CA501C **SRI VENKATESWARA UNIVERSITY:: TIRUPATI**
III B.Tech V Semester (CSE-AI)
DATA COMMUNICATION AND NETWORKING

No. of Credits: 3 **Instruction Hours/Week: 3**

Unit-I
Introduction to Data Communications:
Components, Data Representation, Data Flow, Networks- Distributed Processing, Network Criteria, Physical Structures, Network Models, Categories of Networks Interconnection of Networks, The Internet - A Brief History, The Internet Today, Protocol and Standards - Protocols, Standards, Standards Organizations, Internet Standards. Network Models, Layered Tasks, OSI model, Layers in OSI model, TCP/IP Protocol Suite, Addressing Introduction, Wireless Links and Network Characteristics, WiFi: 802.11 Wireless LANs -The 802.11 Architecture

Unit-II
Data Link Layer:
Links, Access Networks, and LANs- Introduction to the Link Layer, The Services Provided by the Link Layer, Types of errors, Redundancy, Detection vs Correction, Forward error correction Versus Retransmission Error-Detection and Correction Techniques, Parity Checks, Check summing Methods, Cyclic Redundancy Check (CRC) , Framing, Flow Control and Error Control protocols , Noisy less Channels and Noisy Channels, HDLC, Multiple Access Protocols, Random Access ,ALOHA, Controlled access, Channelization Protocols. 802.11 MAC Protocol, IEEE 802.11 Frame

Unit-III
The Network Layer:
Introduction, Forwarding and Routing, Network Service Models, Virtual Circuit and Datagram Networks-Virtual-Circuit Networks, Datagram Networks, Origins of VC and Datagram Networks, Inside a Router-Input Processing, Switching, Output Processing, Queuing, The Routing Control Plane, The Internet Protocol(IP):Forwarding and Addressing in the Internet- Datagram format, Ipv4 Addressing, Internet Control Message Protocol(ICMP), IPv6

Unit-IV
Transport Layer:
Introduction and Transport Layer Services : Relationship Between Transport and Network Layers, Overview of the Transport Layer in the Internet, Multiplexing and Demultiplexing, Connectionless Transport: UDP -UDP Segment Structure, UDP Checksum, Principles of Reliable Data Transfer-Building a Reliable Data Transfer Protocol, Pipelined Reliable Data Transfer Protocols, Go- Back-N(GBN), Selective Repeat(SR), Connection Oriented Transport: TCP - The TCP Connection, TCP Segment Structure, Round-Trip Time Estimation and Timeout, Reliable Data Transfer, Flow Control, TCP Connection Management, Principles of Congestion Control - The Cause and the Costs of Congestion, Approaches to Congestion Control

Unit-V
Application Layer:
Principles of Networking Applications – Network Application Architectures, Processes Communicating, Transport Services Available to Applications, Transport Services Provided by the File Transfer: FTP,- FTP Commands and Replies, Electronic Mail in the Internet- STMP, Comparison with HTTP, DNS-The Internet's Directory Service – Service Provided by DNS, Overview of How DNS Works, DNS Records and messages.

TEXTBOOKS:

1. Computer Networking A Top-Down Approach – Kurose James F, Keith W, 6th Edition, Pearson.
2. Data Communications and Networking Behrouz A. Forouzan 4th Edition McGraw-Hill Education

REFERENCES:

1. Data communication and Networks - Bhusan Trivedi, Oxford university press, 2016
2. Computer Networks -- Andrew S Tanenbaum, 4th Edition, Pearson Education
3. Understanding Communications and Networks, 3rd Edition, W. A. Shay, Cengage Learning.

Course Outcomes:

Upon completing this course, the student will be able to

1. Know the Categories and functions of various Data communication Networks
2. Design and analyze various error detection techniques.
3. Demonstrate the mechanism of routing the data in network layer
4. Know the significance of various Flow control and Congestion control Mechanisms
5. Know the Functioning of various Application layer Protocols.

CA502C **SRI VENKATESWARA UNIVERSITY:: TIRUPATI**

III B.Tech V Semester (CSE-AI)

ADVANCED ARTIFICIAL INTELLIGENCE

No.of Credits: 3 **Instruction Hours/Week: 3**

Course Objectives:

- Understand the advanced topics of AI toward non monotonic logic and truth maintenance system.
- Introduce the concepts of constraint reasoning and qualitative reasoning techniques.
- Examine the concepts of case based and explanation based learning to implement

UNIT-1

Logic Foundation of Artificial Intelligence :

Introduction, Logic Programming, Non monotonic Logic, Closed World Assumption, Default Logic, Circumscription Logic, Non monotonic Logic NML, Auto epistemic Logic, Truth Maintenance System, Situation Calculus, Frame Problem. Dynamic Description Logic

UNIT-2

Constraint Reasoning:

Introduction, Backtracking, Constraint Propagation, Constraint Propagation in Tree Search, Intelligent Backtracking and Truth Maintenance, Variable Instantiation Ordering and Assignment Ordering, Local Revision Search, Graph-based Back jumping, Influence-based Back jumping, Constraint Relation Processing, Constraint Reasoning System COPS,ILOG Solver

UNIT-3

Qualitative Reasoning

Introduction, Basic approaches in qualitative reasoning, Qualitative Model, Qualitative Process, Qualitative Simulation Reasoning, Algebra Approach, Spatial Geometric Qualitative Reasoning

Case-Based Reasoning

Overview, Basic Notations, Process Model, Case Representation, Case Indexing, Case Retrieval, Similarity Relations in CBR, Case Reuse, Case Retain ion, Instance-Based Learning, Forecast System for Central Fishing Ground

UNIT-4

Explanation-Based Learning

Introduction, Model for EBL, Explanation-Based Generalization, Explanation Generalization using Global Substitutions, Explanation-Based Specialization, Logic Program of Explanation-Based Generalization, SOAR Based on Memory Chunks, Operationalization, EBL with imperfect domain theory

UNIT-5

Artificial Life

Introduction, Exploration of Artificial Life, Artificial Life Model, Research Approach of Artificial Life, Cellular Automata, Morphogenesis Theory, Chaos Theories, Experimental Systems of Artificial Life

Text Books:

1. Zhongzhi Shi, "Advanced Artificial Intelligence", World Scientific, March 2011.

CA503C **SRI VENKATESWARA UNIVERSITY:: TIRUPATI**
III B.Tech V Semester (CSE-AI)

DATA MINING (Professional Elective-I)

No.of Credits: 3 **Instruction Hours/Week: 3**

CourseObjectives:

Thecourseis designed to

- UnderstandtheprinciplesofData WarehousingandDataMining
- KnowtheArchitectureofaDataMining system
- Learnpre-processingtechniquesanddataminingfunctionalities
- Compareandcontrastclassificationandclusteringalgorithms.

UNIT-I

Introduction: Why Data Mining? What Is Data Mining? What Kinds of Data Can Be Mined? What Kinds of Patterns Can Be Mined? Which Technologies Are Used? Which Kinds ofApplicationsAreTargeted?MajorIssues in DataMining.

Data Objects and Attribute Types, Basic Statistical Descriptions of Data, Data Visualization,MeasuringDataSimilarity and Dissimilarity.

Data Preprocessing: An Overview, Data Cleaning, Data Integration, Data Reduction,

DataTransformationandDataDiscretization.

UNIT-II

DataWarehouse:BasicConcepts,DataWarehouseModeling:DataCubeandOLAP,DataWarehouse Design and Usage, Data Ware house Implementation, Data Generalization by Attribute-Oriented Induction.

Data Cube Computation, Data Cube Computation Methods, Processing Advanced Kinds ofQueriesbyExploringCubeTechnology,MultidimensionalData AnalysisinCubeSpace.

UNIT-III

Mining Frequent Patterns, Associations and Correlations: Basic Concepts, Frequent Item set Mining Methods, Which Patterns Are Interesting?—Pattern Evaluation Methods.

Advanced Pattern Mining: A Road Map, Pattern Mining in Multilevel, Multidimensional Space, Constraint-Based Frequent Pattern Mining, Mining High-Dimensional Data and Colossal Patterns, Mining Compressed or Approximate Patterns, Pattern Exploration and Application.

Classification: Basic Concepts, Decision Tree Induction, Bayes Classification Methods, Rule-Based Classification, Model Evaluation and Selection, Techniques to Improve ClassificationAccuracy.

UNIT-IV

Classification-AdvancedMethods:BayesianBeliefNetworks,ClassificationbyBackpropagation, Support Vector Machines, Classification Using Frequent Patterns, LazyLearners(orLearningfromYourNeighbors),OtherClassificationMethods,AdditionalTopicsRegarding Classification.

ClusterAnalysis:BasicConcepts,PartitioningMethods,HierarchicalMethods,Density-BasedMethods, Grid-Based Methods, Evaluationof Clustering.

UNIT-V

AdvancedClusterAnalysis:ProbabilisticModel-BasedClustering,ClusteringHigh-DimensionalData, ClusteringGraphandNetwork Data,Clustering with Constraints.

OutlierDetection:OutliersandOutlierAnalysis,OutlierDetectionMethods,StatisticalApproaches,Proximity-BasedApproaches,Clustering-BasedApproaches,Classification-Based Approaches, Mining Contextual and Collective Outliers, Outlier Detection in High-DimensionalData.

Overview of Data MiningTrendsandResearchFrontiers:MiningComplexData Types,Other Methodologies of Data Mining, Data Mining Applications, Data Mining and Society,DataMining Trends.

TextBooks:

1.JiaweiHan,MichelineKamberandJianPei,DataMining:ConceptsandTechniques,3rdEdition, Morgan Kaufmann Publishers, Elsevier, 2012.

