Quantifiers, Nested Quantifiers Rules of Inference, Introduction to Proofs, Proof Methods and Strategy, Basic Structures-Sets, Functions, Sequences and Sums: Sets, Set Operations, Functions, Sequences and Summations.

2. **The Fundamentals-Algorithms, the Integers and Matrices:** Algorithms, The Growth ofFunctions, Complexity of Algorithms, The Integers and Division, Primes and Greatest Common Devisors, Integers and Algorithms, Applications of Number Theory, Matrices.

3. **Induction and Recursion:** Mathematical Induction, Strong Induction and Well-Ordering,Recursive Definitions and Structural Induction, Recursive Algorithms, Program Correctness.
   **Counting:** The Basics of Counting, The Pigeonhole Principle, Permutations and Combinations,Binomial Coefficients, Generalized Permutations and Combinations, Generating Permutations and Combinations.

4. **Advanced Counting Techniques:** Recurrence Relations, Solving Linear Recurrence Relations,Divide-and-Conquer Algorithms and Recursion Relations, Generating Functions, Inclusion-Exclusion, and Applications of Inclusion-Exclusion.

5. **Relations:** Relations and their properties, n-ary relations, applications, Representation, closure,

equivalence relations, Partial orderings.

**Graphs**: Graphs and Graph Models, Graph Terminology and Special Types of Graphs, Representing Graphs and Graph Isomorphism, Connectivity, Euler and Hamilton Paths, Shortest-Path Problems, Planar Graphs, Graph Coloring

6. **Trees:** Introduction to Trees, Applications of Trees, Tree Traversal, Spanning Trees, Minimum Spanning Trees,

7. **Boolean Algebra:** Boolean Functions, Representing Boolean Functions, Logic Gates, Minimization of Circuits

   **Modeling Computation:** Languages and Grammars, Finite-State Machines with Output, Finite-State Machines with No Output, Language Recognition, Turing Machines

**Text Book:**

1. Discrete Mathematics & Its Applications with Combinatorics and Graph Theory by Kenneth H Rosen, Tata McGraw-Hill Publishing Company Ltd., New Delhi.
2. Discrete Mathematical Structures by Y.N Singh.

**Reference Books:**

1. Discrete Mathematics for Computer Scientists & Mathematicians by Joe L. Mott, Abraham Kandel, Theodore P. Baker, Prentice-Hall, India.

2. Discrete Mathematics by Richard Johnson Baug, Pearson Education, New Delhi.

3. Discrete and Combinatorial Mathematics by Ralph. G. Grimaldi, Pearson Education, New Delhi.

| CSE 222 | **COMPUTERORGANIZATION AND ARCHITECTURE**<br>*Common with 6years integrated B.Tech(CSE)+M.Tech and B.Tech(IT)* | |
|---|---|---|
| **Instruction: 3Periods/week, Univ. Exam: 3 Hours** | | **Credits: 3** |
| **Internal: 30 Marks** | **University Exam: 70 Marks** | **Total: 100 Marks** |

**Course Objectives:**

1. To study about structure and functional components of a computer.
2. Understanding the hierarchical organization of a computer system which consists of instruction set of commands.
3. Learn about the architecture of a computer from a programming view.
4. To design a balance system that minimizes performance and utilization of all elements.

**Course Outcomes:**

**1.** Knowledge about major components of a computer such as processor, memory and I/O modules along with their interconnections internally with outside world.
**2.** Detailed idea about architecture of central processing unit, functions of control unit, memory, I/O devices and their issues.
**3.** simple and multiple processor organization and their issues.

**Syllabus:**

1. **Register Transfer and Micro operations:** Register Transfer Language, Register Transfer,Bus and Memory Transfers, Arithmetic Micro operations, Logic Micro operations, Shift Micro operations, Arithmetic Logic ShiftUnit.

2. **BasicComputerOrganizationandDesign:**InstructionCodes,ComputerRegisters,Computer Instructions, Timing and Control, Instruction Cycle, Memory-Reference Instructions,Input-OutputandInterrupt,CompleteComputerDescription,DesignofBasicComputer,Designof AccumulatorLogic.

3. **Micro programmed Control**: Control Memory, Address Sequencing, Micro programExample, Design of ControlUnit.

4. **Central Processing Unit:** Introduction, General Register Organization, StackOrganization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, ProgramControl, Reduced Instruction SetComputer(RISC), Architecture and Programming of 8085Microprocessor.

5. **Pipeline and Vector Processing:** Parallel Processing, Pipelining, Arithmetic Pipeline,Instruction Pipeline, RISK Pipeline, Vector Processing, ArrayProcessors.

6. **Input/output Organization:** Peripheral Devices, I/O interface, Asynchronous datatransfer, Modes of transfer, priority Interrupt, Direct memory access, Input-Output Processor(IOP), Serial Communication.

7. **Memory Organization**: Memory Hierarchy, Main memory, Auxiliary memory,Associate Memory, Cache Memory, and Virtual memory, Memory ManagementHardware.

**TextBooks:**


1. Computer System Architecture, M. Morris Mano, Prentice Hall of India Pvt. Ltd., ThirdEdition, Sept. 2008.
2. Computer Architecture and Organization, P.Chakraborty.
3. Microprocessor Architecture, Programming and Applications with the 8085 by Ramesh S Gaonkar


**ReferenceBooks:**


1. Computer Architecture and Organization, William Stallings, PHI Pvt. Ltd., EasternEconomy Edition, Sixth Edition,2003.
2. Computer Organization and Architecture, Linda Null, Julia Lobur, Narosa Publications ISBN81- 7319-609-5
3. Computer System Architecture", John. P.Hayes.

| CSE 223 | **DATABASE MANAGEMENT SYSTEMS**<br>*Common with 6years integrated B.Tech(CSE)+M.Tech and B.Tech(IT)* | |
|---|---|---|
| **Instruction: 3Periods/week,** Univ. Exam: 3 Hours | | **Credits: 3** |
| **Internal: 30 Marks** | **University Exam: 70 Marks** | **Total: 100 Marks** |

**Course Objectives:**

1. To learn the evolution of DBMS Versus File systems, data models, and layers of abstraction.
2. To understand conceptual and physical aspects of database design.
3. To learn formal and commercial query language specifications.
4. To understand concurrency control, recovery management, and other related issues.

**Course Outcomes:**

1. The student will understand ER-modeling for conceptual database design and relational model.
2. The student is introduced to formal and commercial query languages : Relational Algebra, calculus and SQL.
3. The student will learn schema refinement and normalization.
4. The Student understands locking protocols concurrency control, and crash recovery methods.

**Syllabus:**

1. **Introduction**: File system versus a DBMS , Advantages of a DBMS, Describing and Storing Data ina DBMS, The Relational model, Levels of abstraction, Data Independence, Transaction management, Structure of a DBMS.

2. **Introduction to Database Design and The Relational Model**: Database Design and ER Diagrams,Entities, Attributes and Entity Sets, Relationships & Relationship Sets, Additional Features of the ER Model, Conceptual Design with ER Model, Introduction to the Relational Model, Integrity Constraints over Relations, Enforcing Integrity Constraints, Querying Relational Data, Logical Database Design: ER to Relational, Introduction to Views, Destroying/ Altering Tables and Views.

3. **Relational Algebra and SQL**: Preliminaries, Relational Algebra, The form of a Basic SQL Query,UNION, INTERSECT and EXCEPT, Nested Queries, Aggregate Operators, Null Values, Complex Integrity Constraints in SQL, Triggers and Active Databases, Embedded SQL, Dynamic SQL, JDBC.

4. **Database Design**: Schema Refinement and Normal Forms, Introduction to Schema Refinement,Functional Dependencies, Reasoning about FD's, Normal Forms, Properties of Decomposition, Normalization, Other kinds of Dependencies.

5. **Transaction Management**: The ACID Properties, Transactions & Schedules,

ConcurrentExecution of Transactions, Lock-Based Concurrency Control.

6. **Concurrency Control**: 2PL, Serializability and Recoverability, Introduction to Lock Management,Lock Conversions, Dealing with Deadlocks, Specialized Locking Techniques, Concurrency Control without Locking.

7. **Crash Recovery**: Introduction to ARIES, The Log, Other Recovery-Related Structures, The Write-Ahead Log Protocol, Check pointing, Recovering from a System Crash, Media Recovery.

**Text Books:**


1. Database Management Systems; Raghu Ramakrishnan, Johannes Gehrke 4th Edition, McGraw- Hill

2. Database Management Systems; Raghu RamaKrishnan, Johannes Gehrke.


**Reference:**


1. Database System Concepts; A. Silberschatz, H. Korth 5th Edition, McGraw-Hill

| CSE 224 | **DESIGN&ANALYSISOFALGORITHMS**<br>*Common with 6years integrated B.Tech(CSE)+M.Tech and B.Tech(IT)* | |
|---|---|---|
| **Instruction: 3Periods + 1 tutorial/week,** Univ. Exam: 3 Hours | | **Credits: 4** |
| **Internal: 30 Marks** | **University Exam: 70 Marks** | **Total: 100 Marks** |

**Course Objectives:**

On completing this course student will be able to

1. Solve problems using algorithm design methods such as the greedy method, divide and conquer, dynamic programming, backtracking, and branch and bound and writing programs for these solutions
2. Analyze the asymptotic performance of algorithms.
3. Demonstrate a familiarity with major algorithms and data structures.
4. Synthesize efficient algorithms in common engineering design situations.

**Course Outcomes:**

1. Students will be able to justify the correctness of algorithms using inductive proofs and invariants
2. Analyze worst-case running times of algorithms using asymptotic analysis.
3. Describe various paradigms of design use them appropriately when an algorithmic design situation calls for it.
4. Students will be able to Compare between different data structures. Pick an appropriate data structure for a design situation.

**Syllabus:**

1. **Introduction–** Fundamentals of algorithmic problem solving – important problemtype. Fundamentals of analysis of algorithms and efficiency – Analysis framework– Asymptotic Notations and Basic Efficiency classes – Mathematical Analysis ofNon- recursiveAlgorithms– MathematicalAnalysisofrecursiveAlgorithms–EmpiricalAnalysis of Algorithms – AlgorithmVisualization
2. **BruteForce**–SelectionSortandBubblesort–SequentialSearchandBrute–ForceString Matching – Closest Pair and Convex-Hull Problems by Brute Force – ExhaustiveSearch **Divide-and-Conquer**–Merge sort–Quick sort–BinarySearch–BinaryTreeTraversals and Related Properties – Multiplication of large integers and Strassen's Matrix Multiplication– Closest- Pair Convex-Hull Problems by Divide- and –Conquer

3. **Decrease – and – Conquer** – Insertion Sort – Depth-First Search and Breadth-FirstSearch- TopologicalSorting–AlgorithmsforGeneratingCombinatorialObjects– Decrease-by-a- Constant-Factor Algorithms – Variable-Size-DecreaseAlgorithms.

4. **Transform-and-Conquer** – Presorting – Gaussian Elimination – Balanced Search Trees– Heaps and Heap sort – Horner's Rule and Binary Exponentiation – ProblemReduction

   **Space and Time Tradeoffs** – Sorting by Counting – Input Enhancement in stringMatching – Hashing –B-Trees

5. **Dynamic Programming** – Computing a Binomial Coefficient – Warshall's andFloyd's Algorithm – Optimal Binary Search Trees - The Knapsack Problem and MemoryFunctions

6. **Greedy Technique** – Prim's Algorithm – Kruskal's Algorithm – Dijkstra's Algorithm– Huffman Trees **Limitations of Algorithm Power** – Lower-Bound Arguments –Decision Trees – P, NP and NP – complete problems – Challenges of NumericalAlgorithms

7. **Coping with the Limitations of Algorithms Power** – Backtracking – Branch-and-Bound– Approximation Algorithms for NP-hard Problems – Algorithms for solvingNonlinear Equations.

**TextBook:**

1. Introduction to Design & Analysis of Algorithms by Anany Levitin, Pearson Education, New Delhi, 2003
2. Fundamentals of Computer Algorithms, Horowitz and Sahni, Galgothiapublications.

**ReferenceBooks:**

1. Introduction to Algorithms by Thomas H. Corman, Charles E. Leiserson, Ronald R. Rivest &Clifford Stein, Prentice Hall of India, New Delhi, NewDelhi.

| CSE 225 | ORGANIZATIONAL BEHAVIOUR | |
|---|---|---|
| **Instruction: 3Periods/week,** | **Univ. Exam: 3 Hours** | **Credits: 3** |
| **Internal: 30 Marks** | **University Exam: 70 Marks** | **Total: 100 Marks** |

**UNIT-I**

**OrganizationalBehavior:** Concept of Organization - Concept of OrganizationalBehavior - Nature of OrganizationalBehavior - Role of Organizationalbehavior - Disciplines contributing to OrganizationalBehavior.

**UNIT-II**

**Motivation:** Definition - Nature of Motivation - Role of Motivation - Theories of Motivation : Maslow's Need Hierarchy Theory, Herzberg's Motivation Hygiene Theory and Mc Gregor's Theory X and Theory Y.

**UNIT -III**

**Group Dynamics**: Meaning - Concept of Group - Types of groups -Formal and Informal groups - Group development - Group cohesiveness and factors affecting group cohesiveness.

**UNIT-IV**

**Leadership:** Concept of Leadership - Difference between Leadership and Management - Importance of Leadership - Leadership styles: Autocratic leadership, Participative leadership and Free Rein leadership.

**UNIT-V**

**Communication:** Meaning - Communication Process - Forms of communication: Oral, Written and Non- Verbal communication - Direction of communication : Downward, Upward and Horizontal communication.

**UNIT-VI**

**Organizational conflicts:** Concept of conflict - Reasons for conflict - Types of Conflict: Intrapersonal conflict, Interpersonal conflict, Intragroup conflict, Intergroup conflict, Interorganisational conflict - Conflict management.

**UNIT -VII**

**Organisational Change:** Nature - Factors inOrganisational change -Planned change: Process of planned change - Resistance to change: Factors in resistance to change - Overcoming resistance to change.

**Text Books**.

1.L.M.Prasad: Organisational Beaviour, Sultan Chand & Sons, New Delhi -110002
2.K. Aswathappa: Organisational Behaviour, Himalaya Publishing House, New Delhi

**Reference Books.**

1. Stephen Robbins: Organisational Behaviour, Pearsons Education, New Delhi.

| CSE 226 | **ENVIRONMENTALSTUDIES**<br>*Common with 6years integrated B.Tech(CSE)+M.Tech and B.Tech(IT)* | |
|---|---|---|
| **Instruction: 3Periods/week, Univ. Exam: 3 Hours** | | **Credits: 0** |
| **Internal: 30 Marks** | **University Exam: 70 Marks** | **Total: 100 Marks** |

**Course Objectives:**

The Program seeks to provide students better understanding and planning for conservation through an interdisciplinary environmental science curriculum that is designed to enhance scientific inquiry and to strengthen scientific competence.Through these efforts, the Program aims at preparing and providing students to opportunities for careers in environmental sciences, environmental health, public health, and medical schools.

**Course Outcomes:**

1. Recognize major concepts in environmental sciences and demonstrate in-depth understanding of the environment.
2. Develop analytical skills, critical thinking, and demonstrate problem-solving skills using scientific techniques.
3. Demonstrate the knowledge and training for entering graduate or professional schools, or the job market

**1. Introduction**

(a) Definition, Scope andimportance
(b) Measuring and defining environmental development:indicators

**2. Ecosystem**

(a) Introduction, types, characteristic features, structure and functions ofEcosystems -Forest –Grass land -Desert -Aquatic (lakes, rivers andestuaries)

**3. Environmental and Natural Resourcesmanagement**

a) Landresource-Land as a resource -Common property resource -Land degradation -Soil erosionand desertification -Effects of modern agriculture, fertilizer –pesticideproblems
b) Forestresources Use and over-exploitation-Mining and dams- their effects on forest and tribalpeople
c) Waterresources-Use and over-utilization of surface and ground water-Floods and droughts-Water loggingand salinity-Dams –benefits and costs-Conflicts overwater
d) Energyresources

e) Energy needs-Renewable and non-renewable energy source-Use of alternate energy sources-Impact of energy use onenvironment

**4. Bio-diversity and itsconservation**

a) Value of bio-diversity-consumptive and productive use, social, ethical, aesthetic and optionvalues
b) Bio-geographical classification of India- India as a mega diversityhabitat

c) Threats to biodiversity- Hot spots, habitat loss, poaching of wildlife, loss of species, seedsetc.
d) Conservation of bio-diversity- In-situ and Ex-situconservation

**5. Environmental Pollution Local and GlobalIssues** Cause,effectsandcontrol measuresofAirPollution-Indoorairpollution-Waterpollution-Soilpollution- Marine pollution-Noise pollution-Solid waste management, composting, vermin culture-Urban and industrial wastes, recycling andreuse

a) Nature of thermal pollution and nuclearhazards
b) Global Warming
c) Acid rain
d) Ozonedepletion

**6. Environmental problems inIndia** Drinking water, Sanitation and Publichealth

a) Effects of activities on the quality of environment, Urbanization-Transportation-Industrialization-
b) Greenrevolution
c) Water scarcity and Ground Waterdepletion
d) Controversies on major dams- resettlement and rehabilitation of people: problems andconcerns
e) Rain water harvesting, cloud seeding and watershedmanagement

**7. Economy andEnvironment** The economy and environmentinteraction

a) Economics of development, preservation and conservation
b) Sustainability: theory andpractice
c) Limits toGrowth
d) Equitable use of resources for sustainablelifestyles
e) Environmental ImpactAssessment

**8. Social Issues and theEnvironment Population growth andenvironment**

a) Environmental education
b) Environmentalmovements
c) Environment vsDevelopment

**9. Institutions andGovernance(5lectures)**

a) Regulation byGovernment
b) Monitoring and Enforcement of Environmentalregulation

c) Environmental Acts Water (Prevention and Control of pollution) act-Air (Prevention and Controlof pollution) act-Envt. Protection act-Wild life Protection act-Forest Conservation act-CoastalZone Regulations
d) Institutions and policies relating toIndia
e) Environmental Governance

**10. InternationalConventions( 2lectures**)

a) Stockholm Conference1972
b) Earth Summit1992
c) World Commission for environmental Development(WCED)

**11. CaseStudies:** Chipko movement

a) Narmada BachaoAndolan
b) Silent ValleyProject
c) Madhura Refinery and TajMahal
d) Industrialization of Pattancheru
e) Nuclear reactor in Nagarjunasagar
f) Tehri dam
g) Ralegaon Siddhi (AnnaHazzare)
h) Kollerulake-aquaculture
i) Florosis in AndhraPradesh

**12. FieldWork**

a) Visit to a local area to document and mapping environmental assests- river/ forest/ grassland/Hill/ Mountain.
b) Study of local environment- common plants, insects,birds
c) Study of simple ecosystems- pond, river, hill, slopesetc.
d) Visit to Industries, Water treatment plants, affluent treatmentplants

| CSE 227 | **DATABASE MANAGEMENT SYSTEMS LAB**<br>*Common with 6years integrated B.Tech(CSE)+M.Tech and B.Tech(IT)* | |
|---|---|---|
| **Instruction: 3Periods/week,** Univ. Exam: 3 Hours | | **Credits: 1.5** |
| **Internal: 50 Marks** | **University Exam: 50 Marks** | **Total: 100 Marks** |

**Course Objectives**:

1. To introduce to a commercial DBMS such as ORACLE.
2. To learn and practice SQL commands for schema creation, data manipulation.
3. To learn conceptual and physical database design based on a case study.
4. To apply database design stages by studying a case study.