ReferenceBooks:

1. JiaweiHanandMichelineKamber,DataMining:ConceptsandTechniques,2ndEdition,Morgan Kaufmann Publishers, Elsevier, 2006.
2. Pang-NingTan,VipinKumar,MichaelSteinbanch,IntroductiontoDataMining,PearsonEducation, 2016.
3. HongboDu,DataminingTechniquesandApplications:AnIntroduction,1stEdition,Cengage India Publishing, 2013.
4. Arun KPujari, Data MiningTechniques,3rdEdition, UniversitiesPress,2013.
5. T.VSureshKumar,BEswaraReddy,JagadishSKallimani,DataMining:PrinciplesandApplic

ations, First edition, Elsevier, 2012.
6. Vikram Pudi,P RadhaKrishna,DataMining,OxfordUniversityPress,2009.
7. Sam Anahory and Dennis Murray, Data Warehousing in the Real World: A PracticalGuide for Building Decision Support Systems, First Edition, Pearson Education India,2002.
8. K.P.Soman, Shyam Diwakar, V.Ajay, Insight Into Data Mining: Theory and Practice,Prentice HallIndia, 2006.

CourseOutcomes

Bythe endofthiscourse studentswill beable to

- Comprehendthevarious architecturesanditsapplicationwithdatamining
- Design and develop data mining algorithm stoanalyze raw real world data
- Applypreprocessingtechniquesfordatacleansing
- Analyze multi-dimensional modeling techniques and Classification & Clusteringalgorithms

CA503C **SRI VENKATESWARA UNIVERSITY:: TIRUPATI**
III B.Tech V Semester (CSE-AI)
COMPLIER DESIGN(Professional Elective-I)

No.of Credits: 3 **Instruction Hours/Week: 3**

CourseObjectives:

Thecourseis designed to

- Enrichtheknowledgeinvarious phasesofcompilerand itsuse
- Identifydifferentmethodsoflexicalanalysis
- Designtop-downandbottom-upparsers
- Developsyntaxdirected translationschemes
- Developalgorithmstogenerate codeforatargetmachine
- Usethetoolsrelated tocompilerdesign effectivelyandefficiently

UNIT-I

IntroductiontoAssembler,CompilerandInterpreter;ElementsofALP,SinglePassandTwoPassAssemblers, Structureof aCompiler

LexicalAnalysis:RoleofLexicalAnalyzer,InputBuffering,SpecificationofTokens,Recognitionof Tokens,Lexical Analyzer Generator (Lex)

UNIT-II

SyntaxAnalysis:Introduction,ContextFreeGrammars,WritingaGrammar,Top-downParsing,Bottom-upParsing,IntroductiontoLRParsing,MorePowerfulLRParsers,Introductionto YAAC.

UNIT-III

SyntaxDirectedTranslation(SDT):SyntaxDefinitions,EvaluationOrdersforSDTs,Applicationsof SDTs, Schemes ofSDTs

RunTimeEnvironments:StorageOrganization,StackAllocationofSpace,AccesstoNonlocalData on theStack, Heap Management.

UNIT-IV

Intermediate Code Generation: Variants of Syntax Trees, Three Address Code, Types andDeclarations, Translation of Expressions, Type Checking, Control Flow Statements, BackPatching.

UNIT-V

Code Generation: Issues in the Design of a Code Generator, The Target Language, Addressesin the Target Code, Basic Blocks and Flow Graphs, Optimization of Basic Blocks, A SimpleCodeGenerator, PeepholeOptimization.

TextBooks:

1. AlfredV.Aho,MonicaS.Lam,RaviSethi,JeffreyD.Ullman,CompilersPrinciples,Techniquesand Tools, Second Edition, Pearson Education,2014.
2. DMDhamdhere,SystemsProgramming, TMHEducation,2011.

ReferenceBooks:

1. JeanPaulTremblay,PaulGSerenson,"TheTheoryandPracticeofCompilerWriting",BS Publications, 2005
2. Dhamdhere,D.M.,"CompilerConstructionPrinciplesandPractice",2ndedition,MacmillanIndia Ltd., New Delhi,2008

CourseOutcomes:

Bythe endofthiscourse studentswill beable to:

- Designacompilerforasimpleprogramming language
- Understandphasesinthe designof compiler
- Designtop-downandbottom-upparsers
- Developsyntaxdirected translationschemes
- Comprehendandadaptto LexandYacctoolsincompilerdesign

CA503C **SRI VENKATESWARA UNIVERSITY:: TIRUPATI**
III B.Tech V Semester (CSE-AI)

COMPUTER GRAPHICS (Professional Elective-I)

No.of Credits: 3 **Instruction Hours/Week: 3**

CourseObjectives:

Thecourseis designed to

- Understandthebasicsofvariousinputsandoutputcomputergraphicshardwaredevices.
- Explorationoffundamentalconceptsin2Dand3Dcomputergraphics.

- Learn 2D raster graphics techniques, 3D modelling, geometric transformations, 3Dviewingand rendering.

UNIT-I

Introduction-Imageprocessingaspictureanalysis,AdvantagesofInteractiveGraphics,Representative uses of computer graphics, Classification of applications, Development ofhardwareandsoftwareforcomputergraphics,ConceptualframeworkforInteractiveGraphics.ScanConvertingLines

BasicIncrementalalgorithm,MidpointLinealgorithmandadditionalissues;ScanConvertingCircles,ScanConvertingEllipses,SolidFilling–Rectangles, Polygonsand Ellipse arcs; Pattern filling,Thick primitives, Cohen-Sutherlandline clipping algorithm, Parametric line clipping algorithms, Sutherland-Hodgeman polygonclippingalgorithm, Generating characters and Antialiasing.

UNIT-II

Display Systems -Raster- scanand Randomscan.Geometricaltransformations– 2Dtransformations,Homogeneouscoordinates,Matrixrepresentation of 2Dtransformations, Composition of 2D transformations, Window to view-porttransformation,Matrixrepresentationof3Dtransformations,Compositionof3Dtransformationsand Transformation as a change in coordinate system.

Representing Curves and surfaces – Polygon meshes, Parametric cubic curves, Parametricbicubicsurfaces and Quadricsurfaces.Fractals–LinesandSurfaces.

UNIT-III

Viewing in 3D - Projections, Specifying an arbitrary 3D view, Examples of 3D viewing, Mathematics of planar geometric projections, Implementing planar geometric projections,Coordinatesystems.

SolidModeling–

Representingsolids,RegularizedBooleansetoperations,Primitiveinstancing,Sweeprepresentations, Boundaryrepresentations,Spatial-PartitioningRepresentations, Constructive solid geometry, Comparison of representations, User interfacesforsolid modelling.

UNIT-IV

Achromatic and Colored Light Achromatic light, Chromatic colour, Colour models for raster graphics, Reproducing colour, Using colour in computer graphics.VisibleSurfaceDeterminationFunctionsoftwovariables,Techniquesforefficientvisiblesurfacealgorithms, z-Buffer algorithm, Scan-line algorithms, Visible surface ray tracing.

UNIT-V

Illumination Models –Ambient light, diffuse reflection, Atmospheric attenuation.

Shading4Models-Constant shading, Interpolated shading, Poly gonmesh shading, Gouraud shading, Phong shading, Problems with interpolated shading.SurfaceDetail –Surface-detail polygons, Texture mapping, Bump mapping.

Animation – Conventional and Computer-Assisted animation, Animation languages, Methodsofcontrolling animation, Basicrules ofanimation,Problemspeculiar to animation.

TextBooks:

1. Hughes J F, Van Dam A, Foley J D,et al., Computer Graphics*:* Principles andPractice,3rdedition, Addison-Wesley, 2013.

ReferenceBooks:

1. FoleyJD,VanDamA,FeinerSK,JohnFH,ComputerGraphics:Principles&Practicein C, 2nd edition, Pearson Education, 1995.
2. Ragiv Chopra, Computer Graphics, S.Chand&Company,2012.

CourseOutcomes:

Atthe endofthecourse,studentswill beable to

- Understandthevariouscomputergraphicshardwareanddisplaytechnologies.
- Implementvarious2Dand3Dobjectstransformationtechniques.

Apply2Dand 3Dviewingtechnologies intothereal worldapplications

CA504C **SRI VENKATESWARA UNIVERSITY:: TIRUPATI**

III B.Tech V Semester (CSE-AI)

FORMALLANGUAGESANDAUTOMATATHEORY

No.of Credits: 3 **Instruction Hours/Week: 3**

Course Objectives:

Thecourseis designed to

- Identifydifferentformallanguageclassesandtheirrelationships
- Designgrammarsandrecognizersfordifferentformallanguages
- Understandthelogicallimits tocomputationalcapacity
- Getproperinsightonun-decidableproblems

UNIT-I

Why study Automata Theory, Central Concepts of Automata Theory, Informal Picture ofFiniteAutomata,DeterministicFiniteAutomata,NondeterministicFiniteAutomataandApplications,Finite Automation with Epsilon Transitions.

UNIT-II

RegularExpressionsandtheirApplications,FiniteAutomataandRegularExpressions,AlgebraicLaws for RegularExpressions.

Properties of Regular Languages, Equivalence and Minimization of Automata.

UNIT-III

Context Free Grammars (CFG), Parse Trees, Applications of CFG, Ambiguity in GrammarsandLanguages.

Definition of Pushdown Automaton, The Languages of a PDA, Equivalence of PDA's and CFG's, Deterministic Pushdown Automata.

UNIT-IV

Normal forms for CFG, Pumping Lemma for Context Free Languages, Closure and DecisionPropertiesof CFLs

Turing Machine Model, Representation of Turing Machines, Language Acceptability by TM,Designof TMs,Universal TuringMachine, HaltingProblem of TM,Church-Turing Thesis.

UNIT-V

A Language that is not Recursively Enumerable, An Undecidable Problem that is RecursivelyEnumerable,UndecidableProblems about TuringMachines,

TheClasses ofP and NP,NP Complete Problem.

TextBooks:

1. JohnE.Hopcroft,RajeevMotwaniandJeffreyD.Ullman,IntroductiontoAutomataTheory,Languages, and Computation, Pearson Education Asia.
2. Martin J C, Introduction to Languages and the Theory of Computation, 3rd edition,TataMcGraw-Hill, 2003.

ReferenceBooks:

2. Krithivasan K, Introduction to Formal Languages, Automata Theory and Computation,PearsonEducation, 2009.
3. Rich E, Automata, Computability, and Complexity – Theory and Applications, PearsonEducation,2012.
4. SinghA,ElementsofComputationTheory,Springer, 2009.
5. CohenDIA,Introductionto ComputerTheory, 2nd edition, JohnWiley, 2000.
6. Lewis H, Papadimitriou C H, Elements of the Theory of Computation, 2nd edition,PrenticeHall, 1997.

CourseOutcomes

Attheend ofthe course,students willbe ableto

- Writeaformalnotationfor strings,languagesandmachines.
- Designfiniteautomatatoacceptasetofstringsof alanguage.
- Determinewhetherthe given languageis regularor not.
- Designcontextfreegrammarstogenerate stringsofcontextfreelanguage.
- Determine equivalence of languages accepted by pushdown automata and languagesgeneratedby context freegrammars
- Distinguish between computability & non-computability and decidability &un decidability.

CA505C **SRI VENKATESWARA UNIVERSITY:: TIRUPATI**
III B.Tech V Semester (CSE-AI)
ADVANCED DATA STRUCTURES

No.of Credits: 3 **Instruction Hours/Week: 3**

Objectives

•Describe and implement a variety of advanced data structures (hash tables, priority queues, balanced search trees, graphs)

•Analyze the space and time complexity of the algorithms studied in the course

•Identify different solutions for a given problem; analyze advantages and disadvantages to different solutions

•Demonstrate an understanding of Amortization

•Demonstrate an understanding of various search trees

Unit I

Hashing – General Idea, Hash Function, Separate Chaining, Linear Probing, Quadratic Probing, Double Hashing, Rehashing, Universal Hashing, Extendible Hashing.

Skip Lists: Skip list representation, Search and Update Operations on skip lists.

Unit II

Priority Queues (Heaps) – Introduction, Binary Heaps, Basic Heap Operations, Binomial Heaps/Queues, Binomial Queue Structure, Binomial Queue Operations. Implementation of Binomial Heaps

Unit III

Efficient Binary Search Trees – AVL Trees, Single rotation, Double rotation, Splay Trees, Red-Black Trees, B-Trees: Definition of B-trees, Basic operations on B-trees, Deleting a key from a B-tree. B+ Trees, 2-3 Trees

Unit IV

The Disjoint Sets Class – Equivalence relation, Basic Data Structure, Union and Find algorithms, Smart Union and Path compression algorithm.

Graphs Algorithms – Elementary Graph Operations: Topological sort, Single Source Shortest Path Algorithms: Dijkstras, Bellman-Ford, All Pairs Shortest Paths: Floyd-Warshalls Algorithm. Network Flow Problems: A simple Maximum flow algorithm

Unit-V

String Matching – The naive string-matching algorithm, The Rabin-Karp algorithm, The Knuth-Morris-Pratt algorithm.

Digital Search Structures – Operations on search trees: Insertion, Searching, Deletion. Binary Tries and Patricia: Binary Tries, Compressed Binary Trie, Patricia: searching, insertion, deletion.

Course Outcomes

Upon completion of the course, graduates will be able to

- Understand the basic principles and operations of data structures
- Apply Hashing and String Matching techniques for solving problems effectively.
- Apply the concepts of advanced Trees and Graphs for solving problems effectively.
- Analyze the given scenario and choose appropriate Data Structure for solving problems

Text Books

1. Data Structures and Algorithm Analysis in C++, Mark Allen Weiss, Fourth Edition, 2014, Pearson.
2. Introduction to Algorithms, Thomas H Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, Third Edition, 2009, The MIT Press.

Reference Books

1.Advanced Data Structures, Reema Thareja, S. Rama Sree, Oxford University Press, 2018.

2. Data Structures and Algorithms Made Easy by Narasimha Karumanchi, 2020, Career Monk Publications.

3. Advanced Data Structures, Peter Brass, Cambridge University Press, 2008.

CA506L **SRI VENKATESWARA UNIVERSITY:: TIRUPATI**
III B.Tech V Semester (CSE-AI)
Data Communication and Networking Laboratory

No.of Credits: 3 **Instruction Hours/Week: 3**

At least 10 assignments are to be given covering the topics of the courses, ”Data Communication and Networking Laboratory **“**

CA507L **SRI VENKATESWARA UNIVERSITY:: TIRUPATI**
III B.Tech V Semester (CSE-AI)
Advanced Data Structures Laboratory

No.of Credits: 3 **Instruction Hours/Week: 3**

At least 10 assignments are to be given covering the topics of the courses,” Advanced data structures Laboratory **“**

CS508S **SRI VENKATESWARA UNIVERSITY:: TIRUPATI**
III B.Tech V Semester (CSE-AI)
JAVA PROGRAMMING (Skill Advance Course)

No.of Credits: 3 **Instruction Hours/Week: 3**

Course Objectives:
Thecourseis designed to

- IdentifyJavalanguage componentsand howtheyworktogetherinapplications.
- Learnhowtodesignagraphicaluserinterface(GUI)withJavaSwing.
- Understandhow touseJavaAPIs forprogram development.
- LearnhowtoextendJavaclasseswithinheritance anddynamicbinding.
- LearnhowtouseexceptionhandlinginJavaapplications.
- Understandhowtodesignapplications withthreadsinJava.

Thecourseshall cover thefollowing topics:

- Introduction
- DataTypes,Variables,Arrays,Operators
- ControlStatements
- ClassesandMethods
- Inheritance
- Packagesand Interfaces
- Exceptionhandling
- StreambasedI/O
- MultithreadedProgramming
- TheCollectionsFramework
- Networking
- AppletandAWT
- GUIProgrammingwithSwings
- Introductionto JDBC

TextBooks:

1.Herbert Schildt, *Java The complete reference*, 9th edition, McGraw Hill Education(India)Pvt. Ltd.

ReferenceBooks:

1. PaulDietel,Harvey Dietel, *JavaHowtoProgram*,10th Edition,PearsonEducation.
2. T. Budd, *Understanding Object-Oriented Programming with Java*, updated edition,PearsonEducation.
3. CayS.Horstmann, *CoreJavaVolume–1Fundamentals*,PearsonEducation.
4. Sagayaraj, Dennis, Karthik and Gajalakshmi, *Java Programming for core andadvancedlearners*, University Press
5. Y.Daniel Liang,*Introduction toJava programming*,Pearson Education.
6. P.RadhaKrishna,*ObjectOrientedProgrammingthroughJava*,UniversityPress.
7. S.Malhotra,S.Chaudhary, *ProgramminginJava*,2nd edition,OxfordUniv.Press.
8. R.A. Johnson, *Java Programming and Object-oriented Application Development*,CengageLearning.

CourseOutcomes

Havingsuccessfullycompletedthiscoursethestudentswillbeableto:

- Writeprogramsforsolvingrealworldproblemsusingjavacollectionframework.
- Writemultithreadedprograms.
- WriteGUIprograms using swing controls in Java.

ME509M SRI VENKATESWARA UNIVERSITY:: TIRUPATI

III B.Tech V Semester (CSE-AI)

UNIVERSAL HUMAN VALUES

No.of Credits: 3 **Instruction Hours/Week: 3**

Course Objectives:

Thecourseis designed to

- develop a holistic perspective based on self-exploration about themselves

(humanbeing),family, society and nature/existence.

- understand (or developing clarity) the harmony in the human being, family, societyandnature/existence.
- strengthenself-reflectionandtodevelopcommitmentandcouragetoact.
- understandsocialresponsibilityofanengineer.
- appreciateethicaldilemmawhiledischargingdutiesinprofessionallife.

UNIT-I

Introduction-Need,BasicGuidelines,ContentandProcessforValueEducation: Purpose and motivation for the course, Self-Exploration–what is it? - Its content and process;'NaturalAcceptance'andExperientialValidation-astheprocessforself-exploration.
Continuous Happiness and Prosperity-A look at basic Human Aspirations. Right understanding, Relationship and Physical Facility- the basic requirements for fulfilment ofaspirations of every human being with their correct priority.Understanding Happiness andProsperity correctly - A critical appraisal of the current scenario. Method to fulfil the abovehumanaspirations: understanding andliving in harmony atvarious levels.

UNIT-II

UnderstandingHarmonyinTheHumanBeing-Harmony inMyself!:
Understanding human being as a co-existence of the sentient 'I' and the material 'Body'.Understanding the needs of Self ('I') and 'Body' -happiness and physical facility (Sukh andSuvidha). Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer).Understanding the characteristics and activities of 'I' and harmony in 'I'.Understanding theharmonyofIwiththeBody:SanyamandHealth;correctappraisalofPhysicalneeds,meaningof Prosperity in detail. Programs to ensure Sanyam and Health.

UNIT-III

UnderstandingHarmonyinTheFamilyandSociety-HarmonyinHuman-HumanRelationship: Understanding harmony in the Family - the basic unit of human interaction.Understandingvaluesinhuman-humanrelationship;meaningofJustice(nineuniversalvalues in relationships) and program for its fulfilment to ensure mutual happiness (Ubhay-tripti); Trust (Vishwas) and Respect (Samman) as the foundational values of relationship.Understandingthemeaningof Trust;Differencebetweenintentionandcompetence.Understanding the meaning of Respect, Difference between respect and differentiation; theother salient values in relationship. Understanding the harmony in the society (society beingan extension of family): Resolution (Samadhan), Prosperity (Samridhi), fearlessness (Abhay)and co-existence as comprehensive Human Goals.Visualizing a universal harmonious orderin society- Undivided Society (AkhandSamaj), Universal Order (SarvabhaumVyawastha) -fromfamily to world family.

UNIT-IV

UnderstandingHarmonyinTheNatureandExistence-WholeExistenceasCoexistence: Understanding the harmony in the Nature.Interconnectedness and mutualfulfilmentamongthefourordersofnature-recyclabilityandself-regulationinnature.Understanding Existence as Co-existence of mutually interacting units in all-pervasive space.Holisticperception ofharmony at all levels ofexistence.