**Course Outcomes**:

1. The student is exposed to a commercial RDBMS environment such as ORACLE.
2. The student will learn SQL commands for data definition and manipulation.
3. The student understands conceptual through physical data base design.
4. The student takes up a case study and applies the design steps.

Features of a commercial RDBMS package such as ORACLE/DB2, MS Access, MYSQL &Structured QueryLanguage(SQL)usedwiththeRDBMS.

I. Laboratory Exercises ShouldInclude:

a. Defining Schemas forApplications,
b. Creation ofDatabase,
c. Writing SQLQueries,
d. Retrieve Information fromDatabase,
e. CreatingViews
f. CreatingTriggers
g. Normalization up to Third NormalForm
h. Use of HostLanguages,
i. Interface with EmbeddedSQL,
j. Use ofForms
k. ReportWriting

II. Some sample applications are givenbelow:

1. Accounting Package for Shops,
2. Database Manager for Magazine Agency or NewspaperAgency,
3. Ticket Booking forPerformances,
4. Preparing Greeting Cards & BirthdayCards
5. Personal Accounts - Insurance, Loans, Mortgage Payments,Etc.,
6. Doctor's Diary & BillingSystem
7. Personal BankAccount
8. Class MarksManagement
9. HostelAccounting
10. Video TapeLibrary,
11. History of CricketScores,
12. Cable TV Transmission ProgramManager,
13. Personal Library.
14. SailorsDatabase
15. Suppliers and PartsDatabase

| CSE 228 | DIGITAL ELECTRONICS & MICROPROCESSORS LAB | |
|---|---|---|
| **Instruction: 3Periods/week,** Univ. Exam: 3 Hours | | **Credits: 2** |
| **Internal: 50 Marks** | **University Exam: 50 Marks** | **Total: 100 Marks** |

**Course Objective:**

1. To learn the about logic gates, half adders, full adders and flip -flops.
2. To learn about the microprocessor programming.
3. To learn about the microprocessor interfacing with stepper motor, R-2R ladder.

**Course Outcomes:**

1. The student understands the logic gates, half adders, full adders and flip-flops to design a circuit.
2. The student develops the skill of writing microprocessor programming.
3. The student understands the interfacing of microprocessor with stepper motor, R-2R ladder.

**1. DIGITAL EXPERIMENTS**

a. Verification of truth tables of OR, AND, NOT, NAND, NOR, EX-OR gates (By using 7400-series)
b. Construction of gates using NAND, NOR gates.
c. Construction of Half and Full adders and verifying their truth tables.
d. Operation and verifying truth tables of flip- flops- RS, D, and JK using ICs.
e. Construction of Decade counters (7490).
f. 4-bit parallel adder using combinational circuits.
g. Decade counter using JK flip flops.
h. Up/Down counter using JK flip flop.
i. Up/Down counter using 7493.

**2. MICROPROCESSOR (Intel 8085) Programming**

a. Binary addition & subtraction. (8-bit & 16-bit)
b. Multiplication & division.
c. Picking up largest/smallest number.
d. Arranging –ascending/descending order.
e. Decimal addition (DAA) & Subtraction.
f. Time delay generation

**Text Book:**


8. Microprocessor Architecture, Programming and Applications with the 8085 by Ramesh Gaonkar
9. Computer System Architecture, M. Morris Mano, Prentice Hall of India Pvt. Ltd., ThirdEdition, Sept. 2008.
10. Computer Architecture and Organization, P.Chakraborty.

ANDHRA UNIVERSITY: : VISAKHAPATNAM
COMMON SCHEME OF INSTRUCTION & EXAMINATION
**III/IV B.TECH** (FOUR YEAR COURSE) &
**III/IV B.TECH** (SIX YEAR DOUBLE DEGREE COURSE)
(With effect from **2019-2020** admitted batch onwards)

**B.TECH. (CSE) III YEAR I-SEMESTER SCHEME OF INSTRUCTION AND EXAMINATION**

| SUB. REF | NAME OF THE SUBJECT | PERIODS | | | MAXIMUM MARKS | | | CREDITS |
|---|---|---|---|---|---|---|---|---|
| | | THEORY | TUTORIAL | LAB | EXAM | SESSIONALS | TOTAL | |
| CSE311 | COMPUTER NETWORKS | 3 | -- | -- | 70 | 30 | 100 | 3 |
| CSE312 | OPERATING SYSTEMS | 3 | 1 | -- | 70 | 30 | 100 | 4 |
| CSE313 | FORMAL LANGUAGE & AUTOMATA THEORY | 3 | -- | -- | 70 | 30 | 100 | 3 |
| CSE314 | OBJECT ORIENTED SOFTWARE ENGINEERING | 3 | 1 | -- | 70 | 30 | 100 | 4 |
| CSE315 | OPERATIONS RESEARCH | 3 | -- | -- | 70 | 30 | 100 | 3 |
| CSE316 | ELECTIVE - 1 | 3 | -- | -- | 70 | 30 | 100 | 3 |
| CSE317 | DATA COMMUNICATIONS AND COMPUTER NETWORK LAB | -- | -- | 3 | 50 | 50 | 100 | 1.5 |
| CSE318 | OPERATING SYSTEMS LAB | -- | -- | 3 | 50 | 50 | 100 | 1.5 |
| CSE319 | SOFT SKILLS LAB | -- | -- | 3 | 50 | 50 | 100 | 1.5 |
| | **TOTAL** | **18** | **02** | **9** | **570** | **330** | **900** | **24.5** |

**ELECTIVE - I:**

1. Microprocessors
2. Data Communications
3. Principles of Programming Languages

| CSE 311 | **COMPUTER NETWORKS**<br>*Common with 6years integrated B.Tech(CSE)+M.Tech and B.Tech(IT)* | |
|---|---|---|
| **Instruction: 3Periods/week,** Univ. Exam: 3 Hours | | **Credits: 3** |
| **Internal: 30 Marks** | **University Exam: 70 Marks** | **Total: 100 Marks** |

**Course Objectives:**

1. To make the students understanding of basic requirements of network hardware, software and its architecture.
2. Familiarize the students with layered architecture of the network software and hierarchal nature of the network physical infrastructure.
3. Study of various network interconnecting devices and other associated network hardware.
4. Introduction of advanced networking concepts and wireless and wireless sensor networks.

**Course Outcomes:**

1. The student must be able to understand the design and estimate the requirements for practical setup of a given network scenario and size.
2. Realize the Operation, maintenance and management of the Internet by mapping the theoretical networking concepts to the real-time network scenarios.
3. Demonstrate the applications of wireless Networks and over view of advanced networking concepts.
4. Identify different networking devices and their usage and functionality

**Syllabus:**

1.**Introduction to Computer Networks:** Introduction, Network Hardware, NetworkSoftware, Reference Models, Network Examples, Internet Based Applications.

1. The Medium Access Control: The Channel Allocation Problem, CSMA Protocols, Collision Free Protocols, The Ethernet, Wireless LANS, Bluetooth

2. **Network Layer :** Network Layer Design Issues, Routing Algorithms, Congestion ControlAlgorithms, Net work Layer in the Internet, IP Protocol, IP Address, Subnets, and Internetworking.

3. **Transport layer:** Transport Service, Elements of Transport Protocols, TCP and UDPProtocols, Quality of Service Model, Best Effort Model, Network Performance Issues.

4. **Application Layer:** Over View of DNS, SNMP, Electronic Mail, FTP, TFTP, BOOTP, HTTPProtocols, World Wide Web, Firewalls.

5. **Network Devices:** Over View of Repeaters, Bridges, Routers, Gateways, MultiprotocolRouters, Hubs, Switches, Modems, Channel Service Unit CSU, Data Service Units DSU, NIC, Wireless Access Points, Transceivers, Firewalls, Proxies.

6. **Overview of** Cellular Networks, Ad-hoc Networks, Mobile Ad-hoc Networks, Sensor Networks

**Text Books:**


1. Computer Networks, Andrews S Tanenbaum,, 5th Edition, Pearson Edu.
2. An Engineering Approach to Computer Networks-S.Keshav, 2nd Edition, Pearson Education.


**References:**


1. Data Communications and Networking , Behrouz A Forouzan , Tata McGraw-Hill Co Ltd, Second Edition, ISBN: 0-07-049935-7
2. Computer networks, Mayank Dave, CENGAGE.
3. Computer networks, A system Approach, 5thed, Larry L Peterson and Bruce S Davie, Elsevier.
4. Understanding communications and Networks, 3rd Edition, W.A. Shay, Thomson.

| CSE312 | **OPERATINGSYSTEMS**<br>*Common with 6years integrated B.Tech(CSE)+M.Tech and B.Tech(IT)* | |
|---|---|---|
| **Instruction: 3Periods/week, Univ. Exam: 3 Hours** | | **Credits: 4** |
| **Internal: 30 Marks** | **University Exam: 70 Marks** | **Total: 100 Marks** |

**Course objectives:**

1. To understand evolution of Operating System.
2. To understand operating system as a layer of abstraction above physical hardware that facilitates usage convenience and efficient resource management of computer system resources.
3. To learn design and implementation of policies and mechanisms for OS subsystem.
4. To investigate case studies to understand the design philosophies / paradigm for popular multiuser or single user operating system.

**Course Outcomes:**

1. The student understands OS evolution, its structure and services provided by it.
2. Learn process life cycle, process scheduling objectives, policies and mechanisms, process synchronization, inter process communication, deadlocks and other process subsystem related concepts.
3. Learn memory hierarchy, allocation and deallocation policies and mechanism for main and auxiliary memory, file system design and implementation issues.
4. investigate UNIX/ LINUX and Windows OS platforms w.r.t similarities and differences in design philosophies.

**Syllabus:**

1. **Introduction to Operating Systems**: Over View of Operating Systems, Types ofOperating Systems, Operating System Structures, Operating System Services, System Calls,Virtual Machines, Operating System Design andImplementation.

2. **Process Management**: Process Concepts, Operations on Processes, CooperatingProcesses, Threads, Inter Process Communication, Process Scheduling, Scheduling Algorithms, Multiple- Processor Scheduling, ThreadScheduling.

3. **Process Synchronization:** The Critical Section Problem, Peterson's Solution,Synchronization Hardware, Semaphores, Classical Problems of Synchronization, Critical Regions,Monitors.

4. **Deadlocks**: System Model, Deadlock Characterization, Methods For HandlingDeadlocks, Deadlock Prevention, Avoidance, Deadlock Detection, Recovery fromDeadlocks

5. **Memory Management:** Logical versus Physical Address, Swapping, contiguousmemory allocation, paging, structure of the page table , segmentation, Virtual Memory, DemandPaging, Page Replacement, Allocation of Frames, Thrashing, Memory-Mappedfiles

6. **FileSystems,Implementation,andSecondary-storageStructure:**Conceptofafile,Access Methods, Directory Structure, Protection, File System Structure, Allocation Methods,Free Space Management, Directory Management, Device Drivers, overview ofMass-storage structure, Disk structure, disk attachment, disk scheduling, swap-spacemanagement.

7. **Case study:** Overview of LINUX, Windows Operatingsystems

**TextBook:**

1. Operating Systems, Abraham Silberschatz, Peter Baer Galvin, and GregGagne, John Wiley Publ., SeventhEdition.
2. Operating Systems;A Practical Approach.Rajiv Chopra**.**

**Reference Books:**


1. Modern Operating Systems, Andrew S. Tanenbaum, , 2nd edition, 1995,PHI.
2. Operating Systems, William Stallings 5th Edition -PHI
3. Operating Systems: A Design-Oriented Approach', Charles Crowley, 'TataHill Co.,1998 edition.

| CSE 313 | **FORMAL LANGUAGES & AUTOMATA THEORY**<br>*Common with 6years integrated B.Tech(CSE)+M.Tech and B.Tech(IT)* | |
|---|---|---|
| **Instruction: 3Periods/week,** Univ. Exam: 3 Hours | | **Credits:3** |
| **Internal: 30 Marks** | **University Exam: 70 Marks** | **Total: 100 Marks** |

**Course objectives:**

1. To introduce the concepts in automata theory and theory of computation to design grammars and recognizers for different formal languages.
2. To employ finite state machines to solve problems in computing.
3. To introduce finite state machines, context free grammars and Turing Machines and their properties as the basis for the formal expressivity of computer languages for solving linguistic decision problems.
4. To understand the concepts of tractability and decidability, the concepts of NP-completeness and NP-hard problem and also the challenges for Theoretical Computer Science and its contribution to other sciences.

**Course outcomes:**

1. Ability to think analytically and intuitively for problem-solving situations in related areas of theory in computer science
2. Ability to describe the language accepted by an automata or generated by a regular expression or a context-free grammar;
3. Ability to Understand the functioning of Finite-State Machines, Deterministic Finite-State Automata, Nondeterministic Finite-State Automata and Pushdown Automata and Turing Machines.

**Syllabus:**

1. Definitions of alphabet, strings, language, grammar, types of grammar, types of machines, generation of languages from grammar, construction of grammar from the given description of languages

2. Definition of finite state machine, Definite state machine, indefinite state machine, representations in mathematical diagram, tabular etc., id of finite state machine's, design of finite state machine from the given description, elimination of e-transitions , indefinite state machine to definite state machine, optimization of finite state machine

3. Conversion of regular grammar to finite state machine, finite state machine to regular grammar, discussion of pumping lemma, systematic way of construction of finite state machine

4. Definition of regular expression, regular algebra, minimization of regular expressions, closure properties, construction of regular expression from the given description, regular expression to finite state machine, finite state machine to regular expression, construction of regular expression for the given finite state machine- a systematic way using Arden's theorem

5. Definition of push down machine, push down machine, types of push down machine's, push down machine to context free grammar, context free grammar to push down machine, design methodology of various push down machine's, push down machine by empty stack, push down machine by final states, conversion from one type to other type, applications of push down machine's

6. Parsing tree, bottom-up parsing, top-down parsing, types of context free grammar's, left-most and right most derivations, productions, reductions, optimization of context free grammar's, elimination of e productions, unit productions, normal forms- cnf, gnf

7. Definition of Turing machine, ways of representing Turing machine's- tabular form, diagram, mathematical form, quintuples etc., design of Turing machine, id of Turing machine, types of Turing machine, halting problem, church's thesis, universal Turing machine, Gödel number, definitions of recursive functions- prf, rf, decidability.

**NOTE:**Theorem proofs are eliminated

**Text books:**

1. Introduction to automata theory, languages and computation, John.E.H.P croft/ Rajeev Motwani & JD Ullman—pearson education- III edition

2. Theory of computation, K.L.P.Mishra and N.Chandrasekhar, PHI

**Reference Books :**

1. Theory of computation, formal languages and automata theory, G P Saradhi Varma, B.Thirupathi Rao –Sci Tech publications.

| CSE 314 | OBJECT ORIENTED SOFTWARE ENGINEERING<br>*Common with 6years integrated B.Tech(CSE)+M.Tech and B.Tech(IT)* | |
|---|---|---|
| **Instruction: 3Periods+1Tut/week,** Univ. Exam: 3 Hours | | **Credits: 4** |
| **Internal: 30 Marks** | **University Exam: 70 Marks** | **Total: 100 Marks** |

**Course objectives:**

1. To explain the importance of OOSE in Software development.
2. To explain the students the importance of Requirements Engineering.
3. To explain the role of UML and Testing in Software Development.
4. To explain the entire Software Development Process with aid of case studies.

**Course Outcomes:**

1. Ability to define a problem and perform Requirements Engineering.
2. Ability to draw UML diagrams for the requirements gathered.
3. Ability to implement the designed problem in Object Oriented Programming Language and
4. test whether all the requirements specified have been achieved or not.

1. **Introduction to Object Oriented Software Engineering:** Nature of the Software, Types of Software, Software Engineering Projects, Software Engineering Activities, Software Quality, Introductionto Object Orientation, Software Process Models-Waterfall Model, Opportunistic Model ,Phased Released Model, Spiral Model, Evolutionary Model, Concurrent EngineeringModel

2. **Requirements Engineering:** Domain Analysis, Problem Definition and Scope,Requirements Definition, Types of Requirements, Techniques for Gathering and AnalyzingRequirements, Requirement Documents, Reviewing, Managing Change inRequirements.