UNIT-V

Implications of The Above Holistic Understanding of Harmony on Professional Ethics: Natural acceptance of human values. Definitiveness of Ethical Human Conduct.Basis forHumanisticEducation,HumanisticConstitutionandHumanisticUniversalOrder.Competenceinpr

ofessionalethics:a.Abilitytoutilizetheprofessionalcompetenceforaugmenting universal human order b. Ability to identify the scope and characteristics ofpeoplefriendlyandeco-friendlyproductionsystems,c.Abilitytoidentifyanddevelopappropriatetechnologiesandmanagemen tpatternsforaboveproductionsystems.Casestudies of typical holistic technologies, management models and production systems. Strategyfor transition from the present state to Universal Human Order: a. At the level of individual:as socially and ecologically responsible engineers, technologists and managers b. At the levelofsociety: as mutually enriching institutions andorganizations.

TextBooks:

1. Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, ExcelBooks,New Delhi, 2010.
2. JeevanVidya:EkParichaya,ANagaraj, JeevanVidyaPrakashan,Amarkantak,1999.

ReferenceBooks:

1. E. F. Schumancher, 1973, Small is Beautiful: a study of economics as if peoplemattered.Blond & Briggs, Britain.
2. A.N.Tripathy,2003, HumanValues,New Age InternationalPublishers.
3. Ivan IIIich, 1974, Energy & Equity, The Trinity Press, Worcester, and HarperCollins,USA
4. ANagraj,1998JeevanVidyaekParichay,Divya PathSansthan,Amarkantak.
5. SussanGeorge,1976, HowtheOther HalfDies,Penguin Press,Reprinted1986,1991.
6. SubhasPalekar,2000,HowtopracticeNaturalFarming,Pracheen(Vaidik)KrishiTantraS hodh, Amravati.
7. E G Seebauer& Robert L.Berry, 2000, Fundamentals of Ethics for Scientists &Engineers,Oxford University Press.
8. M Govindrajan, S Natrajan& V. S Senthilkumar, Engineering Ethics (includingHumnaValues),EasternEconomyEdition, PrenticeHall of IndiaLtd.
9. TheStory ofMy Experiments withTruth -byMohandas Karamchand Gandhi.
10. India WinsFreedom-MaulanaAbdul KalamAzad.

RelevantCDs,Movies, Documentaries&OtherLiterature:

1. ValueEducationwebsite,http://www.uptu.ac.in
2. StoryofStuff,http://www.storyofstuff.com
3. AIGore,An InconvenientTruth,ParamountClassics,USA
4. CharleChaplin,ModernTimes,United Artists,USA
5. IITDelhi,Modern Technology -the UntoldStory.

CourseOutcomes:

Havingsuccessfullycompletedthiscoursethestudentswillbeableto:

- becomemore awareofthemselves,and theirsurroundings(family,society,nature)
- distinguishbetweenvaluesandskills,happinessandaccumulationofphysicalfacilities,theSelf and the Body,Intention andCompetenceof an individual,etc.
- understandthe roleof ahuman being inensuringharmonyin societyand nature.
- becomesensitivetotheircommitmenttowardswhattheyhaveunderstood(humanvalues,huma n relationship and human society)
- distinguishbetweenethicalandunethicalpractices,andstartworkingoutthestrategytoactualiz eaharmonious environment wherever they work.

CA601C **SRI VENKATESWARA UNIVERSITY:: TIRUPATI**
III B.Tech VI Semester (CSE-AI)

DATA SCIENCE

No.of Credits: 3 **Instruction Hours/Week: 3**

Course Objectives:

- Provide you with the knowledge and expertise to become a proficient data scientist
- Demonstrate an understanding of statistics and machine learning concepts that are vital for data science
- Learn to statistically analyze a dataset
- Explain the significance of exploratory data analysis (EDA) in data science
- Critically evaluate data visualizations based on their design and use for communicating stories from Data

UNIT-I

Introduction, The Ascendance of Data, Motivating Hypothetical: Data Science tester, Finding Key Connectors, The Zen of Python, Getting Python, Virtual Environments, Whitespace Formatting, Modules, Functions, Strings, Exceptions, Lists, Tuples, Dictionaries default dict, Counters, Sets, Control Flow, Truthiness, Sorting, List Comprehensions, Automated Testing and assert, Object Oriented Programming, Iterables and Generators, Randomness, Regular Expressions, Functional Programming, zip and Argument Unpacking, args and kwargs, Type Annotations, How to Write Type Annotations.

UNIT-II

Visualizing Data: mat plot lib, Bar Charts, Line Charts, Scatter plots. Linear Algebra: Vectors, Matrices, Statistics: Describing a Single Set of Data, Correlation, Simpson's Paradox, Some Other Co relational Caveats, Correlation and Causation. Gradient Descent: The Idea Behind Gradient Descent, Estimating the Gradient, Using the Gradient, Choosing the Right Step Size, Using Gradient Descent to Fit Models, Mini batch and Stochastic Gradient Descent

UNIT-III

Getting Data: std in and std out, Reading Files, Scraping the Web, Using APIs, Working with Data: Exploring Your Data Using Named Tuples, Data classes, Cleaning, Manipulating Data, Rescaling, Dimensionality Reduction. Probability: Dependence and Independence, Conditional Probability, Bayes's Theorem, Random Variables, Continuous Distributions, The Normal Distribution, The Central Limit Theorem

UNIT-IV

Machine Learning: Modeling, Over fitting and Under fitting, Correctness, The Bias-Variance Tradeoff, Feature Extraction and Selection, k-Nearest Neighbors, Naive Bayes, Simple Linear Regression, Multiple Regression, Digression, Logistic Regression

UNIT-V

Clustering: The Idea, The Model, Choosing k, Bottom-Up Hierarchical Clustering. Recommender Systems: Manual Curation, Recommending What's Popular, User-Based Collaborative Filtering, Item-Based Collaborative Filtering, Matrix Factorization Data Ethics, Building Bad Data Products, Trading Off Accuracy and Fairness, Collaboration, Interpretability, Recommendations, Biased Data, Data Protection IPython, Mathematics, NumPy, pandas, scikit-learn, Visualization,R

TextBooks:

1. Joel Grus, “Data Science From Scratch”, OReilly. 2. Allen B.Downey, “Think Stats”, OReilly.

ReferenceBooks:

1) Doing Data Science: Straight Talk From The Frontline, 1 st Edition, Cathy O’Neil and Rachel Schutt, O’Reilly, 2013.
2) Mining of Massive Datasets, 2 nd Edition, Jure Leskovek, AnandRajaraman and Jeffrey Ullman, v2.1, Cambridge University Press, 2014.
3) “The Art of Data Science”, 1 st Edition, Roger D. Peng and Elizabeth matsui, Lean Publications, 2015
4) “Algorithms for Data Science”, 1 st Edition, Steele, Brian, Chandler, John, Reddy, Swarna, springers Publications, 2016

Course Outcomes:

- Describe what Data Science is and the skill sets needed to be a data scientist
- Illustrate in basic terms what Statistical Inference means. Identify probability distributions commonly used as foundations for statistical modelling, Fit a model to data
- Use R to carry out basic statistical modelling and analysis
- Apply basic tools (plots, graphs, summary statistics) to carry out EDA
- Describe the Data Science Process and how its components interact
- Use APIs and other tools to scrap the Web and collect data
- Apply EDA and the Data Science process in a case study

CA602C **SRI VENKATESWARA UNIVERSITY:: TIRUPATI**
III B.Tech VI Semester (CSE-AI)

WEB TECHNOLOGY

No.of Credits: 3 **Instruction Hours/Week: 3**

Course Objectives:

- This course is designed to introduce students with no programming experience to theprogramming languages and techniques associated with the World Wide Web.
- Thecourse will introduce web-based media-rich programming tools for creating interactiveweb pages.

UNIT-I

HTML, CSS Basic Syntax, Standard HTML Document Structure, Basic Text Markup, Images, HypertextLinks, Lists, Tables, Forms, HTML5 CSS: Levels of Style Sheets, Style Specification Formats, Selector Forms, The Box Model,Conflict Resolution

UNIT-II

Java script The Basic of Java script: Objects, Primitives Operations and Expressions, Screen Output andKeyboard Input, Control Statements, Object Creation and Modification, Arrays, Functions,Constructors, Pattern Matching using Regular Expressions DHTML: Positioning Moving and Changing Elements

UNIT-III

XML: Document type Definition, XML schemas, Document object model, XSLT, DOM and SAX Approaches, AJAX A New Approach: Introduction to AJAX, Integrating PHP and AJAX.

UNIT-IV

PHP Programming: Introducing PHP: Creating PHP script, Running PHP script.Working with

variables and constants: Using variables, Using constants, Datatypes,Operators.Controlling program flow: Conditional statements,Controlstatements,Arrays,functions.Working with forms and Databases such as MySQL.

UNIT-V

Introduction to PERL, Operators and if statements, Program design and control structures, Arrays, Hashs and File handling, Regular expressions, Subroutines, Retrieving documents from the web withPerl.

Text Books:

1. Programming the World Wide Web, Robet W Sebesta, 7ed, Pearson.
2. Web Technologies, Uttam K Roy, Oxford
3. The Web Warrior Guide to Web Programming, Bai, Ekedahl, Farrelll, Gosselin, Zak, Karparhi, Maclntyre, Morrissey, Cengage

Reference Books:

1. Ruby on Rails Up and Running, Lightning fast Web development, Bruce Tate, CurtHibbs, Oreilly(2006)
2. Programming Perl, 4ed, Tom Christiansen, Jonathan Orwant, Oreilly (2012)

Course Outcomes:

On completion of this course, the students will be able to

- Analyze a web page and identify its elements and attributes.
- Create web pages using XHTML and Cascading Styles sheets.
- Build dynamic web pages.
- Build web applications using PHP.
- Programming through PERL and Ruby
- Write simple client-side scripts using AJAX

CA603C **SRI VENKATESWARA UNIVERSITY :: TIRUPATI**
III B.Tech VISemester (CSE-AI)
CRYPTOGRAPHY AND NETWORK SECURITY

No.of Credits: 3 **Instruction Hours/Week: 3**

CourseObjectives:

Thiscourseaimsattraining studentstomasterthe:

- Understandthebasiccategoriesof threatstocomputersandnetworks
- Discuss various cryptographic algorithms including secret key cryptography andpublic-keycryptography.
- Differentencryptiontechniquesalongwithhashfunctions,MAC,digitalsignatures
- Design issues and working principles of various authentication protocols and PKIstandards.