3. **Unified Modeling Language & Use Case Modeling:** Introduction to UML, Modeling Concepts,Types ofUMLDiagramswithExamples;User-CenteredDesign,CharacteristicsofUsers,DevelopingUse- Case Models of Systems, Use-Case Diagram, Use- Case Descriptions, Basics of User InterfaceDesign, Usability Principles, UserInterfaces.

4. **ClassDesignandClassDiagrams:**EssentialsofUMLClassDiagrams,AssociationsandMultiplicity, Other Relationships, Generalization, Instance Diagrams, Advanced Features of ClassDiagrams, Interaction and Behavioral Diagrams: Interaction Diagrams, State Diagrams, ActivityDiagrams, Component and DeploymentDiagrams.

5. **Software Design and Architecture:** Process of Design, Principles Leading toGoodDesign, Techniques for Making Good Design Decisions, Good Design Document; Pattern Introduction,Design Patterns: Abstraction-Occurrence Pattern, General Hierarchical Pattern, Play-Role Pattern,Singleton Pattern, Observer Pattern, Delegation Pattern, Adaptor Pattern, Façade Pattern, ImmutablePattern, Read-Only Interface Pattern and The Proxy Pattern; Software Architecture Contents ofArchitecture Model, Architectural Patterns: Multilayer, Client-Server, Broker, Transaction Processing, Pipe& Filter and MVC ArchitecturalPatterns

6. **Software Testing:** Overview of Testing, Testing Concepts, Testing Activities, Testing Strategies,Unit Testing, Integration Testing, Function Testing, Structural Testing, Class Based Testing Strategies,Use Case/Scenario Based Testing, Regression Testing, Performance Testing, System Testing,Acceptance Testing,InstallationTesting,OOTestDesignIssues,TestCase Design,QualityAssurance,RootCauseAnalysis, Post-MortemAnalysis.

7. **Software Process Management:** Introduction to Software Project Management,Rationale Management, Configuration Management, Activities of Software Project Management, Structureof Project Plan, Software Engineering Teams, Software Cost Estimation, Project Scheduling,Tracking andMonitoring.

**CASESTUDY:**

1. Simple Chat Instant MessagingSystem
2. GPS Based Automobile NavigationSystem
3. Waste Management Inspection Tracking System(WMITS)
4. Geographical InformationSystem

**TextBooks:**


1.Object-Oriented Software Engineering Practical software developmentusing UML and Java by Timothy C. Lethbridge & Robert, LanganiereMcgraw-Hill

2.Software Engineeing, K.K. Agarwal, New Age Publications2008

3. Object-Oriented Software Engineering: Using UML, Patterns and Java, BerndBruegge and Allen H. Dutoit, 2nd Edition, Pearson EducationAsia.


**Reference:**


1. Software Engineering: A Practitioner's Approach, Roger SPressman.
2. A Practical Guide to Testing Object-Oriented Software, John D. McGregor; David A.Sykes, Addison-WesleyProfessional.

| CSE 315 | **OPERATIONSRESEARCH**<br>*Common with 6years integrated B.Tech(CSE)+M.Tech and B.Tech(IT)* | |
|---|---|---|
| **Instruction: 3Periods/week, Univ. Exam: 3 Hours** | | **Credits: 3** |
| **Internal: 30 Marks** | **University Exam: 70 Marks** | **Total: 100 Marks** |

**Course Objectives**

1. To discuss about basic Operation Research concepts , Formulation of LPP and its solution using graphical method.
2. To discuss about standard form of LPP. solving LPP using various methods.
3. To study the various solutions of transportation problems and assignment problems.
4. To discuss about PERT and CPM charts
5. To discuss about replacement problems, inventory problems and game theory.

**Course Outcomes:**

1. Ability to solve LPP problems using various methods.
2. Ability to solve transportation and assignment problems using several methods.
3. Analyze the PERT and CPM charts
4. Ability to solve replacement problems and game theory problems.

**Syllabus:**

**1.** OverviewofOperationsResearch,TypesofORModels,PhasesofOperationsResearch– ORTechniques,IntroductiontoLinearProgramming,FormulationofLinearProgrammingPro blem, Graphical Solution; Graphical SensitivityAnalysis,

**2.** StandardForm ofLPP,BasicFeasible Solutions,UnrestrictedVariables,SimplexAlgorithm,Artificial Variables, Big M Me th od , Two Phase Simplex Method, Degeneracy,Alternative Optimal, Unbounded Solutions, Infeasible Solutions, Primal And Dual Problems AndTheirRelations, Dual SimplexMethod

**3.** Transportation Problem as LPP, Initial Solutions, North West Corner Rule,Lowest Cost Method, Vogels Approximation Method, Optimum Solutions of TPP, Degeneracyin Transportation, Transportation Algorithms ,

**4.** Assignment Problem , Assignment Problem as LPP, Hungarian Method, Travelling SalesmanProblem, Solutions Of TSP, Sequencing Problems, N-Jobs Two Machine Problems, N-JobsK MachinesProblems,Two-JobsM-MachineProblems,CrewSchedulingProblems

**5.** NetworkRepresentationofAProject,CPMandPERT,CriticalPathCalculations,Time– Cost Optimizations, PERT Analysis and Probability Considerations, Resource Analysis inNetworkScheduling.

6. Replacement Problems-Individual And Group Replacement Policy, Reliability &SystemFailure Problems, Inventory-Factors Effecting Inventory-EOQ, Inventory Problems With andWithout Shortages, Inventory Problems With Price Breakups, Multi Item DeterministicProblems. Probabilistic InventoryProblems

7. Game Theory : Two Person Zero SumGames , MixedStrategyGamesandTheir Algorithms.

**TextBooks:**

1. Operations Research, Kanti Swaroop, P.K. Gupta, Man Mohan, Sulthan Chand& SonsEducation

2. PublishersOperationsResearch–AnIntroduction, HandyATaha– PearsonEducation.

**Reference B:**

1. Operations Research Panneer Selvan Prentice Hall OfIndia.
2. Operations Research By S.DSharma
3. Introduction To Operations Research, F.S. Hiller, G.J. Liberman,TMH
4. Operations Research, Richard Bronson, Schaum's Series,Mcgrawhill

| CSE 316 | ELECTIVE-I MICROPROCESSORS | |
|---|---|---|
| **Instruction: 3Periods/week, Univ. Exam: 3 Hours** | | **Credits: 3** |
| **Internal: 30 Marks** | **University Exam: 70 Marks** | **Total: 100 Marks** |

**Course Objectives:**

1. To discuss the architectures of 8085, 8086 microprocessors, their instruction sets and related ALP programs.
2. To discuss interfacing semiconductor memories, interfacing peripheral to Intel 8086.
3. To study interfacing data converters to 8086 and discuss about micro controller 8051 architecture.

**Course Outcomes:**

1. Understand the basic architectures of 8085 and 8086 microprocessors.
2. Ability to write ALP programs using instruction sets.
3. Understand the various interfacing concepts and micro controllers.

**Syllabus:**

1. **Introduction to Microprocessors and Microcomputers:** A Brief Architecture and Programming of 8085Microprocessor.
2. **Architecture**: Instruction Set and Programming of 8086Microprocessor
3. **Interfacing Semiconductor Memories and I/O Devices**: Semiconductor Memories:Classification Internal Organization& Functional Description, Interfacing SRAMs and EPROMs to8086, Interfacing Characteristics of I/Devices, I/O Device addressing methods, I/O DeviceProgramming Methods.
4. **Interfacing Peripherals to Intel8086 -1:** Parallel I/O Interface- 8255,Serial I/O Interface –8251, Timer Interface -8253/8254
5. **Interfacing Peripheral to Intel8086 -2:**Keyboard/Display Interface-8279,InterruptControllerInterface–8259
6. **Interfacing Data Converters to 8086:** D/A Conversion Methods, A/D Conversionmethods, Interfacing DAC, InterfacingADC.
7. **Introduction to Micro controllers:** Intel 8051Architecture andProgramming

**TextBooks:**


1. Microprocessor Architecture, Programming, and Applications with the8085 Ramesh S.Gaonkar, 4th Edition, PenramInternational,1999
2. The 80x86 Family, Design, Programming and Interfacing, John E.Uffenbeck, 3rd Edition,Pearson Education Inc.,2002

3. KennethJ.Ayala, 8051 Microcontroller Architecture, Programming AndApplications,2nd Edition, Penram InternationalPublications,1999

**Reference Books:**

1. BARRYB.BREY,TheIntelMicroprocessors8086/8088,80186/80188,80286,80386and 80486,Pentium, PentiumPro Processor, Pentium II, Pentium III, Pentium 4, Architecture,ProgrammingandInterfacing,8th Edition,PearsonEducationInc.,2009

2. WalterA.TribelandAvtarSingh,The8088and8086Microprocessors,Programming,interfaci ng,Software, Hardware, and Applications, 4th Edition, Pearson Education Inc.,20033.MicroprocessorsandInterfacing, Programming and Hardware, 2nd Edition, Douglass V. Hall,TMH Edition,1999

3. SanjayK Bose, Hardware and Software of Personal Computers, New Age International (P)Ltd.,1991

4. Myke Predko, Programming and Customizing the 8051 Microcontroller, TMH,1999

| CSE 316 | ELECTIVE-1 DATACOMMUNICATIONS | |
|---|---|---|
| **Instruction: 3Periods/week, Univ. Exam: 3 Hours** | | **Credits: 3** |
| **Internal: 30 Marks** | **University Exam: 70 Marks** | **Total: 100 Marks** |

**Course Objectives:**

1. To study basics of data communication systems.
2. To study the various types of transmission media.
3. To study the various hardware concepts related to data communications.
4. To discuss about modem and multiplexing techniques.

**Course Outcomes:**

1. Student will able to understand basic concepts related communication systems.
2. Ability to understand different transmission medias
3. Ability to understand concepts related to data communication hardware.
4. Ability to understand basic functionality of modems.

**Syllabus:**

1. **Introduction to Data Communications:** A Communications Model,Data Communications and Data Communications Networking, Protocols andProtocol Architecture, Characteristics of Data Transmission: Concepts and Terminology, Analogand Digital Data Transmission, TransmissionImpairments

2. **Transmission Media:** Guided Transmission Media, Wireless Transmission DataEncoding, Digital Data, Digital Signals, Digital Data, Analog Signals, Analog Data, Digital Signals,Analog Data, AnalogSignals

3. **Data Communication Interface:** Asynchronous and Synchronous Transmission, LineConfigurations, Interfacing. Data Link Control Flow Control, Error Detection, Error Control, High-Level DataLink Control (HDLC),Other Data Link ControlProtocols.

4. **Data Communications Hardware:** Terminals: Introduction, Basic TerminalComponents, EnhancedTerminalComponents,General-PurposeTerminals,RemoteJobEntryTerminals, Transaction Terminals, Clustering of TerminalDevices.

5. **Communications ProcessingHardware:** Introduction,SwitchingProcessors,MultidropLines,Multiplexers,Concentrators, Front-EndProcessors.

6. **Modems:** Network Attachment and Regulations, Line Conditioning and LeasedLines, Modems and ModemCircuits.

7. **Multiplexing:** Frequency-Division Multiplexing, Synchronous T ime-DivisionMultiplexing: Characteristics, TDM Link Control, Digital Carrier Systems

StatisticalTime-Division Multiplexing:Characteristics.

**TEXTBOOKS:**


1. William Stallings, Data and Computer Communications, 10th Edition, PH/Pearson Edu.Inc., 2014
2. Data Communications and Computer Networks. Brijendra Singh.
3. Mary E.S. Loomis, Data Communications, PHI-N.J.,1983(Chapter 3, Chapter5)
4. PaulBates,PracticalDigitalandDataCommunications,PHI-N.J,1987(Chapter5)


**REFERENCEBOOKS:**


1. Behrouz A. Forouzan, Data Communications and Networking,3rdEditionTMH,2004
2. William A. Shay, Understanding Data Communications &Networks,2ndEdition Thomson-Brooks/Cole –Vikas PublishingHouse,1999
3. Michale A. Miller, Data &Network Communications, Thomson/Delmar –Vikas Pub.House, 2000

| CSE 316 | ELECTIVE-I PRINCIPLES OF PROGRAMMING LANGUAGES | |
|---|---|---|
| **Instruction: 3Periods/week,** Univ. Exam: 3 Hours | | **Credits: 3** |
| **Internal: 30 Marks** | **University Exam: 70 Marks** | **Total: 100 Marks** |

**Course objectives:**

1. To learn the underlying principles and concepts of programming language.
2. To understand programming language translation process.
3. To expose students to the important paradigms of programming.
4. To understand the concepts of distributed processing and network programming.

**Course outcomes:**

1. Ability to compare different programming languages.
2. Ability to discuss the significant achievements in programming language history.
3. Ability to assess the programming languages in scientific manner.

**Syllabus:**

1. **LanguageDesignIssues**:StudyProgrammingLanguages, HistoryofProgrammingLanguages, Role of Programming Languages, ProgrammingEnvironments.

2. **Impact of Machine Architectures**: OperationofaComputer,VirtualComputers andBinding Times**;**LanguageTranslationIssues:ProgrammingLanguageSyntax,StagesinTranslation,Formal Translation Models, Recursive Descent Parsing; Modeling Language Properties: Formal Propertiesof Languages, LanguageSemantics.

3. **Elementary Data Types**: Properties of Types and Objects, Scalar Data Types, Composite DataTypes **Encapsulation**: Structured Data Types, Abstract Data Types, Encapsulationby Subprograms, TypeDefinitions.**Inheritance**:AbstractDataTypesRevisited,Inheritance,Polymorphism.

4. **SequenceControl**:ImplementandExplicitSequence Control, Sequence with ArithmeticExpressions, Sequence Control Between Statements, Sequencingwith Non-arithmetic Expressions.

5. **Subprogram Control**: Subprogram Sequence Control, Attributes of Data Control,Parameter Transmission, Explicit CommonEnvironment.

6. **Storage Management**: Elements Requiring Storage, Programmer- and System - ControlledStorage, Static Storage Management, Heap StorageManagement.

7. **Distributed Processing**: Variations on Subprogram Control, Parallel Programming,

Hardware Developments, Software Architecture. **Network Programming**: Desktop Publishing,The World WideWeb.

**TextBook:**

1.Programming languages – Design and Implementation by Terrence W. Pratt MarvinV. Zelkowitz.3 rd Edition, Prentice Hall ofIndia.
2.Principles of Programming Languages by Er. Anil Panghal and Ms. Sharda Panghal

**Reference Books:**

1. Concepts of Programming Languages by Robert L. Sebesta, 4th Edition,Pearson Education.
2. Fundamentals of Programming Languages, Design & Implementation by SeyedH.Roosta. Vikaspublications.
3. Programming Languages by Paradigm and Practice – Doris Appleby Julius J. VendekoppleTata McGraw HillEdition.

| CSE317 | DATA COMMUNICATIONS AND COMPUTER NETWORKSLAB | |
|---|---|---|
| **Instruction: 3Periods/week,** Univ. Exam: 3 Hours | | **Credits: 1.5** |
| **Internal: 50 Marks** | **University Exam: 50 Marks** | **Total: 100 Marks** |

**FIRST CYCLE OF EXPERIMENTS**

1. PC-to-PC COMMUNICATIONS UNDER DOS WITH NULL MODEM a) Using Serial Ports and RS-232 C Cable Connection b) Using Paralell Ports and Parallel Cable Connection
2. PC-to-PC COMMUNICATIONS UNDER DOS WITH MODEM and 4-LINE EXCHANGE Using Communication Software: COMIT or XTALK
3. PC-to-PC COMMUNICATIONS UNDER WIN 98's DIRECT CABLE CONNECTION with NULL MODEM a) Using Serial Ports and RS-232 C Cable Connection b) Using Paralell Ports and Parallel Cable Connection
4. PC-to-PC COMMUNICATIONS UNDER WIN 98's DIAL-UP NETWORKING WITH MODEM and 4-LINE EXCHANGE
5. PC-to-PC COMMUNICATIONS UNDER WIN 98's HYPER TERMINAL WITH MODEM and 4-LINE EXCHANGE
6. LAN WITH BUS TOPOLOGY with a minimum of two systems i) Windows Peer-to-Peer Network ii) Windows NT Client-Server Network b) LAN WITH STAR TOPOLOGY with a minimum of two systems
7. a) LAN WITH BUS TOPOLOGY with a minimum of two systems using NOVELL Netware b) LAN WITH STAR TOPOLOGY with a minimum of two systems using NOVELL Netware

## NETWORK PROGRAMMING

1. Socket Programming
   a. TCP Sockets
   b. UDPSockets
   c. Applications usingSockets
2. Simulation of Sliding WindowProtocol
3. Simulation of RoutingProtocols
4. RPC
5. Development of applications such as DNS/ HTTP/ E – mail/ Multi - userChat

**Reference Books:**


1. Internet and Web Technologies by Raj Kamal, TataMcGraw-Hill
2. Programming the World Wide Web by Robert W. Sebesta, PearsonEducation

| CSE 318 | **OPERATING SYSTEMS LAB**<br>*Common with 6years integrated B.Tech(CSE)+M.Tech and B.Tech(IT)* | |
|---|---|---|
| **Instruction: 3Periods/week,** Univ. Exam: 3 Hours | | **Credits: 1.5** |
| **Internal: 50 Marks** | **University Exam: 50 Marks** | **Total: 100 Marks** |

**Course Objectives:**

1. To learn about UNIX/LINUX operating system, its intervals.
2. To learn system programming for UNIX/LINUX Operating System.
3. To understand UNIX/LINUX shell and its programming.
4. To understand resource management policies and mechanisms and their performance evaluation.

**Course Outcomes:**

1. The student practices UNIX commands, Vi editor, shell commands.
2. The student develops skill in writing C programs using system calls for process management, inter process communication and other aspects.
3. The student learns shell programming and develops skill for writing scripts for batch level tasks.
4. The student learns to simulate OS resource management aspects like process scheduling , page replacement and others to evaluate performance.

**Module I**

1. OS lab familiarization, Home Assignment on Unix commands, Vi editor
2. Simple C programs using command line arguments, system calls, library function calls, make utility
3. C programs using fork system call to create processes and study parent, child process mechanism
4. C programs to create process chaining, spawning
5. C programs to handle errors using errno, perror() function
6. C programs to use pipe system call for inter process communication

**Module II**

1. Familiarization of Unix shell programming
2. Simple shell programming exercises
3. Shell programming using decision making constructs

4. Shell programming using loop constructs

5. Shell programming for file and directory manipulation

**Module III**

1. C programs to study process scheduling implementing FCFS, Shortest Job First, and Round Robin algorithms
2. C programs to study page replacement implementing FIFO, Optimal, and LRU page replacement algorithms
3. C programs to study deadlock avoidance and detection
4. C Programs to simulate free space management

**References:**


1. Unix concepts and applications by Sumitabha Das,

   TMH Publications.
2. Unix programming by Stevens, Pearson Education.
3. Shell programming by YashwanthKanetkar.
4. Operating SystemConcepts by Silberschatz, and Peter Galvin.

| CSE319 | **SOFTSKILLSLAB**<br>*Common with 6years integrated B.Tech(CSE)+M.Tech and B.Tech(IT)* | |
|---|---|---|
| **Instruction: 3Periods/week,** Univ. Exam: 3 Hours | | **Credits:1.5** |
| **Internal: 50 Marks** | **University Exam: 50 Marks** | **Total: 100 Marks** |

1. English LanguageSkills
2. Spoken EnglishSkills
3. Presentation Skills

ANDHRA UNIVERSITY: : VISAKHAPATNAM
COMMON SCHEME OF INSTRUCTION & EXAMINATION
**III/IV B.TECH** (FOUR YEAR COURSE) &
**III/IV B.TECH** (SIX YEAR DOUBLE DEGREE COURSE)
(With effect from **2019-2020** admitted batch onwards)

**B.TECH. (CSE) III YEAR II-SEMESTER SCHEME OF INSTRUCTION AND EXAMINATION**

| SUB. REF | NAME OF THE SUBJECT | PERIODS | | | MAXIMUM MARKS | | | CREDITS |
|---|---|---|---|---|---|---|---|---|
| | | THEORY | TUTORIAL | LAB | EXAM | SESSIONALS | TOTAL | |
| CSE321 | COMPILER DESIGN | 3 | -- | -- | 70 | 30 | 100 | 3 |
| CSE322 | WEB TECHNOLOGIES | 3 | -- | -- | 70 | 30 | 100 | 3 |
| CSE323 | ELECTIVE – II | 3 | -- | -- | 70 | 30 | 100 | 3 |
| CSE324 | ELECTIVE – III | 3 | -- | -- | 70 | 30 | 100 | 3 |
| CSE325 | DATA WAREHOUSING & DATA MINING | 3 | -- | -- | 70 | 30 | 100 | 3 |
| CSE326 | PROJECT – I | -- | -- | 4 | 50 | 50 | 100 | 2 |
| CSE327 | ELECTIVE - II LAB | -- | -- | 3 | 50 | 50 | 100 | 1.5 |
| CSE328 | WEB TECHNOLOGIES LAB | -- | -- | 3 | 50 | 50 | 100 | 1.5 |
| | **TOTAL** | **15** | **0** | **10** | **500** | **300** | **800** | **20** |

**ELECTIVE - II**
1. Computer Graphics
2. Embedded Systems
3. Soft Computing

**ELECTIVE - III**
1. Artificial Intelligence
2. Image Processing
3. Distributed Systems

| CSE 321 | **COMPILERDESIGN**<br>*Common with 6years integrated B.Tech(CSE)+M.Tech and B.Tech(IT)* | |
|---|---|---|
| **Instruction: 3Periods/week,** Univ. Exam: 3 Hours | | **Credits: 3** |
| **Internal: 30 Marks** | **University Exam: 70 Marks** | **Total: 100 Marks** |

**Course objectives:**

1. To explain the basic understanding of grammars and language definition and Introducing various phases of designing a compiler.
2. To make the student to understand the concepts underlying the design and implementation of language processors and its mechanisms.
3. To extend the knowledge of parser by parsing LL parser and LR parser.
4. To enrich the knowledge in various phases of compiler ant its use, code optimization techniques, loop optimization techniques, machine code generation, and use of symbol table..

**Course outcomes:**

1. Ability to design & conduct experiments for Intermediate Code Generation in compiler.
2. Ability to learn the new code optimization techniques to improve the performance of a program in terms of speed & space.
3. Ability to acquire the knowledge of modern compiler & its features.

**Syllabus**

1. **Introduction:**Introductionto CompilersandLanguageprocessors,,ProgrammingLanguagebasics,Structure&DifferentPhasesofaCompiler,ReviewofCompilerStructure,StructureofOptimizingCompilation, Compiler construction tools, Boot strapping, Crosscompilers.
2. **FiniteAutomata&LexicalAnalysis:**IntroductiontoLexicalAnalysis,LexicalAnalyzers,Approachesto design Lexical Analyzers, Language for specifying lexical analyzers, Introduction toFinite automata, Regular Expressions & Languages, Recognition of Tokens, TransitionDiagrams, Implementation of lexical analyzers, Lexical Analyzer GeneratorLEX.
3. **SyntaxAnalysis:**SyntacticSpecificationofProgrammingLanguages,ContextFreeGrammars&Languages,IntroductiontoParsers.Top-downparsingtechniques:Bruteforceparsing,RecursiveDescentParsing,PredictiveParsing,Bottom–upParsing:Shiftreduceparsing,Operator parsing, LR (k)parsing.
4. **SemanticAnalysisandIntermediateCodeGeneration:**Semantic Actions,SyntaxDirectedTranslations,TranslationontheparseTree,ImplementationofSyntaxDirectedTranslator,IntermediateCodes,SyntaxDirectedtranslationtoPostfixcode,Syntax Trees,IntermediateCodeGeneration,ThreeAddr5essCode-TranslationofExpressions,TypeChecking&TypeConversions.

5. **CodeOptimization:**Principal sourcesofCodeOptimization,Loop Optimization, BasicBlocks&FlowGraphs,DAGRepresentationofBasicBlocks,ApplicationsofDAG, LocalOptimization,,Unreachable CodeElimination,DeadCodeElimination,Data FlowAnalysis,DataFlowEquations&Computations,Peep-HoleOptimization.MachineDependentOptimizations,OverviewofInformalCompiler AlgorithmNotation(ICAN), If Simplification,Loop Simplification, Loop Inversion, Branch Optimization andPrediction

6. **CodeGenerationandCodeScheduling:**IssuesinCodeGeneration,InputtoCodeGenerator,InstructionSelection,RegisterAllocation,SimpleTargetMachineModel,ProgramandInstructionCosts,Registerallocation&Assignments,CodeGenerationAlgorithm,CodeGenerators, Optimal Code Generation for Expressions, Code Generation FromDAG.

7. **SymbolTables,RuntimeEnvironmentandErrorHandling**:ContentsofaSymbolTable, Data Structures for Symbol Tables; Run time Environments, Implementation of a simple Stack allocation, Heap Management, Block Structured Languages; Error Detection & Recovery,Lexical Phase Errors, Syntactic & Semantic Errors, Error Handling Routines.

**TextBooks:**


1. Principles of Compiler Design by Aho,D. Ullman, Lam and Ravi Sethi, Pearson EducationSecond Edition
2. Advanced Compiler Design and Implementation, Steven Muchnic, ElsevierPublications.


**ReferenceBooks**:


1. Compiler Construction by Kenneth. C. Louden,VikasPub.House.
2. Compiler Design, A.A. Pentambekar,TechnicalPublications
3. Modern Compiler Design, Grune.D, Van Reeuwijk K, Bal H.E, Jacobs C J H, Langendoen K,Springer,

| CSE 322 | **WEB TECHNOLOGIES**<br>*Common with 6years integrated B.Tech(CSE)+M.Tech and B.Tech(IT)* | |
|---|---|---|
| **Instruction: 3Periods/week,** Univ. Exam: 3 Hours | | **Credits: 3** |
| **Internal: 30 Marks** | **University Exam: 70 Marks** | **Total: 100 Marks** |

**Course Objectives:**

On completing this course student will be able to

1. Understand the principles of Web based application development.
2. Design dynamic content in Web Pages using JavaScript.
3. Understanding the concepts of java Servlets, java Server Pages and design applications using them.
4. Understand the concepts of Component development and design applications by establishing connections to Databases

**Course Outcomes :**

1. Students will be able to construct web based applications and Identify where data structures are appearing in them.
2. Students will be able to connect java programs to different databases.
3. Students will be able to develop EJB programs

**Syllabus:**

**1.** 1.Introduction to HTML , Core Elements , Links and Addressing, Images , Text , Colors and Background, Lists, Tables and Layouts , Frames, Forms , Cascading Style Sheets.

**2.** Introduction to Java Scripts, Elements of Objects in Java Script, Dynamic HTML with Java Script

**3.** Document type definition, XML Syntax, XML Schemas, Document Object model, Presenting XML, Using XML Processors

**4.** Introduction to Servlet, Servlet Life Cycles, Servlet Basics, Tomcat Web Server, Configuring ApacheTomcat, Handling Client Request and Response, Handling Cookies, Session Tracking.

**5.** Introduction to PHP, Language Basics, Functions, Strings, Arrays.

**6.** Web Techniques, Data bases, Graphics, PDF, Dates and Times.

**7.** MYSQL Installation, Accessing MySQL Using PHP, Form Handling, Cookies, Sessions, and Authentication,Tables, Inserting Data into Tables , Selecting Data from a Table,Updating Table , Deleting data from Table, Webpage creation.

**Text Books:**


1. Web Programming, building internet applications, 2nd Ed., Chris Bates, Wiley Dreamtech
2. Web Technologies; by Uttam K. Roy
3. The complete Reference HTML and DHTML, Thomas A. Powey


**Reference Books:**


1. Internet , World Wide Web , How to program, Dietel , Nieto, PHI/PEA
2. Web Tehnologies, Godbole, kahate, 2nd Ed., TMH

| CSE 323 | ELECTIVEII | COMPUTERGRAPHICS |
|---|---|---|
| **Instruction: 3Periods/week,** | Univ. Exam: 3 Hours | **Credits: 3** |
| **Internal: 30 Marks** | **University Exam: 70 Marks** | **Total: 100 Marks** |

**Course Objectives:**

1. Provides a comprehensive introduction to computer graphics with a foundation in Graphics Applications.
2. A thorough introduction to computer graphics techniques.
3. To give the basics of Geometric Transformations and projections.
4. To introduce three dimensional concepts and object representations with color models and basics of computer animation.

**Course Outcomes:**

1. The students will understand graphics principles and graphics hardware.
2. The students can demonstrate geometrical transformations.
3. The students can create interactive graphics applications and demonstrate computer graphics animation.

**Syllabus:**

1. **Introduction:** Computer Graphics and their applications: Computer Aided Design, ComputerArt, Entertainment,EducationandTraining,GraphicalUserInterfaces;OverviewofGraphicssystems:Video DisplayDevices,RasterScanSystems,RandomScanSystems,GraphicsMonitorsAnd Workstations,InputDevices,HardCopyDevices,InteractiveInputMethods,Windowsand Icons,VirtualRealityEnvironments,GraphicsSoftware.

2. **Output primitives :**Points and Lines, **,** Line and Curve Attributes, Color and Gray scalelevels, Antialiasing, Loading the Frame buffer, Line function, Line Drawing Algorithms, CircleGeneratingAlgorithms,EllipseGeneratingAlgorithms,PixelAddressing,AreaFillAttributes,FilledAreaPrimitives,Filled Area Functions, Cell Array, Character Generation, Character Attributes, Bundled Attributes,CurveFunctions, Parallel CurveAlgorithms.

3. **Two Dimensional Transformations:** Basic 2DTransformations, Matrix Representations, Homogeneous Coordinates, Composite Transformations, Other Transformations,Transformations between Coordinate Systems, AffineTransformations.

4. **Three Dimensional Transformations &Projections:** Translation, Rotation, Scaling,OtherTransformations, Composite Transformations, 3D Transformation Functions, Modeling and Coordinate Transformations, Need for projections, Parallel & Perspective projections, GeneralProjectionTransformations.

5. **Viewing Pipeline and Clipping operations :** Viewing Pipeline ,Viewing Coordinates &Reference frames, Window-to-Viewport Coordinate Transformation, Two Dimensional Viewing Functions, ,Three Dimensional Viewing, View Volumes, Clipping and its Operations, Types of clipping operations-Point

Clipping,LineClipping,PolygonClipping,,CurveClipping,,TextandExteriorClipping.

6. **Three Dimensional Concepts and Object representations:** 3D display methods, 3D Graphics, PolygonSurfaces,CurvedLinesandSurfaces,QuadraticSurfaces,SuperQuadrics,BlobbyObjects,Spline Representations, Cubic Spline methods, Bézier Curves and Surfaces, B-Spline Curves andSurfaces,

7. **Color Models and Basics of Computer Animation:** Intuitive color concepts, Basics of RGB Colormodel, YIQColorModel,CMY&HSVColormodels.DesignofanimationSequences,RasterAnimations,Key Frame systems: Morphing, A Simple program onAnimation.

**Text Books:**

1. Computer Graphics, Donald Hearn & M.Pauline Baker, Pearson Education,New Delhi.
2. Computer Graphics by Dr. Rajiv Chopra.

**Reference Books:**


1. ProceduralElementsforComputerGraphics,DavidF.Rogers,TataMcGrawHillBookCompany,NewDelhi,2003
2. ComputerGraphics:Principles&PracticeinC,J.D.Foley,S.KFeiner,AVanDamF.HJohnPearsonEducation,2004
3. ComputerGraphicsusingOpenGL,FranscisSHillJr,PearsonEducation,2004.
4. Computer Vision and Image Processing: A Practical Approach using CVIPtools, S. E.Umbaugh,, Prentice Hall,1998

| CSE 323 | ELECTIVE-II EMBEDDED SYSTEMS | |
|---|---|---|
| **Instruction: 3Periods/week,** Univ. Exam: 3 Hours | | **Credits: 3** |
| **Internal: 30 Marks** | **University Exam: 70 Marks** | **Total: 100 Marks** |

**Course Objectives:**

1. To study the basics of embedded systems and its examples.
2. To study the 8051 Microcontroller architecture and its instruction set.
3. To discuss various software architectures in embedded systems.
4. To discuss Inter Task Communication procedures in RTOS and design issues of RTOS.
5. To study various embedded software development tools and debugging techniques.

**Course Outcomes:**

1. Student will be understand the basic architecture of 8051 micro controller.
2. ability to write ALP programs using 8051 instruction set.
3. Ability to understand the concepts related to RTOS and its Inter Task Communication methods.
4. Ability to understand various design issues of RTOS.
5. Understand about embedded software development tools.

**Syllabus:**

1. **Introduction to Embedded Systems:** Examples, Typical Hardware, Memory, Microprocessors , Busses; Introduction to 8051 Microcontroller , Architecture, Instruction set, Programming. **Interrupts**: Interrupt Basics, Shared-Data problem, Interrupt Latency.

2. **Software Architectures:** Round-Robin Architecture, Round-Robin with Interrupts Architecture, Function-Queue Scheduling Architecture, Real-Time Operating Systems Architecture, Selection of Architecture.

3. **Real Time Operating System**: Tasks and Task States, Tasks and Data, Semaphores and Shared Data, Semaphore Problems, Semaphore variants.

   **Inter Task Communication:** Message Queues, Mailboxes, Pipes, Timer Functions, Events, Memory Management, Interrupt Routines in RTOS Environment.

4. **Design issues of RTOS:** Principles , Encapsulation Semaphores and Queues, Hard Real-Time Scheduling Considerations, Saving Memory Space, Saving Power.

5. **Embedded Software development Tools:** Host and Target Machines , Linker/Locator for Embedded Software, Getting Embedded Software into the Target System.

   **Embedded Software Debugging Techniques :**Testing on your Host Machine, Instruction Set Simulators, Laboratory Tools used for Debugging.

6.**Introduction to the Internet of Things:** History of IoT, IoT Architecture, M2M – Machine to Machine, Web of Things, IoT protocols, The Layering concepts, IoT Communication Pattern, IoT protocol Architecture.

**Text Books:**


1. The 8051 Microcontroller Architecture, Programming & Applications, Kenneth J. Ayala, Penram International.

2.Introduction to Embedded Systems by K.V Shibu

3. An Embedded Software Primer, David E. Simon, Pearson Education , 2005.

4. Internet of Things: Converging Technologies for Smart Environments and Integrated Ecosystems, Marina Ruggieri & Homayoun Nikookar, River Publishers Series in Communications.


**Reference Book:**


1. Embedded Systems: Architecture , Programming and Design, Raj Kamal, Tata McGraw-Hill Education, 2008

| CSE 323 | ELECTIVE-II SOFTCOMPUTING | |
|---|---|---|
| **Instruction: 3Periods/week,** Univ. Exam: 3 Hours | | **Credits: 3** |
| **Internal: 30 Marks** | **University Exam: 70 Marks** | **Total: 100 Marks** |

**Course objectives:**

1. To make the student to understand the role of imprecision and uncertainty in real world scenarios.
2. To explain the role of Soft Computing in addressing the imprecision and uncertainty.
3. To explain the principal components of soft computing that include Fuzzy Sets and Fuzzy Logic, Artificial Neural Networks, Genetic Algorithms and Rough Sets.
4. To learn the Design and Implementation of Soft Computing methodologies.
5. To explain the design of hybrid systems which is combination of one or more soft computing methodologies mentioned.