UNIT-I

IntroductiontoSecurity:SecurityAttacks,SecurityServices,SecurityMechanisms,Fundamental Security Design Principles, Attack Surfaces and Attack Trees, a Model forNetwork Security Mathematics of Cryptography: Algebraic Structures (Groups, Rings, FieldsandGaloisFields),DivisibilityandtheDivisionAlgorithm,TheEuclideanAlgorithm,Modular

Arithmetic, Prime Numbers, Fermat's and Euler's Theorems, Testing for Primality,TheChineseRemainderTheorem, Discrete Logarithms

UNIT-II

ClassicalEncryptionTechniques:SymmetricCipherModel,SubstitutionTechniques,Transposition Techniques, Rotor Machines, Steganography Block Ciphers: Traditional BlockCipher Structure, The Data Encryption Standard, The Strength of DES, Block Cipher DesignPrinciples, Advanced Encryption Standard, AES Structure, AES Transformation Functions,AESKeyExpansion,MultipleEncryptionandTripleDES,BlockCipherModesofOperation

UNIT-III

Public-Key Cryptography: Principles of Public-Key Cryptosystems, The RSA Algorithm,Diffie-Hellman Key Exchange, Elgamal Cryptographic System, Elliptic Curve CryptographyCryptographic Hash Functions: Applications of Cryptographic Hash Functions, Requirementsand Security, Secure Hash Algorithm (SHA) Message Authentication Codes: RequirementsforMessageAuthentication Codes, HMAC, CMAC

UNIT-IV

Digital Signatures: Digital Signatures, Elgamal Digital Signature Scheme, Schnorr DigitalSignatureScheme,NISTDigitalSignatureAlgorithm,EllipticCurveDigitalSignatureAlgorithm Key Management and Distribution: Symmetric Key Distribution Using SymmetricEncryption,SymmetricKeyDistributionUsingAsymmetricEncryption,DistributionofPublicKeys,X.509Certificates,Public-KeyInfrastructureUserAuthentication:RemoteUser-Authentication Principles, Remote User-Authentication Using Symmetric Encryption,Kerberos,Remote User-Authentication Using AsymmetricEncryption.

UNIT-V

Transport-Level Security: Web Security Considerations, Transport Layer Security, SecureShell (SSH) Electronic Mail Security: S/MIME, Pretty Good Privacy IP Security: IP SecurityOverview, Encapsulating Security Payload, Combining Security Associations, Internet KeyExchange

TextBooks:

1. William Stallings, *Cryptography and Network Security*, 8th Edition, PearsonEducation

ReferenceBooks:

1. Bernard L. Menezes, Ravinder Kumar, *Cryptography, Network Security and CyberLaws*,CengageLearning.
2. Behrouz A Forouzan, DebdeepMukhopadhyaya, *Cryptography and NetworkSecurity*,3rdEdition, Mc-GrawHill.
3. JasonAlbanese,Wes Sonnenreich,*NetworkSecurityIllustrated*,McGraw Hill.

CourseOutcomes:

Attheendofthecourse,thestudentswillbeableto:

- Apply different encryption and decryption techniques to solve problems related toconfidentialityand authentication.
- Understandkeymanagementanddistribution schemesanddesignuserauthentication protocols
- Apply different digital signature algorithms to achieve authentication and createsecureapplications
- Performsimplevulnerablilityassessmentsandpasswordaudits.

- Configuresimplefirewallarchitectures

CA604C **SRI VENKATESWARA UNIVERSITY:: TIRUPATI**
III B.Tech VI Semester (CSE-AI)

MACHINE LEARNING

No.of Credits: 3 **Instruction Hours/Week: 3**

Course Objectives:

- Identify problems that are amenable to solution by ANN methods, and which ML methods may be suited to solving a given problem.
- Formalize a given problem in the language/framework of different ANN methods (e.g., as a search problem, as a constraint satisfaction problem, as a planning problem, as a Markov decision process, etc).

UNIT-I

Introduction- Artificial Intelligence, Machine Learning, Deep learning, Types of Machine Learning Systems, Main Challenges of Machine Learning. Statistical Learning: Introduction, Supervised and Unsupervised Learning, Training and Test Loss, Tradeoffs in Statistical Learning, Estimating Risk Statistics, Sampling distribution of an estimator, Empirical Risk Minimization.

UNIT-II

Supervised Learning(Regression/Classification):Basic Methods: Distance based Methods, Nearest Neighbours, Decision Trees, Naive Bayes, Linear Models: Linear Regression, Logistic Regression, Generalized Linear Models, Support Vector Machines, Binary Classification: Multiclass/Structured outputs, MNIST, Ranking.

UNIT-III

Ensemble Learning and Random Forests: Introduction, Voting Classifiers, Bagging and Pasting,Random Forests, Boosting, Stacking. Support Vector Machine: Linear SVM Classification, Nonlinear SVM ClassificationSVM Regression, Naïve Bayes Classifiers.

UNIT-IV

Unsupervised Learning Techniques:Clustering, K-Means, Limits of K-Means, Using Clustering for Image Segmentation, Using Clustering for Preprocessing, Using Clustering for SemiSupervised Learning, DBSCAN, Gaussian Mixtures. Dimensionality Reduction: The Curse of Dimensionality, Main Approaches for Dimensionality Reduction, PCA, Using Scikit-Learn, Randomized PCA, Kernel PCA.

UNIT-V

Neural Networks and Deep Learning: Introduction to Artificial Neural Networks with Keras, Implementing MLPs with Keras, Installing TensorFlow 2, Loading and Preprocessing Data with TensorFlow.

Text Books:

1. Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow, 2nd Edition,

   O'Reilly Publications, 2019

2. Data Science and Machine Learning Mathematical and Statistical Methods,Dirk P. Kroese,

Zdravko I. Botev, Thomas Taimre, Radislav Vaisman,25th November 2020

3. Machine Learning Probabilistic Approach, Kevin P. Murphy, MIT Press, 2012

Course Outcomes:

After the completion of the course, student will be able to

- Explain the fundamental usage of the concept Machine Learning system
- Demonstrate on various regression Technique
- Analyze the Ensemble Learning Methods
- Illustrate the Clustering Techniques and Dimensionality Reduction Models in Machine Learning.
- Discuss the Neural Network Models and Fundamentals concepts of Deep Learning
-

CA605C SRI VENKATESWARA UNIVERSITY:: TIRUPATI

III B.Tech VI Semester (CSE-AI)

SOFTWARE ENGINEERING

No.of Credits: 3 **Instruction Hours/Week: 3**

CourseObjectives:

Thecourseis designedto understand

- Softwarelifecyclemodels.
- SoftwarerequirementsandSRSdocument.
- Differentsoftwaredesign strategies
- Qualitycontrolandhow toensuregood quality software.
- Planningandestimationofsoftwareprojects.
- Maintenanceofsoftwareand gainknowledgeoftheoverallprojectactivities.

UNIT-I

Introduction to Software Engineering: The Nature of Software, The Unique Nature ofWebApps, Software Engineering, Software Process, Software Engineering Practice, SoftwareMyths.

ProcessModels:AGenericProcessModel,ProcessAssessmentandImprovement,Prescriptive Process Models, Specialized Process Models, The Unified Process, Personal andTeamProcess Models, Process Technology, Productand Process.

Agile Development: Agility, Agility and the Cost of Change, Extreme Programming, AgileProcessModels

UNIT-II

UnderstandingRequirements: RequirementsEngineering,ElicitingRequirements,DevelopingUse Cases,BuildingtheRequirementsModel,NegotiatingRequirements,ValidatingRequirements.

Requirements Modeling: Requirements Analysis, Scenario based Modeling, Class basedModeling,RequirementsModelingStrategies,FlowOrientedModeling,PatternsforRequireme ntModeling, Requirements Modeling forWebApps

DesignConcepts: DesignProcess,DesignConcepts,DesignModel.

ArchitecturalDesign:Software Architecture, ArchitecturalGenres,ArchitecturalStyles,Architectural Design, Alternative Architectural Designs, Architectural Mapping using Dataflow.

UNIT-III

Component Level Design: Component, Class based Components, Conducting Componentlevel design, Component level Design for WebApps, Designing Traditional

Components,Componentbased Development.
User Interface Design: The Golden Rules, User Interface Analysis and Design, InterfaceAnalysis,Interface Design Steps,WebAppInterfaceDesign, DesignEvaluation.
PatternBasedDesign:DesignPatterns,PatternbasedSoftwareDesign,ArchitecturalPatterns,Component LevelDesign Patterns, User InterfaceDesign Patterns.

UNIT-IV

SoftwareQualityConcepts: SoftwareQuality,SoftwareQualityDilemma,AchievingSoftwareQuality.
Software Quality Assurance: Elements of Software Quality Assurance, SQA Goals andMetrics,Formal Approaches toSQA, Statistical SQA, SoftwareReliability.
Software Testing Strategies: A Strategic Approach to Software Testing, Strategic Issues,Unit Testing and Integration Testing (both Conventional and OO Software), Test StrategiesforWebApps, ValidationTesting, SystemTesting,Art of Debugging.
Testing Conventional Applications: Software Testing Fundamentals, Internal and ExternalView of Testing, White-Box Testing, Basis Path Testing, Control Structure Testing, Black-BoxTesting,ModelbasedTesting,TestingforSpecializedEnvironments,PatternsforSoftwareTesting.
Computer Aided Software Engineering: CASE and its Scope, CASE Environment, CASESupport in Software Life Cycle, Characteristics of CASE Tools, Towards Second GenerationCASE Tool.

UNIT-V

Managing Software Projects: Project Management Concepts, Metrics in the Process andProject Domains, Software Measurement, Metrics for Software Quality, Project PlanningProcess,SoftwareScopeandFeasibility,SoftwareProjectEstimation,DecompositionTechniques, Empirical Estimation Models, Estimation for OO Projects, Project Scheduling –Basic Principles, Defining a Task Set and Task Network, Scheduling, Introduction to RiskManagement,SoftwareMaintenance,SoftwareSupportability,SoftwareReengineering,Reverse Engineering,Restructuring, ForwardEngineering,Economics ofReengineering.