**Course outcomes:**

1. Ability to represent Uncertainty / imprecision data.
2. Ability to select a suitable method of Soft Computing to solve a particular problem.
3. Ability to build hybrid systems using Soft Computing techniques.

**Syllabus:**

1. **Soft Computing:** Introduction to Fuzzy Computing, Neural Computing, GeneticAlgorithms, Associative Memory, Adaptive Resonance Theory, Different Tools and Techniques,Usefulness andApplications.

2. **Fuzzy Sets and Fuzzy Logic**: Introduction, Fuzzy Sets Versus Crisp Sets, Operations on FuzzySets, Extension Principle, Fuzzy Relations and Relation Equations, Fuzzy Numbers, LinguisticVariables, Fuzzy Logic, Linguistic Hedges,Applications,

3. **Interference in fuzzy logic:** fuzzy if-then rules, Fuzzy implications and Fuzzyalgorithms, Fuzzifications and Defuzzificataions, Fuzzy Controller, Fuzzy Controllers, FuzzyPattern Recognition, Fuzzy Image Processing, FuzzyDatabase.

4. **Artificial Neural Network**: Introduction, Artificial Neuron and its model, activationfunctions, Neural network architecture: single layer and multilayer feed forward networks,re-current networks. Various learning techniques, perception and convergence rule, Auto-associativeand hetro-associative memory , Hebb's Learning, Adaline,Perceptron

5. **Multilayer Feed Forward Network:** Back Propagation Algorithms, Different IssuesRegarding Convergence of Multilayer Perceptron, Competitive Learning, Self-Organizing, FeatureMaps, Adaptive Resonance Theory, Associative Memories,Applications.

6. **Evolutionary and Stochastic Techniques:** Genetic Algorithm (GA), GeneticRepresentations, (Encoding) Initialization and Selection, Different Operators of

GA, Analysis ofSelection Operations, Hypothesis of Building Blocks, Schema Theorem and Convergence ofGenetic Algorithm, Simulated Annealing and Stochastic Models, Boltzmann Machine,Applications.

7. **Rough Set:** Introduction, Imprecise Categories Approximations and Rough Sets, Reductionof Knowledge, Decision Tables and Applications. Hybrid Systems: Neural-Network-BasedFuzzy Systems, Fuzzy Logic-Based Neural Networks, Genetic Algorithm for Neural Network Designand Learning, Fuzzy Logic and Genetic Algorithm for Optimization,Applications

**TextBooks:**


1. NeuralNetworks,FuzzyLogicandGeneticAlgorithm:SynthesisandApplications,S.Rajsekaran and G.A. Vijayalakshmi Pai, Prentice Hall ofIndia.
2. Rough Sets, Z.Pawlak, Kluwer Academic Publisher,1991.
3. Intelligent Hybrid Systems, D. Ruan, Kluwer Academic Publisher,1997


**References:**


1. Artificial Intelligence and Intelligent Systems, N.P.Padhy, Oxford UniversityPress.
2. Neural Fuzzy Systems, Chin-Teng Lin & C. S. George Lee, Prentice HallPTR. Addison-Wesley
3. Learning and Soft Computing, V. Kecman, MIT Press,2001
4. Fuzzy Sets and Fuzzy Logic, Klir & Yuan, PHI,1997

| CSE 324 | ELECTIVE-III ARTIFICIALINTELLIGENCE | |
|---|---|---|
| **Instruction: 3Periods/week,** Univ. Exam: 3 Hours | | **Credits: 3** |
| **Internal: 30 Marks** | **University Exam: 70 Marks** | **Total: 100 Marks** |

**Course Objectives:**

1. To learn about AI problem, Production Systems and their characteristics.
2. To understand the importance of search and the corresponding search strategies for solving AI problem.
3. To introduce to Planning, Natural Language Processing and Expert Systems.

**Course Outcomes:**

1. The Student understands AI problem characteristics, state space approach for solving AI problem, Production System framework.
2. The student learn several optimal search strategies and the use of heuristics.
3. The student learns relational, inferential, inheritable and procedural knowledge and the corresponding knowledge representation approaches.
4. The student is introduced to applying AI problem solving approaches to natural language processing, planning and expert systems.

**Syllabus:**

1. **Introduction to Artificial Intelligence:** Artificial Intelligence, AI Problems, AI Techniques, Definingthe Problem as a State Space Search, Problem Characteristics, ProductionSystems.
2. **Search Techniques:** Issues in The Design of Search Programs, Un-Informed Search, BFS, DFS;Heuristic Search Techniques: Generate-And- Test, Hill Climbing, Best-First Search, $A^*$ Algorithm,Problem Reduction, $AO^*$Algorithm, Constraint Satisfaction, Means-EndsAnalysis.
3. **Knowledge Representation using Rules:** Procedural Vs Declarative Knowledge, Logicprogramming, Forward Vs Backward Reasoning, Matching Techniques, Partial Matching, RETE Matching AlgorithmAI Programming languages: Overview of LISP and PROLOG, Production System inProlog.
4. **Symbolic Logic**: Propositional Logic, First Order Predicate Logic: Representing Instance andis-a Relationships, Computable Functions and Predicates, Unification & Resolution, NaturalDeduction; **Structured Representations of Knowledge**: Semantic Nets, Partitioned Semantic Nets,Frames, Conceptual Dependency, Conceptual Graphs,Scripts.
5. **Reasoning under Uncertainty**: Introduction to Non-Monotonic Reasoning, TruthMaintenance Systems, Logics for Non-Monotonic Reasoning, **Statistical Reasoning**: Bayes Theorem,Certainty Factors and Rule-Based Systems, Bayesian Probabilistic Inference, Bayesian Networks,Dempster- Shafer Theory, Fuzzy Logic: Crisp Sets ,Fuzzy Sets, Fuzzy Logic Control, Fuzzy Inferences &Fuzzy Systems.
6. **Natural Language Processing**: Steps in The Natural Language Processing, Syntactic Processingand Augmented Transition Nets,Semantic Analysis, NLP Understanding

Systems; **Planning:** Components ofaPlanningSystem,GoalStackPlanning,Non-linearPlanningusingConstraitPosting,Hierarchical Planning, ReactiveSystems.

7. **Experts Systems:** Overview of an Expert System, Architecture of an Expert Systems, Different Typesof ExpertSystems-RuleBased,FrameBased,DecisionTreebased,CaseBased,NeuralNetworkbased, Black Board Architectures, Knowledge Acquisition and Validation Techniques, , KnowledgeSystem Building Tools, Expert SystemShells.

**TextBooks:**

1. Artificial Intelligence, Elaine Rich and Kevin Knight, Tata Mcgraw-HillPublications
2. Python Programming: A modular approach by Pearson; by Taneja Sheetal (Author), Kumar Naveen.

**References:**


1. Artificial Intelligence, George F Luger, Pearson EducationPublications
2. Artificial Intelligence : A modern Approach, Russell and Norvig, PrinticeHall
3. Introduction To Artificial Intelligence & Expert Systems, Patterson, PHIpublications

| CSE 324 | ELECTIVE-III | IMAGE PROCESSING |
|---|---|---|
| **Instruction: 3Periods/week,** Univ. Exam: 3 Hours | | **Credits:3** |
| **Internal: 30 Marks** | **University Exam: 70 Marks** | **Total: 100 Marks** |

**Course objectives**

1. To explain fundamentals of Image processing concepts.
2. To provide mathematical foundation of image enhancement, image compression and image segmentation.
3. To explain the students about Morphology and its applications in image processing.
4. To explain various methods and techniques for image transformation.

**Course outcomes**

1. Ability to develop algorithms for fundamental concepts in Image processing.
2. Ability to perform image enhancement , image compression and image segmentation using various methods.
3. Ability to implement Image transformation techniques

**Syllabus:**

1. **FundamentalsofImageProcessing:**ImageAcquisition,ImageModel,Sampling,Quantization,RelationshipBetweenPixels,DistanceMeasures,Connectivity,ImageGeometry,PhotographicFilm.Histogram:Definition,DecisionOfContrastBasingOnHistogram,OperationsBasingonHistogramsLikeImage Stretching, Image Sliding, Image Classification. Definition and Algorithm ofHistogramEqualization.

2. **ImageEnhancementinSpatialDomain**:ArithmeticandLogicalOperations,PixelorPointOperations,SizeOperations;SmoothingFilters-Mean,Median,ModeFilters–ComparativeStudy.

3. **Edgeenhancementinspatialdomain:**Edgeenhancementfilters,DirectorialFilters,Sobel,Laplacian,Robert,KIRSCHHomogeneity &DIFFfilters,PREWITTFilter,Contrastbasededgeenhancementtechniques,Comparativestudy,Lowpassfilters,Highpassfilters,Sharpeningfilters,Comparativestudy,Color fundamentals and colormodel

4. **ImageCompression:**RunLengthEncoding,modifiedrunlengthencoding,ContourCoding,HuffmanCode,CompressionDuetoChangeinDomain,CompressionDuetoQuantizationCompressionattheTime of Image Transmission. Brief Discussion on:- Image CompressionStandards.

5. **ImageSegmentation:**Definitionofsegmentation,CharacteristicsofSegmentation,Detection ofDiscontinuities,Thresholding.PixelBasedSegmentationMethod.RegionBasedSegmentationMethods,Segmentation by Pixel Aggregation, Segmentation by Sub Region Aggregation, HistogramBasedSegmentation, Spilt and Merge Technique, Segmentation of moving objects.

6. **Morphology:**Dilation,Erosion,Opening,Closing,Hit-And-MissTransform,Thinning,Thickening,Skeletons , Pruning Extensions to Gray – ScaleImages Application of Morphology inI.P

7. **Image Transforms :** A Detail Discussion On Fourier Transform, DFT,FFT, Properties ofFouriertransform,WALSHTransForm,WFT,HADAMARDTransform,DCTImageEnhancementinFrequencyDomain:DesignofLowPass,HighPass,EDGEEnhancement,SmootheningFiltersinFrequencyDomain.ButterWorthFilter,HomomorphicFiltersinFrequencyDomainAdvantagesofFiltersinFrequencyDomain, Comparative Study of Filters in Frequency, Domain and SpatialDomain.

**TextBooks:**

1. DigitalImageProcessing,RafaelC.GonzalezAnd RichardE.Woods,AddisionWesley
2. Digital Image Processing, S. Jayaraman, S. Esakkirajan&T. Veera Kumar,TMH

**ReferenceBooks:**

1. Fundamentals Of Electronic Image Processing By Arthyr – R – Weeks,Jr.(PHI)
2. ImageProcessing,Analysis,AndMachineVisionByMilanSonkaVaclanHalavacRogerBoyle,VikasPublishingHouse.
3. Fundamentals of Digital Image Processing, Chris Solomon, Tobi Breckon,Wiley-Blackwell

| CSE 324 | ELECTIVEIII | DISTRIBUTED SYSTEMS |
|---|---|---|
| **Instruction: 3Periods/week,** | Univ. Exam: 3 Hours | **Credits: 3** |
| **Internal: 30 Marks** | **University Exam: 70 Marks** | **Total: 100 Marks** |

**Course Objectives:**

This course provides an introduction to the fundamentals of distributed computer systems, assuming the availability of facilities for data transmission.

**Course Outcomes:**

By the end of the course, students should be able to build distributed systems that:

1. Scale as the number of entities in the system increase
2. Can sustain failures and recover from them
3. Work with distributed, fault tolerant file systems
4. Can handle and process large data volumes
5. Are secure and handle certain classes of distributed denial of service attacks
6. Are Loosely coupled, transactional and eventually stable

**Syllabus:**

1. Introduction to Distributed Systems, What is a Distributed System?, Hard ware concepts, Software concepts, Design issues.
2. Communication in Distributed Systems, Lay red Protocols, ATM networks, The Client – server model, Remote Procedure call, Group communication.
3. Synchronization in Distributed System, Clock Synchronization, Mutual Exclusion, Election algorithms, Atomic transactions, Deadlocks in Distributed Systems.
4. Process and processors in Distributed System threads, System Models, Processors allocation, Scheduling in Distributed System, Fault tolerance, Real time Distributed System.
5. Distributed File Systems, Distributed File System Design, Distributed File System implementation, Trends in Distributed File System.
6. Distributed Shared Memory, Introduction, What is Shared memory?, Consistency models, Page based Distributed Shared memory, Shared – variable Distributed Shared memory, Object based Distributed Shared Memory.

**Text Books:**

1. Distributed Operating Systems, Andrew S. Tanenbanm
2. Advanced Concepts in Operating Systems, Makes Singhal and Niranjan G.Shivaratna

| CSE 325 | **DATAWAREHOUSING &DATAMINING**<br>*Common with 6years integrated B.Tech(CSE)+M.Tech and B.Tech(IT)* | |
|---|---|---|
| **Instruction: 3Periods/week,** Univ. Exam: 3 Hours | | **Credits: 3** |
| **Internal: 30 Marks** | **University Exam: 70 Marks** | **Total: 100 Marks** |

**Course Objectives**:

1. To understand the evolution of data warehousing and data mining systems
2. To understand extracting, cleaning and transformation of data into a warehouse.
3. To learn the principles of statistics, information theory, machine learning and other areas AI and implementation of data mining techniques.
4. To understand pattern mining using classification and clustering methods.

**Course Outcomes:**

1. The student understands the differences between OLTP and OLAP.
2. The student learns how data cube technology supports summarization and querying high dimensional data.
3. The student is introduced to similarity, distance, information gain and other performance and error metrics used for evaluation of mining results.
4. The student is introduced to various approaches to association rule mining , supervised and unsupervised learning and the corresponding classification and clustering approaches involving decision trees, Bayesian approaches, model based and agglomerative approaches.

**Syllabus:**

1. **Introduction to Data Mining:**Importance ofData WarehousingandDataMining,KindsofPatterns,Technologies,Applications, Major Issues in Data Mining,DataObjectsand Attributes Types, Statistical Descriptions of Data, Estimating Data Similarityand Dissimilarity
2. **Data exploration and pre-processing:** Data Visualization, Quality data**,** Data Cleaning, Data Integration, Data Reduction, Data Transformation, Discretization and Concept Hierarchy Generation.
3. **Data Warehouse and OLAP Technology:** Basic Concepts of Data warehouse, Data Modelingusing CubesandOLAP,DWHDesignandusage,ImplementationusingDataCubesandOLAPs,Data Generalization withAOI.
4. **Data Cube Technology:** Preliminary Concepts of Data Cube Computation, Data CubeComputation Methods:Multi-wayArrayAggregationforFullCube, BUC, Star-cubing, Pre-computing shell fragments for High dimensional OLAP
5. **Mining Frequent Patterns Based on Associations and Correlations**: Basic

Concepts, Frequent Itemset Mining Methods: Apriori Algorithm, Association Rule Generation, Improvements to A Priori, FP- Growth Approach, Pattern Evaluation Method**s**

6. **Classification & Prediction**: Basic Concepts, Decision Tree Induction, Bayes Classification, Rule- Based Classification, Model Evaluation and Selection, Techniques to Improve Classification Accuracy, Classification by Back Propagation, K-nearest neighbor classifier.
7. **Cluster Analysis:** Basic Concepts and issues in clustering, Types of Data in ClusterAnalysis, Partitioning Methods, Hierarchical Methods, DBSCAN, Grid Based Methods, Evaluationof Clustering Solutions

**TextBooks:**

1. Data Mining- Concepts and Techniques by Jiawei Han, Micheline Kamber and Jian Pei–Morgan Kaufmann publishers –--3rd edition
2. Data Mining Techniques, A.K.Pujari, University Press

**References:**

1. Data mining concepts byTan, Steinbech, and Vipin Kumar - Pearson Edupublishers

| CSE 327 | ELECTIVE-II LAB: COMPUTER GRAPHICS LAB | |
|---|---|---|
| Instruction: 3 Periods +0Tut/week, Univ. Exam: 3Hours | | Credits: 1.5 |
| Internal: 50 Marks | University Exam: 50 Marks | Total: 100 Marks |

**Course Objectives:**

5. Provides a comprehensive introduction to computer graphics with a foundation in Graphics Applications.
6. A thorough introduction to computer graphics techniques.
7. To give the basics of Geometric Transformations and projections.
8. To introduce three dimensional concepts and object representations with color models and basics of computer animation.

**Course Outcomes:**

4. The students will understand graphics principles and graphics hardware.
5. The students can demonstrate geometrical transformations.
6. The students can create interactive graphics applications and demonstrate computer graphics animation.

A. Digital Differential Analyzer Algorithm

B. Bresenham's Line Drawing Algorithm

C. Midpoint Circle Generation Algorithm

D. Ellipse Generation Algorithm

E. Creating various types of texts and fonts

F. Creating two dimensional objects

G. Two Dimensional Transformations

H. Coloring the Pictures

I. Three Dimensional Transformations

J. Curve Generation

K. Simple Animations using transformations

L. Key Frame Animation

| CSE 327 | ELECTIVE-II LAB: EMBEDDED SYSTEMS LAB | |
|---|---|---|
| **Instruction: 3 Periods +0Tut/week, Univ. Exam: 3Hours** | | **Credits: 1.5** |
| **Internal: 50 Marks** | **University Exam: 50 Marks** | **Total: 100 Marks** |

**PART- I:**

1. Simple Assembly Program for Addition | Subtraction | Multiplication | Division
2. Operating Modes, System Calls and Interrupts, Loops, Branches
3. Write an Assembly programs to configure and control General Purpose Input/Output (GPIO) port pins.
4. Write an Assembly programs to read digital values from external peripherals and execute them
   with the Target board.
5. Program for reading and writing of a file
6. Program to demonstrate Time delay program using built in Timer / Counter feature on IDE
   environment
7. Program to demonstrates a simple interrupt handler and setting up a timer
8. Program demonstrates setting up interrupt handlers. Press button to generate an interrupt and trace program flow with debug terminal.
9. Program to Interface 8 Bit LED and Switch Interface
10. Program to implement Buzzer Interface on IDE environment
11. Program to Displaying a message in a 2 line x 16 Characters LCD display and verify the result in debug terminal.
12. Program to demonstrate I2C Interface on IDE environment
13. Program to demonstrate I2C Interface – Serial EEPROM
14. Demonstration of Serial communication. Transmission from Kit and reception from PC using
15. Serial Port on IDE environment use debug terminal to trace the program.
16. Generation of PWM Signal
17. Program to demonstrate SD-MMC Card Interface.