TextBooks:

1. Pressman R S, *Software Engineering: A Practitioner's Approach*, 7th edition,McGraw-Hill,2010.
2. SommervilleI,*Software Engineering*,9th edition,Pearson Education,2011.

ReferenceBooks:

1. JaloteP,*SoftwareEngineering: APrecise Approach*,Wiley, 2010.
2. Braude E J, Bernstein M E, *Software Engineering: Modern Approaches*, 2nd edition, Wiley,2010.
3. SalehKA,*SoftwareEngineering*,JRossPublishing,2009.
4. Bruegge B, Dutoit A H, *Object-Oriented Software Engineering Using UML, Patterns, andJava*,3rd edition, PrenticeHall, 2009.
5. Bennett S, McRobb S, Farmer R, *Object-Oriented System Analysis and Design Using UML*,4ndedition,McGraw-Hill, 2010.
6. Lethbridge T C, Laganiere R, *Object-Oriented Software Engineering*, 2nd edition, McGraw-Hill,2005.

CourseOutcomes

Bythe endofthiscourse studentswill beable to

- Defineanddevelop asoftwareproject fromrequirementgathering toimplementation.
- Obtainknowledgeaboutprinciplesandpracticesofsoftwareengineering.
- Focusonthefundamentalsof modelingasoftwareproject.

- Obtainknowledgeaboutestimationand maintenanceofsoftwaresystems
- Comprehend,assess,andcalculatethe costofriskinvolvedinaprojectmanagement
- Implementtestingmethods ateachphaseofSDLC

CA607L **SRI VENKATESWARA UNIVERSITY:: TIRUPATI**
III B.Tech VI Semester (CSE-AI)
Cryptography and Network Security Laboratory

No.of Credits: 3 **Instruction Hours/Week: 3**

At least 10 assignments are to be given covering the topics of the courses,"Cryptography and Network Security Laboratory **"**

CA608L **SRI VENKATESWARA UNIVERSITY:: TIRUPATI**
III B.Tech VI Semester (CSE-AI)
Data Science Laboratory

No.of Credits: 3 **Instruction Hours/Week: 3**

At least 10 assignments are to be given covering the topics of the courses,"Data Science Laboratory **"**

CA609S **SRI VENKATESWARA UNIVERSITY:: TIRUPATI**
III B.Tech VI Semester (CSE-AI)
ADVANCED PYTHON PROGRAMMING (SKILL COURSE)

No.of Credits: 3 **Instruction Hours/Week: 3**

CourseObjectives:
Thecourseis designed to

- Familiarizethebasicsof PythonThirdPartyToolsandusages.
- Understand the advantage of using Python libraries for implementing

MachineLearningmodels.

- UnderstandthePythonDataStructuresforFullStackDevelopment.

Thecourseshall cover thefollowing topics:

- ParallelSystemTools:ForkingProcesses,Threads,ProgramExits,InterprocessCommunication,ThemultiprocessingModule,OtherWaystoStartPrograms,APortableProgram-Launch Framework, OtherSystem Tools Coverage.

- GUI Design with Tkinter:Menus,Listboxes and Scrollbars, Text, Canvas, Grids,TimeTools, Threads, and Animation, Other Widgets and Options.

- GUICodingTechniques:GuiMixin:CommonToolMixinClasses,GuiMaker:AutomatingMenusandToolbars,ShellGui:GUIsforCommand-LineTools,GuiStreams:RedirectingStreamstoWidgets,ReloadingCallbackHandlersDynamically,WrappingUpTop-LevelWindowInterfaces,GUIs,Threads,andQueues, More Ways to Add GUIs to Non-GUI Code, ThePyDemos and PyGadgetsLaunchers.

- Complete GUI Programs: PyEdit: A Text Editor Program/Object, PyPhoto: An ImageViewer and Resizer, PyView: An Image and Notes Slideshow, PyDraw: Painting andMoving Graphics, PyClock: An Analog/Digital Clock Widget, PyToe: A Tic-Tac-ToeGameWidget.

- Network Scripting:PythonInternetDevelopmentOptions,PlumbingtheInternet,SocketProgramming, Handling Multiple Clients, MakingSocketsLook Like FilesandStreams, A SimplePython FileServer.

- Client-Side Scripting: FTP: Transferring Files over the Net, Transferring Files withftplib, Transferring Directories with ftplib, Transferring Directory Trees with ftplib,ProcessingInternetEmail,POP:FetchingEmail,SMTP:SendingEmail,email:Parsing and Composing Mail Content, A Console-Based Email Client, The mailtoolsUtility Package, NNTP: Accessing Newsgroups, HTTP: Accessing Websites, TheurllibPackageRevisited,Other Client-Side ScriptingOptions.

- ThePyMailGUIClient:MajorPyMailGUIChanges,APyMailGUIDemo,PyMailGUIImplementation, Ideas for Improvement.
- Server-SideScripting:What'saServer-SideCGIScript?,RunningServer-SideExamples,ClimbingtheCGILearningCurve,SavingStateInformationinCGIScripts, The Hello World Selector, Refactoring Code for Maintainability, More onHTMLand URL Escapes, Transferring Files toClients and Servers.

- The PyMailCGI Server: The PyMailCGI Website, The Root Page, Sending Mail bySMTP,ReadingPOPEmail,ProcessingFetchedMail,UtilityModules,WebScriptingTrade-Offs.

- DatabasesandPersistence:PersistenceOptionsinPython,DBMFiles,PickledObjects,ShelveFiles,TheZODBObject-OrientedDatabase,SQLDatabaseInterfaces, ORMs: Object Relational Mappers, PyForm: A Persistent Object Viewer(External).

- DataStructures:ImplementingStacks,ImplementingSets,SubclassingBuilt-inTypes, Binary Search Trees, Graph Searching, Permuting Sequences, Reversing andSortingSequences, PyTree: A GenericTreeObject Viewer.

- Text and Language: Strategies for Processing Text in Python, String Method

Utilities,Regular Expression Pattern Matching, XML and HTML Parsing, Advanced LanguageTools,Custom LanguageParsers,PyCalc: A CalculatorProgram/Object.

- Python Data Structures for Data Science: Numpy, Pandas, Scipy, MatplotLib,Seaborn
- Python Data Structures for Full Stack Development, Python for Natural LanguageProcessing
- Python for Machine Learning: Working with Beautiful Soup, Scikit-Learn, NLP withPython,Text mining with python.
- PythonforDeepLearning:WorkingwithTensorflow,KerasandPyTorch
- PythonforCryptographyandNetworkSecurity:Stanford-Corenlp,Bcrypt

TextBooks:

1. MarkLutz,ProgrammingPython, O`Reilly,4thEdition,2010
2. MichaelUrbanandJoelMurach,PythonProgramming,Shroff/Murach,2016

ReferenceBooks:

1. MarkLutz,LearningPython, O`Reilly,FifthEdition,2013.
2. Dattaraj Rao, Keras to Kubernetes: The Journey of a Machine Learning Model toProduction,Wiley, 2019.
3. Wes McKinney, Python for Data Analysis: Data Wrangling with Pandas, NumPy, andIPython,O`Reilly,Second Edition, 2017.
4. AurélienGéron, Hands-On Machine Learning with Scikit-Learn and TensorFlow:Concepts, Tools, and Techniques to Build Intelligent Systems, O`Reilly, First Edition,2017.
5. Andreas C. Müller and Sarah Guido, Introduction to Machine Learning with Python:AGuide for Data Scientists, O`Reilly, First Edition, 2016.

CourseOutcomes

Havingsuccessfullycompletedthiscoursethestudentswillbeableto:

- ApplyPythonThird-PartyToolsin realtimeenvironment.
- ApplyPython forCryptography andNetworkSecurity.
- Implement Fullstackdevelopmentapps.
- ApplyPythonlibrariesforimplementingMachine Learningmodels.
- Applybasicprinciplesof PythonDataStructuresforDataScience

ME610M **SRI VENKATESWARA UNIVERSITY:: TIRUPATI**
III B.Tech VI Semester (CSE-AI)
PROFESSIONAL ETHICS (Mandatory Audit Course)

No.of Credits: 3 **Instruction Hours/Week: 3**

CourseObjectives:

Thecourseis designed to

- createanawarenessonEngineeringEthicsandHumanValues.
- instillMoralandSocialValues andLoyaltyandtoappreciate therightsof others.
- studythemoralissuesanddecisionsconfrontingindividualsandorganizations
- engagedinengineeringprofession.

- studytherelatedissuesaboutthemoralideals,character,policies,and
- relationshipsofpeopleandcorporationsinvolved intechnologicalactivity.

UNIT-I

Human Values: Morals, values and Ethics – Integrity – Work ethic –Service learning –Civic virtue–Respectfor others–Livingpeacefully–Caring–Sharing–Honesty–Courage–Valuingtime–Cooperation–Commitment–Empathy–Self-confidence–Character –Spirituality –Introduction toYogaand meditation for professional excellenceandstress management.

UNIT-II

Engineering Ethics: Senses of Engineering Ethics – Variety of moral issues – Types ofinquiry – Moral dilemmas – Moral Autonomy – Kohlberg''s theory – Gilligan's theory –Consensus and Controversy –Models of professional roles – Theories about right action –Self-interest – Customs andReligion– Uses ofEthical Theories.

UNIT-III

Engineering as Social Experimentation: Engineering as Experimentation – Engineers as Responsible Experimenters – Codesof Ethics – A Balanced Outlook on Law.

UNIT-IV

Safety, Responsibilities and Rights: Safety and Risk – Assessment of Safety and Risk–Risk Benefit Analysis and Reducing Risk – Respect for Authority – Collective Bargaining – Confidentiality–ConflictsofInterest–OccupationalCrime–ProfessionalRights–EmployeeRights – Intellectual Property Rights (IPR)
Discrimination.

UNIT-V

GlobalIssues: MultinationalCorporations–BusinessEthics-EnvironmentalEthics–Computer Ethics - Role in Technological Development – Weapons Development – EngineersasManagers–ConsultingEngineers–EngineersasExpertWitnessesandAdvisors–Honesty–MoralLeadership–SampleCodeofConduct – CorporateSocialResponsibility.

TextBooks:

1. Mike W. Martin and Roland Schinzinger, "Ethics in Engineering", Tata McGraw Hill,NewDelhi, 2003.
2. GovindarajanM,NatarajanS,SenthilKumarV.S,"EngineeringEthics",PrenticeHallofIndia, New Delhi,2004.

ReferenceBooks:

1. Charles B. Fleddermann, "Engineering Ethics", Pearson Prentice Hall, New Jersey,2004.
2. Charles E. Harris, Michael S. Pritchard and Michael J. Rabins, "Engineering Ethics – Conceptsand Cases", CengageLearning, 2009.
3. John R Boatright, "Ethics and the Conduct of Business", Pearson Education, NewDelhi,2003.
4. Edmund G Seebauer and Robert L Barry, "Fundamentals of Ethics for Scientists andEngineers",Oxford University Press,Oxford, 2001.
5. LauraP.HartmanandJoeDesjardins,"BusinessEthics:DecisionMakingforPersonal Integrity and Social Responsibility" Mc Graw Hill education, India Pvt. Ltd.,NewDelhi, 2013.

6. Jake VanderPlas, Python Data Science Handbook: Essential Tools for Working withData,O`Reilly, First Edition, 2016.
7. Delip Rao and Brian McMahan, Natural Language Processing with PyTorch: BuildIntelligent Language Applications Using Deep Learning, O`Reilly, First Edition,2019.
8. Miguel Grinberg, Flask Web Development: Developing Web Applications withPython,O`Reilly,Second Edition, 2018.
9. Joel Grus, Data Science from Scratch: First Principles with Python, O`Reilly, FirstEdition, 2015.
10. J. Burton Browning, Marty AlchinPro Python 3: Features and Tools for ProfessionalDevelopment,Apress,Third Edition, 2019.
11. Abhishek Nandy, Manisha Biswas, Reinforcement Learning: With OpenAI,TensorFlowand Keras Using Python, Apress, 2018.
12. NavinKumarManaswi,DeepLearningwithApplicationsUsingPython:ChatbotsandFace,Object, andSpeechRecognitionWithTensorFlow andKeras,Apress,2018.
13. Akshay Kulkarni, AdarshaShivananda, Natural Language Processing Recipes:Unlocking Text Data with Machine Learning and Deep Learning using Python,Apress,2019.
14. SayanMukhopadhyay, Advanced Data Analytics Using Python: With MachineLearning,Deep LearningandNLP Examples, Apress, 2018.
15. JojoMoolayil, Learn Keras for Deep Neural Networks: A Fast-Track Approach toModernDeep Learningwith Python, Apress, 2019.
16. Manohar Swamynathan, Mastering Machine Learning with Python in Six Steps: APractical Implementation Guide to Predictive Data Analytics Using Python, Apress,2017.
17. Daniel Rubio, Beginning Django Web Application Development and DeploymentwithPython, Apress, 2017.
18. Fabio Nelli, Python Data Analytics: Data Analysis and Science Using Pandas,matplotlib,and thePython Programming Language,Apress, 2015.
19. Fabio Nelli, Python Data Analytics: With Pandas, NumPy, and Matplotlib, Apress,SecondEdition, 2018.

CourseOutcomes

Havingsuccessfullycompletedthiscoursethestudentswillbeableto:

- Discuss the ethical issues related to engineering and realize the responsibilities andrightsin the society.
- Learn the moral issues and problems in engineering; find the solution to thoseproblems.
- Learn the need for professional ethics, codes of ethics and roles, concept of safety,riskassessment.

Gain exposure to Environment Ethics & computer ethics; know their responsibilitiesand rights

CA701C **SRI VENKATESWARA UNIVERSITY:: TIRUPATI**
IV B.Tech VII Semester (CSE-AI)
NEURAL NETWORKS

No.of Credits: 3 **Instruction Hours/Week: 3**

Course Objectives

- To understand the biological neural network and to model equivalent neuron models.
- To understand the architecture, learning algorithms

- To know the issues of various feed forward and feedback neural networks.
- To explore the Neuro dynamic models for various problems.

UNIT-I

Introduction: A Neural Network, Human Brain, Models of a Neuron, Neural Networks viewed as Directed Graphs, Network Architectures, Knowledge Representation, Artificial Intelligence and Neural Networks
Learning Process: Error Correction Learning, Memory Based Learning, Hebbian Learning, Competitive, Boltzmann Learning, Credit Assignment Problem, Memory, Adaption, Statistical Nature of the Learning Process

UNIT-II

Single Layer Perceptrons: Adaptive Filtering Problem, Unconstrained Organization Techniques, Linear Least Square Filters, Least Mean Square Algorithm, Learning Curves, Learning Rate Annealing Techniques, Perceptron –Convergence Theorem, Relation Between Perceptron and Bayes Classifier for a Gaussian Environment
Multilayer Perceptron: Back Propagation Algorithm XOR Problem, Heuristics, Output Representation and Decision Rule, Computer Experiment, Feature Detection

UNIT-III

Back Propagation: Back Propagation and Differentiation, Hessian Matrix, Generalization, Cross Validation, Network Pruning Techniques, Virtues and Limitations of Back Propagation Learning, Accelerated Convergence, Supervised Learning

UNIT – IV

Self-Organization Maps (SOM): Two Basic Feature Mapping Models, Self-Organization Map, SOM Algorithm, Properties of Feature Map, Computer Simulations, Learning Vector Quantization, Adaptive Patter Classification

UNIT-V

Neuro Dynamics: Dynamical Systems, Stability of Equilibrium States, Attractors, Neuro Dynamical Models, Manipulation of Attractors as a Recurrent Network Paradigm
Hopfield Models – Hopfield Models, restricted boltzmen machine.

Course Outcomes

Upon completing this course, the student will be able to

- Understand the similarity of Biological networks and Neural networks.
- Perform the training of neural networks using various learning rules.
- Understanding the concepts of forward and backward propagations.
- Understand and Construct the Hopfield models.

Text Books

1. Neural Networks a Comprehensive Foundations, Simon S Haykin, PHI Ed.,.
2. Introduction to Artificial Neural Systems Jacek M. Zurada, JAICO Publishing House Ed. 2006.
3. Neural Networks in Computer Inteligance, Li Min Fu TMH 2003
4. Neural Networks -James A Freeman David M S Kapura Pearson Ed., 2004.
5. Artificial Neural Networks – B. Vegnanarayana Prentice Hall of India P Ltd 2005

CA702C

SRI VENKATESWARA UNIVERSITY:: TIRUPATI
IV B.Tech VII Semester (CSE-AI)
NATURAL LANGUAGE PROCESSING

No.of Credits: 3 **Instruction Hours/Week: 3**

Course Objectives:

- Introduce to some of the problems and solutions of NLP and their relation to linguistics and statistics.

UNIT I

Finding the Structure of Words: Words and Their Components, Issues and Challenges, Morphological Models Finding the Structure of Documents: Introduction, Methods, Complexity of the Approaches, Performances of the Approaches

UNIT II

Syntax Analysis: Parsing Natural Language, Treebanks: A Data-Driven Approach to Syntax, Representation of Syntactic Structure, Parsing Algorithms, Models for Ambiguity Resolution in Parsing, Multilingual Issues

UNIT III

Semantic Parsing: Introduction, Semantic Interpretation, System Paradigms, Word Sense Systems, Software.

UNIT IV

Predicate-Argument Structure, Meaning Representation Systems, Software.

UNIT V

Discourse Processing: Cohension, Reference Resolution, Discourse Cohension and Structure Language Modeling: Introduction, N-Gram Models, Language Model Evaluation, Parameter Estimation, Language Model Adaptation, Types of Language Models, Language-Specific Modeling Problems, Multilingual and Crosslingual Language Modeling

TEXT BOOKS:

1. Multilingual natural Language Processing Applications: From Theory to Practice – Daniel M. Bikel and ImedZitouni, Pearson Publication
2. Natural Language Processing and Information Retrieval: Tanvier Siddiqui, U.S. Tiwary
3. Speech and Natural Language Processing - Daniel Jurafsky& James H Martin, Pearson Publications

Course Outcomes:

- Show sensitivity to linguistic phenomena and an ability to model them with formal grammars.
- Understand and carry out proper experimental methodology for training and evaluating empirical NLP systems
- Able to manipulate probabilities, construct statistical models over strings and trees, and estimate parameters using supervised and unsupervised training methods.
- Able to design, implement, and analyze NLP algorithms
- Able to design different language modelling Techniques

CA703C **SRI VENKATESWARA UNIVERSITY:: TIRUPATI**
IV B.Tech VII Semester (CSE-AI)

IMAGE PROCESSING(Professional Elective-II)

No.of Credits: 3 **Instruction Hours/Week: 3**

CourseObjectives:

Thecourseis designed to

- Understandthe fundamentalsofDigitalimagingandImageProcessingtechniques.
- Discusstheconceptsofimagecompressionandsegmentation.
- Evaluatetheperformanceofimageprocessing algorithmsandsystems.

UNIT-I

Introduction: Fundamentals of Image Processing, Applications of Image Processing, HumanVisual Perception,Introduction to Image Formation, Sampling and Quantization, BinaryImage,Three-DimensionalImaging,Imagefileformats.ColorandColorImagery:PerceptionofColors.

UNIT-II

ImageTransformation:FourierTransforms,DiscreteCosineTransform,Walsh-adamardTransform,Karhaunen-LoeveTransformorPCA.DiscreteWaveletTransform:WaveletTransform,Extensionto2DSignals,LiftingImplementationoftheDiscreteWaveTransforms.

UNIT-III

Image Enhancement and Restoration : Introduction, Distinction between image enhancementand restoration, Histrogram-basedContrast Enhancement, Frequency Domain Methods ofImageEnhancement,NoiseModeling,ImageRestoration,ImageReconstruction,ImageSegmentation.