**PART- II:**

Write the following programs to understand the use of RTOS with ARM Processor on IDE

Environment using ARM Tool chain and Library:

1. Create an application that creates two tasks that wait on a timer whilst the main task loops.

2. Write an application that creates a task which is scheduled when a button is pressed, whichillustrates the use of an event set between an ISR and a task

3. Write an application that Demonstrates the interruptible ISRs(Requires timer to have higherpriority than external interrupt button)

4. a).Write an application to Test message queues and memory blocks.

b).Write an application to Test byte queues

5. Write an application that creates two tasks of the same priority and sets the time slice period toillustrate time slicing. Interfacing Programs:

6. Write an application that creates a two task to Blinking two different LEDs at different timings

7. Write an application that creates a two task displaying two different messages in LCD display in two lines.

8. Sending messages to mailbox by one task and reading the message from mailbox by another task.

9. Sending message to PC through serial port by three different tasks on priority Basis.

10. Basic Audio Processing on IDE environment.

| CSE 327 | ELECTIVE –II LAB: SOFT COMPUTING LAB | |
|---|---|---|
| **Instruction: 3 Periods +0Tut/week, Univ. Exam: 3Hours** | | **Credits: 1.5** |
| **Internal: 50 Marks** | **University Exam: 50 Marks** | **Total: 100 Marks** |

**Course Objectives:**

1. This course introduces soft computing techniques that are different from conventional AI techniques.
2. This course also provides necessary mathematical background for understanding and implementing soft computing Techniques, such as neural networks, fuzzy systems, and genetic algorithms.

**Course Outcomes:**

1. Understand importance of soft computing.
2. Understand different soft computing techniques like Genetic Algorithms, Fuzzy Logic, Neural Networks and their combination.
3. Implement algorithms based on soft computing.
4. Apply soft computing techniques to solve engineering or real life problems.

**Exercises:**

**Experiment 1:** Write a program in MATLAB to plot various membership functions.

**Experiment 2:** Use Fuzzy toolbox to model tip value that is given after a dinner which can be-not good, satisfying, good and delightful and service which is poor, average or goodand the tip value will range from Rs. 10 to 100.

**Experiment 3:** Implement FIS Editor.

**Experiment 4:** Generate AND, NOT function using McCulloch-Pitts neural net by MATLAB program.

**Experiment 5:** Generate XOR function using McCulloch-Pitts neural net by MATLAB program.

**Experiment 6:** Write a MATLAB program for Perceptron net for an AND function with bipolar inputs and targets.

**Experiment 7:** Write a MATLAB program for Hebb Net to classify two dimensional input patternsin bipolar with their given targets

**Experiment 8:** Write a program of Perceptron Training Algorithm

**Experiment 9:** Write a program to implement Hebb's rule

**Experiment 10:** Write a program of Back Propagation Algorithm.

| CSE328 | **WEB TECHNOLOGIESLAB**<br>*Common with 6years integrated B.Tech(CSE)+M.Tech and B.Tech(IT)* | |
|---|---|---|
| **Instruction: 3Periods/week,** Univ. Exam: 3 Hours | | **Credits:1.5** |
| **Internal: 50 Marks** | **University Exam: 50 Marks** | **Total: 100 Marks** |

Each student should develop two projects out of this list using JSP, JDBC, J2EE

1. Design Airlines Ticket Reservation System
2. Design ONLINE Banking system.
3. Design Library Information system
4. Design Gram Panchayat Information system for House tax, water tax, wealth tax, Library tax collection, phone bill, Electricity bill collection.
5. Design student information system portal which maintain attendance, marks etc.
6. Design online examination system.

ANDHRA UNIVERSITY: : VISAKHAPATNAM
COMMON SCHEME OF INSTRUCTION & EXAMINATION
**IV/IV B.TECH** (FOUR YEAR COURSE) &
**IV/IV B.TECH** (SIX YEAR DOUBLE DEGREE COURSE)
(With effect from **2019-2020** admitted batch onwards)

**B.TECH. (CSE) IV YEAR I-SEMESTER SCHEME OF INSTRUCTION AND EXAMINATION**

| SUB. REF | NAME OF THE SUBJECT | PERIODS | | | MAXIMUM MARKS | | | CREDITS |
|---|---|---|---|---|---|---|---|---|
| | | THEORY | TUTORIAL | LAB | EXAM | SESSIONALS | TOTAL | |
| CSE411 | ELECTIVE – IV | 3 | -- | -- | 70 | 30 | 100 | 3 |
| CSE412 | ELECTIVE – V | 3 | -- | -- | 70 | 30 | 100 | 3 |
| CSE413 | GPS APPLICATIONS | 3 | -- | -- | 70 | 30 | 100 | 3 |
| CSE414 | COMPUTATIONAL BIOLOGY | 3 | -- | -- | 70 | 30 | 100 | 3 |
| CSE415 | PROJECT – II | -- | -- | 12 | 50 | 50 | 100 | 6 |
| CSE416 | ELECTIVE – IV LAB | -- | -- | 3 | 50 | 50 | 100 | 1.5 |
| CSE417 | ELECTIVE – V LAB | -- | -- | 3 | 50 | 50 | 100 | 1.5 |
| | **TOTAL** | **12** | **0** | **18** | **430** | **270** | **700** | **21** |

**ELECTIVE -IV**
1. Big Data Analytics
2. Machine Learning
3. R Programming

**ELECTIVE - V**
1. Cryptography & network security
2. IOT
3. Cloud Computing

| CSE 411 | **ELECTIVE-IV BIGDATA ANALYTICS**<br>*Common with 6years integrated B.Tech(CSE)+M.Tech and B.Tech(IT)* | |
|---|---|---|
| **Instruction: 3Periods/week,** Univ. Exam: 3 Hours | | **Credits: 3** |
| **Internal: 30 Marks** | **University Exam: 70 Marks** | **Total: 100 Marks** |

**Course Objectives:**

- To introduce Big Data and the Data analytics lifecycle to address business challenges that leverage big data.
- To understand the importance of mining data streams and social network graphs.
- To introduce big data analytics technology and tools including MapReduce and Hadoop.

**Expected Course Outcome:**

- Reframe a business challenge as an analytics challenge.
- Apply appropriate analytic techniques and tools to analyze big data.
- Create models and identify insights that can lead to actionable results.
- Effectively participate in big data and other analytics projects.
- Use tools such as MapReduce / Hadoop.

1. **Big Data Concepts and Environment**: Big Data Overview-Big Data Challenges and Opportunities- Data analytics lifecycle overview – Phases of Data Analytics: Discovery, Data preparation, Model planning, Model building.
2. **Overview of Hadoop and HDFS**: Introduction to Hadoop - The Distributed File System: HDFS, GPFS – The Design of HDFS – HDFS-Concepts-Blocks, Name Nodes and Data Nodes; Components of Hadoop- Hadoop Cluster Architecture-Batch Processing- Serialization - Hadoop ecosystem of tools-NoSQL .
3. **Map Reduce**: MapReduce Basics - Functional Programming Roots - Mappers and Reducers - The Execution Framework -MapReduce Algorithm Design –Shuffling, Grouping, Sorting- Custom Partitioners and Combiners- MapReduce Formats and Features.
4. **Data Stream Mining**: The Stream Data Model: A Data-Stream-Management System, Examples of Stream Sources, Stream Queries, Issues in Stream Processing. Sampling Data in a Stream, Filtering Streams (The Bloom Filter), Counting Distinct Elements in a Stream, Counting Ones in a Window, Decaying Windows.
5. **Big Data Clustering:**Overview of clustering techniques, Hierarchical Clustering, Partitioning Methods, CURE algorithm, Clustering stream
6. **Mining Social Network Graphs**: Link Analysis: Page Rank- Efficient computation of Page Rank- Topic Sensitive Page Rank- Link Spam- Hubs and Authorities. Mining Social Network Graphs: Web Advertising: Online and Offline Algorithms; Social Network Graphs: Clustering of Social Network Graphs- Direct Discovery of Communities- Partitioning of Graphs- Finding overlapping communities- Simrank Counting Triangles- Neighborhood properties of Graphs.

**Text Book:**

1. Radha Shankarmani, M Vijayalakshmi, "Big Data Analytics", 2nd Edition, Wiley

**Reference Books:**

1. Anand Rajaraman and Jeffrey David Ullman, Mining of Massive Datasets, Cambridge University Press, 2014.

2. Data Warehousing in the Age of Big Data, Krish Krishnan Elsevier Inc, 2013

| CSE 411 | **ELECTIVE-IV MACHINE LEARNING**<br>*Common with 6years integrated B.Tech(CSE)+M.Tech and B.Tech(IT)* | |
|---|---|---|
| **Instruction: 3Periods/week,** Univ. Exam: 3 Hours | | **Credits: 3** |
| **Internal: 30 Marks** | **University Exam: 70 Marks** | **Total: 100 Marks** |

1. Introduction to Machine Learning, Applications of Machine learning, Supervisory Learning: Learning classes from examples, Vapnik-Charvonenkis (VC) Dimension, Probably Approximately Correct(PAC) Learning, noise, learning multiple classes, regression, model selection and generalization, dimensions of supervised machine learning algorithms
2. Bayesian Decision Theory: Classification, losses and risks, discriminant functions, utility theory, value of information, Bayesian networks, Influence diagrams, Association rules, Parametric Methods: Maximum likelihood estimation, evaluating an estimator with bias and variance, Bayes' estimator, parametric classification, regression, tuning model complexity: bias vs variance dilemma, model selection procedures
3. Multivariate methods: Multivariate data, parameter estimation, missing value imputation, univariate normal distribution and classification, discrete features, regression, Dimensionality Reduction: Subset selection, PCA, Factor Analysis, multi-dimensional scaling, LDA
4. Clustering: Mixture densities, K-means clustering, Expectation Maximization algorithm, mixtures of Latent Variable Models, Supervised learning after clustering, Hierarchical clustering, choosing number of clusters
5. Non-parametric methods: Non-parametric methods density estimation, generalisation to multivariate data, nonparametric classification, condensed nearest neighbors, non-parametric regression: smoothing models, choosing smoothing parameters
6. Decision trees and Linear Discrimination: Univariate classification and regression trees, rule extraction from trees, Multivariate trees, Generalizing linear model, two class and multi-class geometry of linear discriminant, pairwise separation, gradient descent, logistic discrimination for binary and multi-class problems, Support vector machines, optimal separating hyperplane, kernel functions for non-separable spaces, SVM for regression.
7. Hidden Markov Models: Discrete Markov processes, Hidden Markov Models, Three basic problems of HMM, Evaluation problem, finding the state sequence, Learning model parameters, continuous observations, Model selection in HMM Assessing and comparing classification Algorithms: Cross-validation and resampling methods, measuring error, interval estimation, hypothesis testing, assessing performance of a classifier, comparing two classification algorithms, comparing multiple classification algorithms based on variance

**Text Book:**

1. Introduction to Machine Learning by Ethem Alpaydin, Prentice-Hall of India, 2006
2. Machine Learning by Saikat Dutt and Subramanian Chandramouli

**Reference books:**

1. Machine Learning, Tom Mitchell , McGraw Hill, 1997

| CSE 411 | ELECTIVE-IV : R PROGRAMMING<br>*Common with 6years integrated B.Tech(CSE)+M.Tech and B.Tech(IT)* | |
|---|---|---|
| **Instruction: 3 Periods +0Tut/week, Univ. Exam: 3Hours** | | **Credits: 3** |
| **Internal: 30 Marks** | **University Exam: 70 Marks** | **Total: 100 Marks** |

2. Pattern Classification, Richard 0. Duda, Peter E. Hart and David G. Stork, John Wiley & Sons Inc., 2001

**COURSE OBJECTIVS:**

After taking the course, students will be able to

- Use R for statistical programming, computation, graphics, andmodeling,
- Write functions and use R in an efficientway,
- Fit some basic types of statisticalmodels
- Use R in their ownresearch,
- Be able to expand their knowledge of R on theirown.

**COURSE OUTCOMES:**

At the end of this course, students will be able to:

- List motivation for learning a programming language
- Access online resources for R and import new function packages into the R workspace
- Import, review, manipulate and summarize data-sets in R
- Explore data-sets to create testable hypotheses and identify appropriate statistical tests
- Perform appropriate statistical tests using R Create and edit visualizations

**UNIT-I:**Introduction, How to run R, R Sessions and Functions, Basic Math, Variables, Data Types, Vectors, Conclusion, Advanced Data Structures, Data Frames, Lists, Matrices, Arrays, Classes**.**

**UNIT-II:**R Programming Structures, Control Statements, Loops, - Looping Over Nonvector Sets,- If-Else, Arithmetic and Boolean Operators and values, Default Values for Argument, Return Values, Deciding Whether to explicitly call return- Returning Complex Objects, Functions are Objective, No Pointers in R, Recursion, A Quicksort Implementation-Extended Extended Example: A Binary Search Tree.

**UNIT-III:**Doing Math and Simulation in R, Math Function, Extended Example Calculating Probability- Cumulative Sums and Products-Minima and Maxima- Calculus, Functions Fir Statistical Distribution, Sorting, Linear Algebra Operation on Vectors and Matrices, Extended Example: Vector cross Product- Extended Example: Finding Stationary Distribution of Markov Chains, Set Operation, Input /out put, Accessing the Keyboard and Monitor, Reading and writer Files,

**UNIT-IV:**Graphics, Creating Graphs, The Workhorse of R Base Graphics, the plot() Function – Customizing Graphs, Saving Graphs to Files.

**UNIT-V:**Probability Distributions, Normal Distribution- Binomial Distribution- Poisson Distributions Other Distribution, Basic Statistics, Correlation and Covariance, T-Tests,- ANOVA.

**UNIT-VI:**Linear Models, Simple Linear Regression, -Multiple Regression Generalized Linear Models, Logistic Regression, - Poisson Regression- other Generalized Linear Models- Survival Analysis, Nonlinear Models, Splines- Decision- Random Forests,

**TEXT BOOKS:**


1) The Art of R Programming, A K Verma, CengageLearning.
2) R for Everyone, Lander,Pearson
3) The Art of R Programming, Norman Matloff, No starchPress.


**REFERENCE BOOKS:**


1) R Cookbook, Paul Teetor,Oreilly.
2) R in Action, Rob Kabacoff,Manning

| CSE 412 | ELECTIVE-V CRYPTOGRAPHY &NETWORK SECURITY<br>*Common with 6years integrated B.Tech(CSE)+M.Tech and B.Tech(IT)* | |
|---|---|---|
| **Instruction: 3Periods/week,** Univ. Exam: 3 Hours | | **Credits: 3** |
| **Internal: 30 Marks** | **University Exam: 70 Marks** | **Total: 100 Marks** |

**Course Objectives:**

1. Introduction of the issues in network security- its need and importance, taxonomy and terminology.
2. Discussion of various cryptographic techniques.
3. Exploration of different types of security threats and remedies.
4. Understanding of Internet security protocols and standards

**Course Outcomes:**

1. Realize the need and importance of network and data security in the Internet and in the distributed environments.
2. Identify the different types of network security issues and their remedies.
3. Application various cryptographic tools and techniques in different contexts and as per need of security levels.
4. Implementation of some Internet security protocols and standards

**Syllabus:**

1 **Overview:** Computer Security Concepts, Threats, Attacks, and Assets, Security Functional Requirements, A Security Architecture for Open Systems, ComputerSecurity Trends, Computer Security Strategy. Cryptographic Tools: Confidentiality with Symmetric Encryption, Message Authentication and Hash Functions,Public-Key Encryption, Digital Signatures and Key Management, Random andPseudorandom Numbers, Practical Application: Encryption of Stored Data. User Authentication:Means of Authentication, Password-Based Authentication, Token-BasedAuthentication, Biometric Authentication, Remote User Authentication, Security Issues forUser Authentication, Practical Application: An Iris Biometric System, Case Study:Security Problems for ATMSystems.

2 **Access Control:** Access Control Principles, Subjects, Objects, and AccessRights, Discretionary Access Control, Example: UNIX File Access Control, Role-BasedAccess Control, Case Study: RBAC System for a Bank. Database Security: The Need forDatabase Security, Database Management Systems, Relational Databases, DatabaseAccess Control, Inference, Statistical Databases, Database Encryption, CloudSecurity.

3 **Malicious Software:** Types of Malicious Software (Malware),Propagation—Infected Content—Viruses, Propagation—Vulnerability Exploit—Worms,Propagation—Social Engineering—SPAM E-mail, Trojans, Payload—System Corruption,Payload—Attack Agent—Zombie, Bots, Payload—Information Theft—Key loggers, Phishing,Spyware, Payload—Stealthing—Backdoors, Root kits,Countermeasures.

Denial-of-Service Attacks: Denial-of-Service Attacks, Flooding Attacks,Distributed Denial-of-Service Attacks, Application-Based Bandwidth Attacks, Reflector andAmplifier Attacks, Defenses Against Denial-of-Service Attacks, Responding to aDenial-of-Service Attack.

4 **Intrusion Detection:** Intruders, Intrusion Detection, Host-Based IntrusionDetection, Distributed Host-Based Intrusion Detection, Network-Based IntrusionDetection, Distributed Adaptive Intrusion Detection, Intrusion Detection ExchangeFormat, Honeypots, Example System: Snort. Firewalls and Intrusion Prevention Systems:The NeedforFirewalls,FirewallCharacteristics,TypesofFirewalls,FirewallBasing,Firewall Location and Configurations, Intrusion Prevention Systems, Example: UnifiedThreat ManagementProducts.

5 **Buffer Overflow:** Stack Overflows, Defending Against Buffer Overflows, Other Formsof Overflow Attacks, Software Security: Software Security Issues, Handling ProgramInput, Writing Safe Program Code, Interacting with the Operating System and OtherPrograms, Handling Program Output. Operating System Security: Introduction to OperatingSystem Security, System Security Planning, Operating Systems Hardening, ApplicationSecurity, Security Maintenance, Linux/Unix Security, Windows Security, VirtualizationSecurity.

6 **Symmetric Encryption and Message Confidentiality:** Symmetric EncryptionPrinciples, Data Encryption Standard, Advanced Encryption Standard, Stream Ciphers andRC4, Cipher Block Modes of Operation, Location of Symmetric Encryption Devices,Key Distribution. Public-Key Cryptography and Message Authentication: SecureHash Function, HMAC, The RSA Public-Key Encryption Algorithm, Diffie-Hellman andOther AsymmetricAlgorithms.

7 **Internet Security Protocols and Standards:** Secure E-mail and S/MIME, DomainKeys IdentifiedMail,SecureSocketLayer(SSL)andTransportLayerSecurity(TLS),HTTPS, IPv4 and IPv6 Security. Internet Authentication Applications: Kerberos, X.509,Public-Key Infrastructure, Federated Identity Management. Wireless Network Security:Wireless Security Overview, IEEE 802.11 Wireless LAN Overview, IEEE 802.11i WirelessLAN Security.

**TextBook:**

1. Computer Security - Principles and Practices (Except the Chapters 13, 14, 15, 16, 17,18, 19), 2nd Edition by William Stallings, Pearson Education,Inc.

**ReferenceBooks:**

1. Cryptography and Network Security by William Stallings, Pearson Education Asia,New Delhi.
2. NetworkSecurityEssentialsApplicationsandStandards,byWilliamStallings,Pearson Education Asia, NewDelhi.

| CSE 412 | **ELECTIVE-VINTERNET OF THINGS**<br>*Common with 6years integrated B.Tech(CSE)+M.Tech and B.Tech(IT)* | |
|---|---|---|
| **Instruction: 3Periods/week,** Univ. Exam: 3 Hours | | **Credits: 3** |
| **Internal: 30 Marks** | **University Exam: 70 Marks** | **Total: 100 Marks** |

1) Introduction to the internet of things. IoT Architecture: History of IoT, M2M –Machine to Machine, Web of Things, IoT protocolsThe Architecture The Layering concepts , IoT Communication Pattern, IoT protocol Architecture, The 6LoWPAN

2) prototyping connected objects. Open-source prototyping platforms, Basics of IoT Networking(IOT components and Gateways)

3) Integrating internet services. XML and JSON. HTTP APIs for accessing popular Internet services (Facebook, Twitter, and others). Practical activities. IoT Application Development: Application Protocols MQTT, REST/HTTP,CoAP, MySQL,RPL,

4) Overview of IoT supported Hardware platforms such as: Raspberry pi, ARM Cortex Processors, Arduino andIntel Galileo boards

5)Ubiquitous computing,applications of IOT,Virtualization of network resources and physical devicesin IOT.

6) Internet of Things Standardisation M2M Service Layer Standardisation OGC Sensor Web for IoT

**TEXT BOOK:**

Internet Of Things: Converging Technologies For Smart Environments And Integrated Ecosystems, Marina Ruggieri H, River Publishers Series In Communications

| CSE 412 | **ELECTIVE-V : CLOUDCOMPUTING**<br>*Common with 6years integrated B.Tech(CSE)+M.Tech and B.Tech(IT)* | |
|---|---|---|
| **Instruction: 3Periods/week,** Univ. Exam: 3 Hours | | **Credits: 3** |
| **Internal: 30 Marks** | **University Exam: 70 Marks** | **Total: 100 Marks** |

**Course Objectives:**

1. To import fundamental concepts in the area of cloud computing.
2. To understand the concept of Virtualization and cloud data storage.
3. To learn cloud Application Development and cloud Governance.
4. To gain competence in Map Reduce and Hadoop Overview.

**Course Outcomes:**

1. Identify the architecture and infrastructure of cloud computing.
2. Develop applications for cloud computing.
3. Design and Implement a novel cloud computing application.

**Syllabus**

1. **Introduction to cloud computing:** Cloud computing components, Infrastructure services,storage applications, database services – introduction to Saas, Paas, Iaas, Idaas, data storage incloud

2. **Virtualization:** enabling technologies, types of virtualization, server virtualization,desktop virtualization, memory virtualization, application and storage virtualization-tools andproducts available forvirtualization

3. **SAAS and PAAS:** Getting started with Saas, SaaS solutions,SOA , PaaS andbenefits.

4. **Iaas and Cloud data storage:** understanding Iaas, improving performance for load balancing,server types within Iaas, utilizing cloud based NAS devices, cloud based data storage, and backupservices, cloud based block storage and databaseservices

5. **Cloud Application development:** Client server distributed architecture for cloud designingcloud basedsolutions,coding cloudbasedapplications,traditional AppsvscloudApps,clientsideprogramming, server side programming overview-fundamental treatment of webapplication frameworks.
6. **Cloud Governance and economics:** Securing the cloud, disaster recovery and business continuityin the cloud, Managing the cloud, migrating to the cloud, governing and evaluating theclouds business impact andeconomics,

7. **Inside Cloud**: Introduction to MapReduce and Hadoop-over view of big data and its impact oncloud

**TextBooks:**


1. Cloud Computing: SaaS, PaaS, IaaS, Virtualization, Business Models, Mobile, Securityand More, Kris Jamsa, Jones & Bartlett Publishers,Paper back edition,2013
2. Hadoop Map Reduce cookbook, SrinathPerera and Thilina Gunarathne, Packtpublishing
3.


**References:**


1.Cloud Computing: A Practical Approach,Anthony T .Velte, Toby J.Velte, RobertElsenpeter, Tata McGraw HillEdition

| CSE413 | **GPS APPLICATIONS**<br>*Common with 6years integrated B.Tech(CSE)+M.Tech and B.Tech(IT)* | |
|---|---|---|
| **Instruction: 3Periods/week,** Univ. Exam: 3 Hours | | **Credits: 3** |
| **Internal: 30 Marks** | **University Exam: 70 Marks** | **Total: 100 Marks** |

UNIT-1:Development of NAVSTAR GPS. GPS Satellite configuration- Space segment, Control segment, User segment.

UNIT-2:GPS working principle, basic equations for finding user position, user position determination with least squares estimator.

UNIT-3:Other Global Satellite Constellations, GLONASS, GALILEO, Comparison of 3 GNSS (GPS, GALILEO, GLONASS) interms of constellation and services provided.

UNIT-4:GPS Signal generation, Pseudorandom noise (PRN) code, C/A code , P code, Navigation data, Signal structure of GPS, signal power.

UNIT-5:Coordinate Systems: Geoid, Ellipsoid, Coordinate Systems, Geodetic and Geo centric coordinate systems, ECEF coordinates, world geodetic 1984 system, Conversion between Cartesian and geodetic coordinate frame.

UNIT-6:GPS Error sources, ionospheric effects on GPS signals and its mitigation methods.

UNIT-7:Satellite based augmentation system-need for GPS augmentation, GPS Aided GEO Augmented System (GAGAN).

**Textbook:**

1. G S RAO, Global Navigation Satellite Systems, McGraw-Hill Publications, New Delhi, 2010
2. Pratap Mishra, Global positioning system: signals, measurements, and performance, Ganga-Jamuna Press, 2006.

**Reference Books:**

1. Scott Gleason and Demoz Gebre-Egziabher, GNSS Applications and Methods, Artech House, 685 Canton Street, Norwood, MA 02062, 2009.
2. James Ba – Yen Tsui, 'Fundamentals of GPS receivers – A software approach', John Wiley & Sons (2001).
3. B.Hoffmann-Wellenhof, GPS theory and practice, 5th Edition, Springer 2001.

| CSE 414 | COMPUTATIONAL BIOLOGY | |
|---|---|---|
| **Instruction: 3Periods/week,** Univ. Exam: 3 Hours | | **Credits: 3** |
| **Internal: 30 Marks** | **University Exam: 70 Marks** | **Total: 100 Marks** |

1. Introduction: Definitions, Sequencing, Biological sequence/structure, Genome Projects, Pattern recognition an prediction, Folding problem, Sequence Analysis, Homology and Analogy, EMBnet, NCBI.

2. Protein Information Resources: Biological databases, Primary sequence databases, Protein Sequence databases, Secondary databases, Protein pattern databases, and Structure classification databases.

3. DNA Sequence analysis: DNA sequence databases, Importance of DNA analysis, Gene structure and DNA sequences, Features of DNA sequence analysis, EST (Expressed Sequence Tag) searches, Gene hunting, Profile of a cell, EST analysis, Effects of EST data on DNA databases.

4. Pair wise alignment techniques: Database searching, Alphabets and complexity, Algorithm and programs, Comparing two sequences, subsequences, Identity and similarity, The Dotplot, Local and global similarity, different alignment techniques, Dynamic Programming, Pair wise database searching.

5. Multiple sequence alignment: Definition and Goal, The consensus, computational complexity, Manual methods, Simultaneous methods, Progressive methods, Databases of Multiple alignments and searching

6. Secondary database: Searching Importance and need of secondary database searches, secondary database structure and building a sequence search protocol

7. Analysis packages: Comprehensive packages, packages specializing in DNA analysis, Probability and Statistics: Introduction, The beginnings of modern probability theory, Chance and Risk, Degrees of certainty. Bayesian Logic.

**Text Books**:

1. Introduction to Bioinformatics, by T K Attwood & D J Parry-Smith Addison WesleyLongman

2. Bioinformatics- A Beginner‟s Guide by Jean-Michel Claveriw, CerdricNotredame, WILEY dreamlech India Pvt. Ltd Reference Books: 1. Introduction to Bioinformatics by M.Lesk OXFORD publishers (Indian Edition)

| CSE 416 | ELECTIVE-IV LAB BIG DATA ANALYTICS LAB<br>*Common with 6years integrated B.Tech(CSE)+M.Tech and B.Tech(IT)* | |
|---|---|---|
| **Instruction: 3 Periods +0Tut/week,** | **Univ. Exam: 3Hours** | **Credits: 1.5** |
| **Internal: 50 Marks** | **University Exam: 50 Marks** | **Total: 100 Marks** |

**Getting Hadoop Up and Running in a cluster:**

1. Setting up Hadoop on standalonemachine.
2. Wordcount Map Reduce program using standaloneHadoop.
3. Adding the combiner step to the Wordcount Map Reduceprogram.
4. Setting upHDFS.
5. Using HDFS monitoringUI
6. HDFS basic command-line fileoperations.
7. Setting Hadoop in a distributed clusterenvironment.
8. Running the WordCount program in a distributed clusterenvironment.
9. Using Map Reduce monitoringUI

**Hadoop Map Reduce Applications:**

10. Choosing appropriate Hadoop datatypes.
11. Implementing a custom Hadoop Writable datatype.
12. Implementing a custom Hadoop keytype.
13. Emitting data of different value types from amapper.
14. Choosing a suitable Hadoop Input Format for your input dataformat.
15. Formatting the results of Map Reduce Computation – using Hadoop OutputFormats.

**Analytics**

16. Simple analytics using MapReduce.
17. Performing Group-By using MapReduce.
18. Calculating frequency distributions and sorting using MapReduce.
19. Plotting the Hadoop results using GNUplot.
20. Calculating histograms using MapReduce.
21. Calculating scatter plots using MapReduce.
22. Parsing a Complex dataset withHadoop.
23. Joining two datasets using MapReduce.

**Text Book:** Hadoop Map Reduce Cookbook, Srinath Perera & Thilina Gunarathne, 2013, PACKT PUBLISHING.

| CSE 416 | ELECTIVE-IV LAB MACHINE LEARNING LAB<br>*Common with 6years integrated B.Tech(CSE)+M.Tech and B.Tech(IT)* | |
|---|---|---|
| **Instruction: 3 Periods +0Tut/week,** | **Univ. Exam: 3Hours** | **Credits: 1.5** |
| **Internal: 50 Marks** | **University Exam: 50 Marks** | **Total: 100 Marks** |

**Course objectives:**

This course will enable students to

1. Make use of Data sets in implementing the machine learning algorithms.
2. Implement the machine learning concepts and algorithms in any suitable language of choice.

**Course outcomes:**

The students should be able to:

1. Understand the implementation procedures for the machine learning algorithms.
2. Design Java/Python programs for various Learning algorithms.
3. Apply appropriate data sets to the Machine Learning algorithms.
4. Identify and apply Machine Learning algorithms to solve real world problems.

**Description (If any):**

1. The programs can be implemented in either JAVA or Python.
2. For Problems 1 to 6 and 10, programs are to be developed without using the built-in classes or APIs of Java/Python.
3. Data sets can be taken from standard repositories (https://archive.ics.uci.edu/ml/datasets.html) or constructed by the students.

**Lab Experiments:**

1. Implement and demonstrate the **FIND-S algorithm** for finding the most specific hypothesis based on a given set of training data samples. Read the training data froma.CSV file.
2. For a given set of training data examples stored in a .CSV file, implement and demonstrate the **Candidate-Elimination algorithm** to output a description of the set of all hypotheses consistent with the training examples.
3. Write a program to demonstrate the working of the decision tree based **ID3 algorithm**. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.
4. Build an Artificial Neural Network by implementing the **Back propagation algorithm** and test the same using appropriate data sets.
5. Write a program to implement the **naïve Bayesian classifier** for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.
6. Assuming a set of documents that need to be classified, use the **naïve Bayesian Classifier** model to perform this task. Built-in Java classes/API can be used to write the program. Calculate the accuracy, precision, and recall for your data set.
7. Write a program to construct a **Bayesian network** considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart Disease Data Set. You can use Java/Python ML library classes/API.
8. Apply **EM algorithm** to cluster a set of data stored in a .CSV file. Use the same data set for clustering using ***k*-Means algorithm**. Compare the results of these two

algorithms and comment on the quality of clustering. You can add Java/Python ML library classes/API in the program.

9. Write a program to implement ***k*-Nearest Neighbor algorithm** to classify the iris data set. Print both correct and wrong predictions. Java/Python ML library classes can be used for this problem.
10. Implement the non-parametric **Locally Weighted Regression algorithm** in order to fit data points. Select appropriate data set for your experiment and draw graphs.

| CSE 416 | ELECTIVE-IV LAB : R- PROGRAMMIMG LAB<br>*Common with 6years integrated B.Tech(CSE)+M.Tech and B.Tech(IT)* | |
|---|---|---|
| **Instruction: 3 Periods +0Tut/week,** | **Univ. Exam: 3Hours** | **Credits: 1.5** |
| **Internal: 50 Marks** | **University Exam: 50 Marks** | **Total: 100 Marks** |

1. Implement the Following
    a. To create a data frame df1 to contain 10 observations and 3 variables, column with letters, column 2 with random numbers and column 3 with first 10 naturalnumbers.
    b. Create df3 by merging df1 by column1 with another data frame df2 containing 20 observations and 2 variables column4 with letters, column5 with sequence of 20 real numbers from 0 to 1 in equalsteps
    c. Find the dimensionality of data framedf3.
    d. Rename observations whose column1 value is 'D' from data framedf3

2. Implement the following
    a. Create h1 to contain 1000 random numbers, distributed in normal distribution and plot the histogram withcolors.
    b. Create a data frame to contain randomly drawn samples of 25 cards from 52 distinct cards with replacements. Use 'table' function to find the 'duplicated' and tabulate the list of cards and their frequency of occurrence in thesample.

3. Write R Program using 'apply' group of functions to create and apply normalization function on each of the numeric variables/columns of iris dataset to transform theminto
    a. 0 to 1 range with min-maxnormalization.
    b. a value around 0 with z-scorenormalization.

4. Create a data frame with 10 observations and 3 variables and add new rows and columns to it using 'rbind' and 'cbind'function.

5. Create a function to discretize a numeric variable into 3 quantiles and label them as low, medium, and high. Apply it on each attribute of iris dataset to create a new data frame. 'discrete_iris' with Categorical variables and the classlabel.

6. Write R program to find the approximate value of $\pi$ (pi) by simulation using a large number of uniformly distributed data points with their coordinates in the range of [-1,1] and find the ratio of number of points within the circle of radius 1, to total number of data points. Observe the improvement in accuracy of result with the increased number of data pointsdistributed.

7. Write R programs to find the probability of a variable to have a given value in different distributions like Uniform, Normal, Poisson and Binomial using 'pnorm', 'ppois', and the other suchfunctions.

8. Apply 'ddply' for data summarization of iris dataset based on 'species' and get the same summarization using'sqldf'

9. After attaching data set ‘mtcars’ to access its variables, use R statements to visulalize the relationship between the variables of‘mtcars’:

    a. using scatter plots withcolors.
    b. boxplots showing the spread of the variable ‘mpg’ for different values of‘cyl’.
    c. Find correlations between all pairs of variables.

10. Write R program to implement linear and multiple regression on ‘mtcars’ dataset to estimate the value of ‘mpg’ variable, with best $R^2$ and plot the original values in ‘green’ and predicted values in‘red’.

11. Write R program to create new variables in low dimensional spaceusing
    a. PCAand
    b. SVD and use them for predicting the values of ‘mpg’variable.

12. Write R Programs to apply k-mean clustering on ‘iris’ data set and get the summary statistics. Implement a mini-project to process a collection of text documents / tweets and apply tokenization, stopword removal and stemming to represent the collection as a document – term matrix reflecting the term frequencies. Cluster the documents using a simple clustering algorithm and estimate the purity of the clusteringsolution.

| CSE417 | ELECTIVE-V LAB : CRYPTOGRAPHY & NETWORK SECURITY LAB<br>*Common with 6years integrated B.Tech(CSE)+M.Tech and B.Tech(IT)* | |
|---|---|---|
| **Instruction: 3 Periods/week** | | **Credits:1.5** |
| **Internal: 50 Marks** | **University Exam: 50 Marks** | **Total: 100 Marks** |

1. Write a C program that contains a string (char pointer) with a value 'Hello world'. The program should XOR each character in this string with 0 and displays the result.
2. Write a C program that contains a string (char pointer) with a value 'Hello world'. The program should AND or and XOR each character in this string with 127 and display the result.
3. Write a Java program to perform encryption and decryption using the following algorithms

a. Ceaser cipher b. Substitution cipher c. Hill Cipher

4. Write a C/JAVA program to implement the DES algorithm logic.
5. Write a C/JAVA program to implement the Blowfish algorithm logic.
6. Write a C/JAVA program to implement the Rijndael algorithm logic.
7. Write the RC4 logic in Java Using Java cryptography; encrypt the text "Hello world" using Blowfish. Create your own key using Java key tool.
8. Write a Java program to implement RSA algorithm.
9. Implement the Diffie-Hellman Key Exchange mechanism using HTML and JavaScript.
10. Calculate the message digest of a text using the SHA-1 algorithm in JAVA.
11. Calculate the message digest of a text using the MD5 algorithm in JAVA.

| CSE 417 | **ELECTIVE-V LAB: INTERNET OF THINGS LAB**<br>*Common with 6years integrated B.Tech(CSE)+M.Tech and B.Tech(IT)* | |
|---|---|---|
| **Instruction: 3Periods**Univ. Exam: 3 Hours | | **Credits: 1.5** |
| **Internal: 50 Marks** | **University Exam: 50 Marks** | **Total: 100 Marks** |

**LIST OF EXPERIMENTS:**

1. STUDY OF VARIOUS NETWORK PROTOCOLS USED IN IOT.

2. APPLICATION OF WIFI IN IOT SYSTEMS.

3. APPLICATION OF 6LOWPAN IN IOT SYSTEMS.

4. APPLICATION OF BLUETOOTH IN IOT SYSTEMS.

5. APPLICATION OF 802.15.4 ZIGBEE. IN IOT SYSTEMS.

6. DESIGN A SIMPLE IOT SYSTEM COMPRISING SENSORS, WIRELESS NETWORK CONNECTION, DATA ANALYTICS

| CSE417 | **ELECTIVE-V LAB : CLOUD COMPUTING LAB**<br>*Common with 6years integrated B.Tech(CSE)+M.Tech and B.Tech(IT)* | |
|---|---|---|
| **Instruction: 3 Periods/week** | | **Credits:1.5** |
| **Internal: 50 Marks** | **University Exam: 50 Marks** | **Total: 100 Marks** |

**Use Eucalyptus or Open Nebula or equivalent to set up the cloud and demonstrate.**

1. Find procedure to run the virtual machine of different configuration. Check how many virtual machines can be utilized at particular time.
2. Find procedure to attach virtual block to the virtual machine and check whether it holds the data even after the release of the virtual machine.
3. Install a C compiler in the virtual machine and execute a sample program.
4. Show the virtual machine migration based on the certain condition from one node to the other.
5. Find procedure to install storage controller and interact with it.

ANDHRA UNIVERSITY: : VISAKHAPATNAM
COMMON SCHEME OF INSTRUCTION & EXAMINATION
**IV/IV B.TECH** (FOUR YEAR COURSE) &
**IV/IV B.TECH** (SIX YEAR DOUBLE DEGREE COURSE)
(With effect from **2019-2020** admitted batch onwards)

**B.TECH. (CSE) IV YEAR II-SEMESTER SCHEME OF INSTRUCTION AND EXAMINATION**

| SUB. REF | NAME OF THE SUBJECT | PERIODS | | | MAXIMUM MARKS | | | CREDITS |
|---|---|---|---|---|---|---|---|---|
| | | THEORY | TUTORIAL | LAB | EXAM | SESSIONALS | TOTAL | |
| CSE421 | ELECTIVE - VI | 3 | -- | -- | 70 | 30 | 100 | 3 |
| CSE422 | ENTERPRENUERSHIP | 3 | -- | -- | 70 | 30 | 100 | 3 |
| CSE423 | 1G - 4G Mobile Communication Networks | 3 | -- | -- | 70 | 30 | 100 | 3 |
| CSE424 | PROJECT - III | -- | -- | 12 | 50 | 50 | 100 | 6 |
| | **TOTAL** | **9** | **0** | **12** | **260** | **140** | **400** | **15** |

**ELECTIVE - VI**

1. Cyber Security & Digital Forensics
2. Advanced Data Structures
3. Application Development using JAVA.

| CSE 421 | ELECTIVE-VI CYBER SECURITY & DIGITAL FORENSICS | |
|---|---|---|
| **Instruction: 3Periods/week,** Univ. Exam: 3 Hours | | **Credits: 3** |
| **Internal: 30 Marks** | **University Exam: 70 Marks** | **Total: 100 Marks** |

**1. Introduction to Information Security Fundamentals and Best Practices:** Protecting Your Computer and its Contents, Securing Computer Networks--Basics of Networking, Compromised Computers, Secure Communications and Information Security Best Practices, Privacy Guidelines, Safe Internet Usage.

**2. Ethics in Cyber Security & Cyber Law:** Privacy, Intellectual Property, Professional Ethics, Freedom of Speech, Fair User and Ethical Hacking, Trademarks, Internet Fraud, Electronic Evidence, Cybercrimes.

**3. Penetration Testing:** Overview of the web from a penetration testers perspective, Exploring the various servers and clients, Discussion of the various web architectures, Discussion of the different types of vulnerabilities, Defining a web application test scope and process, Defining types of penetration testing.

4. **Web Application Security:** Common Issues in Web Apps, What is XSS, SQL injection, CSRF, Password Vulnerabilities, SSL, CAPTCHA, Session Hijacking, Local and Remote File Inclusion, Audit Trails, Web Server Issues.

**5. Forensics & Network Assurance:** Forensic Technologies, Digital Evidence Collection, Evidentiary Reporting, Layered Defense, Surveillance and Reconnaissance, Outsider Thread Protection

6. **Information Risk Management:** Asset Evaluation and Business Impact Analysis, Risk Identification, Risk Quantification, Risk Response Development and Control, Security Policy, Compliance, and Business Continuity. Forensic investigation using Access Data FTK, En-Case

**7. Cyber Incident Analysis and Response:** Incident Preparation, Incident Detection and Analysis. Containment, Eradication, and Recovery. Proactive and Post-Incident Cyber Services, CIA triangle

## Text Books:


1. The Official CHFI Study Guide for Computer Hacking Forensic Investigator by Dave Kleiman
2. CISSP Study Guide, 6th Edition by James M. Stewart
3. www.**nist**.gov/
4. Title: Cyber Forensics by Dejey & S.Murugan, OXFORD university Press

| CSE 421 | ELECTIVE- VI ADVANCED DATA STRUCTURES | |
|---|---|---|
| **Instruction: 3Periods/week,** | **Univ. Exam: 3 Hours** | **Credits: 3** |
| **Internal: 30 Marks** | **University Exam: 70 Marks** | **Total: 100 Marks** |

**Course Objectives:**

1. To study the concepts related to trees such as binary trees, BST, AVL trees etc.
2. To discuss various hashing technique.
3. To study the various external sorting algorithms.
4. To discuss the concepts related to disjoint set ADT.
5. To study several graph algorithms and their time complexities.

**Course outcomes:**

1. Student will be able to write programs to implement various trees.
2. Ability to understand various hashing techniques.
3. Ability to write programs to implement sorting techniques.
4. Ability to understand concepts related to graph theory.

**Syllabus:**

**1. Trees:** Definition , operations and applications of Binary search trees, AVL trees, Red-BlackTrees, Splay trees, Tries and B-Trees, B+ Trees

2. **Hashing:** Hash Table Structure, Hash Function, Collision handling, Separate Chaining, OpenAddressing, Rehashing, Extendible hashing

**3. Priority Queues:** Heap model and implementations, Binary Heap, Applications of PriorityQueues, d-Heaps, Leftist Heaps, Skew Heaps, Binomial Queues structure, operations and implementation

**4. External sorting:** Difference between internal and external sorting, Model and simple algorithmfor External sorting, Multi-way Merge, Poly-phase Merge, Replacement selection

**5. Disjoint Set ADT:** Equivalence relations, Dynamic equivalence problem, Basic data structure,smart union algorithms, path compression, Analysis of union/find algorithm, applications of ADT Disjoint set

**6. Graph algorithms:** Representation of graphs, Topological sort, Network flow problems,Applications of Depth first search for finding Bi-connectivity, Euler circuits, strong components, Introduction of NP-Completeness

**7. Amortized analysis:** Introduction to amortized analysis, Basic approaches, binary queues,Fibonacci heaps ,skew heaps and splay trees.

**Text Book:**

1.Data Structures and Algorithm Analysis in C – Mark Allen Weiss, Pearson Edu Publishers.

2. Advanced Data Structures by Ikvinderpal Singh

**References:**

1. Data Structures and Algorithms: Concepts, Techniques and Applications – G.A.V.Pai, Tata Mc Graw Hill Publishers
2. Advanced Data Structures – Peter Brass, Cambridge University Press, 2008

| CSE 421 | ELECTIVE-VI APPLICATION DEVELOPMENT USING JAVA | |
|---|---|---|
| **Instruction: 3Periods/week,** Univ. Exam: 3 Hours | | **Credits: 3** |
| **Internal: 30 Marks** | **University Exam: 70 Marks** | **Total: 100 Marks** |

**Course Objectives:**

1. Study of object oriented programming.
2. Learn about web based applications such as AWT components.
3. Study of multitasking by using multithreading concept.
4. Learn about network programming and applications development.

**Course Outcomes:**

1. Development of projects for web based and internet applications.
2. Exposure of network programming.
3. Idea about multitasking and multiprogramming development

**Syllabus:**

1. **Overview of Java,** Java Versions and Application Areas, **Basic Java Syntax,** Accessing arrays, Looping,Using if statements, Comparing strings, Building arrays.

2. **Basic Object-Oriented Programming in Java,** Instance variables (data members, fields),Methods(member functions),Constructors, Overloading, Encapsulation and accessor methods, JavaDoc, Inheritance, Abstract classes, Interfaces, @Override, The class path, Packages, Visibility modifiers (public, private, protected, default), JavaDoc options.

3. **3.Applets and Basic Graphics,** Applet restrictions, ,The applet life-cycle and the idea of life-cyclemethods in general, Methods available for drawing operations, Loading and drawing images, Using try/catch blocks, Controlling image loading

4. **Basic File IO with the NIO Package,** Simple file reading: all lines at once into List, Simple file writing:all at once from a List, Some simple file reading and writing utilities, Faster and more flexible file reading

5. **AWT Components,** Basic AWT windows, Canvas, Panel, Frame, Processing events in GUI controls,Basic AWT user interface controls, Button, checkbox, radio button, list box Event-handling options , Handling events with separate listeners, Handling events by implementing interfaces, Organizing Windows with Layout Managers**,** Standard layout managers, Flow Layout, Border Layout, Card Layout, Grid Layout, GridBagLayout,

6. **Multithreaded Programming,** Why threads?, Three variations on the theme, Separate classes thatimplement Runnable, Main app implements Runnable, Inner classes that implement Runnable, Race conditions and synchronization

7. **Network Programming: Clients,** Creating sockets, Implementing a generic network client, Parsingdata: StringTokenizer ,Getting user info from a mail server, Retrieving files from an HTTP server, Retrieving Web documents by using the URL class, Network Programming: Servers**,** Steps for creating a server, Create a Server Socket object, Create a Socket object from ServerSocket,Create an input stream, Create an output stream, A generic network server, Single threaded , Multithreaded.

**TEXT BOOK:**

Timothy Budd, "Understanding Object-oriented programming with Java", Updated Edition, Pearson Education, 2000.

**REFERENCE:**

C. Thomas Wu, "An introduction to Object-oriented programming with Java", Fourth Edition, Tata McGraw-Hill Publishing company Ltd., 2006.

| CSE 422 | **ENTERPRENUERSHIP**<br>*Common with 6years integrated B.Tech(CSE)+M.Tech and B.Tech(IT)* | |
|---|---|---|
| **Instruction: 3Periods/week,** Univ. Exam: 3 Hours | | **Credits: 3** |
| **Internal: 30 Marks** | **University Exam: 70 Marks** | **Total: 100 Marks** |

## Unit-I

## Basic Concepts of Management:

**Management:** Definition, Nature and Importance ; Functions of the Management; Levels of Management; F.W Taylor's Scientific Management; Henry Fayol's Principles of Management;

## Unit-II:

**Forms of Business Organizations:** Introduction, **Types of Business organizations: Private Sector**- Individual Ownership , Partnership, Joint stock companies and Co-Operative organizations**; Public sector**- Departmental Organizations, Public Corporations and Government Companies; The Joint sector Management.

## Unit-III

**Production and operations Management:** Plant location- Factors to be considered in the selection of Plant location; Break - even analysis- Significance and managerial applications; Importance of Production Planning and Control and its Functions; Human Resource Management and Functions of Human Resource Manager (in brief); Functions of Marketing; Methods of Raising Finance.

## Unit-IV

**Entrepreneurship :** Definition, Characteristics and Skills , Types of Entrepreneurs, Entrepreneur vs. Professional Managers, , Growth of Entrepreneurs, Nature and Importance of Entrepreneurs, Women Entrepreneurs, Problems of Entrepreneurship.

## Unit-V

**Entrepreneurial Development and Project Management:** Institutions in aid of Entrepreneurship Development, Idea generation: Sources and Techniques;, Stages in Project formulation ; Steps for starting a small enterprise - Incentives for Small Scale Industries by Government.

**Text Books:**

(1 ) Sharma,S.C, and Banga, T.R., **Industrial Organization & Engineering Economics**, Khanna Publishers, Delhi, 2000.
(2) Vasant Desai **The Dynamics of Entrepreneurial Development and Management (Planning for future Sustainable growth),** HImalayan Publishing House, 2018.

**Reference Books:**

(1) Aryasri , A.R., **Management Science,** McGraw HIll Education (India Private Limited , New Delhi 2014.
(2) Sheela, P. , and Jagadeswara Rao, K., **Entrepreneurship**, Shree Publishing House, Guntur, Andhra Pradesh, 2017.

| CSE 423 | 1G-4G MOBILE COMMUNICATION NETWORKS<br>*Common with 6years integrated B.Tech(CSE)+M.Tech and B.Tech(IT)* | |
|---|---|---|
| **Instruction: 3Periods/week, Univ. Exam: 3 Hours** | | **Credits: 3** |
| **Internal: 30 Marks** | **University Exam: 70 Marks** | **Total: 100 Marks** |

UNIT-1:Overview of Wireless Networks, Introduction of Network Architecture and Design Issues and Key Trends in Wireless Networking. Three Generations of Cellular Networks, Trends in Wireless Technologies. Propagation Mechanisms, Propagation effects with mobile radio, Channel Classification.

UNIT-2:Generations of wireless mobile systems, Cellular geometry, Introduction to cellular concept, Principle of operation of a cellular mobile system, Call transfer operation from one mobile phone to another, Multiple access schemes, Analogue and digital cellular mobile systems.

UNIT-3:Cellular geometry, Frequency reuse, Improving coverage and capacity in cellular systems, Cell splitting, Sectoring, Range extension by the use of repeaters, Microcell zone concept, Picocell zone concept.

UNIT-4:Structure of a wireless communication link, Modulation and demodulation – Binary Phase shift Keying, Quadrature Phase Shift Keying, Quadrature Amplitude Modulation- (8 QAM & 16 QAM) and Binary Frequency Shift Keying.

UNIT-5:First generation (1G), Second generation (2G), TDMA-based 2G standards, IS-95 (Code division multiple access (CDMA) or CDMA One standard), Two point five generation (2.5G), Third generation (3G) development, 3G Air interface technologies, 3G spectrum, Internet speeds of 2G, 2.5G, and 3G technologies, Limitations of 3G.

UNIT-6:Introduction to Wireless Systems & Standards, CDMA, WCDMA evolution, OFDM, Wireless LANs.

UNIT-7:Introduction to 4G Networks, Evolution of 4G, Objectives of 4G, Advantages of 4G network technology over 3G, Applications of 4G, 4G technologies, 4G software, Limitations of 4G.

## Textbook:

1. G S RAO, Mobile Cellular Communication, Pearson Education, New Delhi, 2013
2. Rappaport T.S., "Wireless Communications; Principles and Practice", Prentice Hall, NJ, 2000.
3. Lee W.C.Y., "Wireless & Cellular Telecommunications", McGraw Hill, New York, 3e, 2005.

## Reference Books:

1. Andrea Goldsmith, “Wireless Communications”, Cambridge University Press, 2005.
2. Simon Haykin & Michael Moher, “Modern Wireless Communications”, Pearson Education,
2007.
3. Andreas.F. Molisch, “Wireless Communications”, John Wiley – India, 2006.

# GUIDELINES FOR DOING THE PROJECT WORK

1. Candidates can do their thesis work within the department or in any industry/research organization for one semester in the 4th year of their study. In case of project done in an industry/research organization, one advisor (Guide) should be from the department and one advisor (Co-Guide) should be from the industry/research organization.
2. Students should work in teams of 3 to 4 members and submit thesis on the project work done by them.

**Format For Preparation Of Project Thesis For B. Tech (CSE):**

1. Arrangement Of Contents:

The sequence in which the project report material should be arranged and bound should be as follows:

1. Cover Page & Title Page
2. Bonafide Certificate
3. Abstract
4. Table of Contents
5. List of Tables
6. List of Figures
7. List of Symbols, Abbreviations and Nomenclature
8. Chapters
9. Appendices
10. References

*The table and figures shall be introduced in the appropriate places.