UNIT-IV

RecognitionofImagePatterns:Introduction,DecisionTheoreticPatternClassification,BaesianDecisionTheory,NonparametricClassification,LinearDiscriminantAnalysis,Unsupervised Classification Strategies-clustering, K-means clustering algorithm, SyntacticPattern Classification, Syntactic Inference, Symbolic Projection method. Texture and ShapeAnalysis.

UNIT-V

Fuzzy Set Theory in Image Processing : Introduction, Use of Fuzzy Image, Preliminaries andBackground,ImageasaFuzzySet,FuzzyMethodsofContrastEnhancement,ImageSegmentation using Fuzzy Methods, Fuzzy Approaches to Pixel Classification, Fuzzy c-Means Algorithm, Fusion of Fuzzy logic with neural network. Image mining and Content-BasedRetrieval.

TextBooks:

1. Maria Petrou and Costas Petrou , “Image Processing the Fundamentals”, John-WileyandSons Publishers, 2nd edition, 2010.
2. RafaelC.Gonzalez,RichardE.Woods,StevenL.Eddins,"DigitalImageProcessingUsingMATLAB", 2nd edition, Gatesmark Publishing, 2009.
3. Tinku Acharya and Ajoy K. Ray, “Image Processing Principles and Applications”,JohnWiley & Sons publishers, 2005.

ReferenceBooks:

1. Rafael Gonzalez and Richard E. Woods, Digital Image Processing, 4th edition,Pearson,2017.
2. AnilKJain,FundamentalsofDigitalImagesProcessing,Firstedition,Pearson,2015.

CourseOutcomes

Bythe endofthiscourse studentswill beable to:

- Understand Imagerepresentationandmodeling.
- Designandapplyimage enhancementandrestorationtechniques
- Developimageprocessingtechniquesfor assistingdigitalforensics

CA703C **SRI VENKATESWARA UNIVERSITY:: TIRUPATI**
IV B.Tech VII Semester (CSE-AI)
DISTRIBUTED SYSTEMS (Professional Elective-II)
No.of Credits: 3 **Instruction Hours/Week: 3**

CourseObjectives:

Thecourseis designed to

- Familiarizethestudentswiththebasics ofdistributedcomputingsystems.
- Understandissuesrelatedto clockSynchronizationanddistributedmutualexclusion.
- Introduce the concepts of distributed object based systems and distributed filesystems.

UNIT-I

DistributedSystems:Introduction, Goals,TypesofDistributedSystems.
Architectures:ArchitecturalStyles,SystemArchitectures,ArchitecturesversusMiddleware,Self-Managementin Distributed Systems.
Processes:Threads,Virtualization,Clients,Servers,CodeMigration.

UNIT-II

Communication:Fundamentals,RemoteProcedureCall,Message-OrientedCommunication,Stream-OrientedCommunication, Multicast Communication.
Naming:Names,IdentifiersandAddresses,FlatNaming,StructuredNaming,Attribute-BasedNaming.

UNIT-III

Synchronization:ClockSynchronization,LogicalClocks,MutualExclusion,GlobalPositioningof Nodes, Election Algorithms.
ConsistencyandReplication:Introduction,Data-CentricConsistencyModels,Client-CentricConsistencyModels, ReplicaManagement, Consistency Protocols.

UNIT-IV

FaultTolerance:Introduction,ProcessResilience,ReliableClient-

ServerCommunication,ReliableGroupCommunication, Distributed Commit, Recovery.
Security:Introduction,SecureChannels,AccessControl,SecurityManagement.

UNIT-V

Distributed Object- Based Systems: Architecture, Processes, Communication, Naming, Synchronization, Consistency and Replication, Fault Tolerance, Security. Distributed File Systems: Architecture, Processes, Communication, Naming, Synchronization, Consistency and Replication, Fault Tolerance, Security.

TextBooks:

1.Andrew S. Tanenbaum, Maarten Van Steen, Distributed Systems: Principles andParadigms,Second Edition,Pearson Education, 2007.

ReferenceBooks:

1. Brendan Burns, Designing Distributed Systems: Patterns and Paradigms for Scalable,ReliableServices, O'Reilly, First Edition, 2018.
2. Sukumar Ghosh, Distributed Systems: An Algorithmic Approach, CRC Press, SecondEdition, 2014.
3. Kenneth P Birman, Guide to Reliable Distributed Systems: Building High-AssuranceApplicationsand Cloud-Hosted Services, Springer, 2014.
4. George Coulouris, Jean Dollimore, Tim Kindberg and Gordon Blair, DistributedSystems:Concepts andDesign, PearsonEducation, Fifth Edition,2012.
5. Maarten Van Steen, Andrew S. Tanenbaum, Distributed Systems, CreateSpaceIndependentPublishingPlatform/AmazonDigitalServices,ThirdEdition, 2017.
6. RobertoVitillo,UnderstandingDistributedSystems,RobertoVitillo,2021.
7. GerardTel, IntroductiontoDistributedAlgorithms,CambridgeUniversityPress,SecondEdition, 2000.
8. Andrew S. Tanenbaum, Distributed Operating Systems, Pearson Education, FirstEdition, 2002.

CourseOutcomes

Havingsuccessfullycompletedthiscoursethestudentswillbeableto:

- Understand the design principles in distributed systems and the architectures fordistributedsystems
- Apply various distributed algorithms related to clock synchronization, concurrencycontrol,deadlock detection, load balancing.
- Develop the Mutual Exclusion and Deadlock detection algorithms in distributedsystems.
- Analyzefaulttoleranceandrecoveryin distributedsystemsandalgorithmsforthesame.
- Analyzethe designand functioning ofdistributed filesystems.

CA703C **SRI VENKATESWARA UNIVERSITY:: TIRUPATI**
IV B.Tech VII Semester (CSE-AI)
OPTIMIZATION TECHNIQUES (Professional Elective-II)

No.of Credits: 3 **Instruction Hours/Week: 3**

Course Objectives:

Thecourseis designed to

- Castengineeringextrema(minima/maxima)problemsintooptimizationframework.
- Learnefficientcomputationalprocedurestosolve optimizationproblems.

UNIT-I

OverviewofOperationsResearch,Modelingapproach,DecisionanalysisandGames-Decisionenvironments,Decisionmakingundercertainty,Decisionmakingunderrisk,Decisionmaking under uncertainty, Gametheory.

UNIT-II

Liner Programming – Formulation, Graphical method, Simplex method, Duality, Formulationof transportation, Assignment and Transshipment models. Goal programming – Formulation,Weightingand Preemptivemethods.

UNIT-III

IntegerLinearProgramming–Applications,Branchandbound,andCuttingplanealgorithms.

UNIT-IV

NonlinearProgramming-Sampleapplications,Graphicalillustrationofnonlinearprogrammingproblems,Typesofnonlinearprogrammingproblems,One-variableunconstrainedoptimization, Multivariable unconstrainedoptimization.

UNIT-V

Karush-Kuhn-Tuckerconditionsforconstrainedoptimization,Quadraticprogramming,Separableprogramming,Convex programmingand Non-convex programming.

TextBooks:

1.Hillier F S, and Lieberman G J, *Introduction to Operations Research*, 7th edition, TataMcGraw-Hill,2003.

ReferenceBooks:

1. TahaHA,OperationsResearch–AnIntroduction,8thedition,PrenticeHallofIndia,2006.
2. WagnerHM,PrinciplesofOperationsResearchwithApplicationstoManagerialDecisions,2nd edition, PrenticeHall ofIndia,2004.
3. TulsianPC,andPandey V,QuantitativeTechniques–TheoryandProblems,PearsonEducationAsia, 2002.

CA704C **SRI VENKATESWARA UNIVERSITY:: TIRUPATI**
IV B.Tech VII Semester (CSE-AI)
DEEP LEARNING (Professional Elective-III)

No.of Credits: 3 **Instruction Hours/Week: 3**

Course objectives

- Applybasicconceptsofmathematicstoformulate anoptimizationproblem
- Analyseandappreciatevarietyofperformancemeasuresforvariousoptimizationproblems

- Selectappropriatesolutiontechnologiesandstrategies,
- Interpretthesolutionofanoptimizationproblem
- Understandthe effectsofproblemvariationonthe optimalsolution.

UNIT I

Fundamentals of Deep Learning: Artificial Intelligence, History of Machine learning: ProbabilisticModeling, Early Neural Networks, Kernel Methods, Decision Trees, Random forests and Gradient BoostingMachines, **Fundamentals of Machine Learning:** Four Branches of Machine Learning, Evaluating Machinelearning Models, Overfitting and Underfitting.

UNIT-II

Introducing Deep Learning: Biological and Machine Vision, Human and Machine Language, Artificial Neural Networks, Training Deep Networks, Improving Deep Networks.

UNIT-III

Neural Networks: Anatomy of Neural Network, Introduction to Keras: Keras, TensorFlow, Theano and CNTK, Setting up Deep Learning Workstation, Classifying Movie Reviews: Binary Classification, Classifying newswires: Multiclass Classification.

UNIT-IV

Convolutional Neural Networks: Nerual Network and Representation Learing, Convolutional Layers,Multichannel Convolution Operation,

UNIT-V

Recurrent Neural Networks: Introduction to RNN, RNN Code, PyTorch Tensors: Deep Learning withPyTorch, CNN in PyTorch.

Course Outcomes:

After the completion of the course, student will be able to

- Implement deep neural networks to solve real world problems
- Choose appropriate pre-trained model to solve real time problem
- Interpret the results of two different deep learning models

Text Books:

1. Deep Learning- Ian Goodfellow, YoshuaBengio and Aaron Courvile, MIT Press, 2016
2. Deep Learning with Python - Francois Chollet, Released December 2017, Publisher(s): ManningPublications, ISBN: 9781617294433
3. Deep Learning Illustrated: A Visual, Interactive Guide to Artificial Intelligence - Jon Krohn, GrantBeyleveld, AglaéBassens, Released September 2019, Publisher(s): Addison-Wesley Professional,ISBN: 9780135116821
4. Deep Learning from Scratch - Seth Weidman, Released September 2019, Publisher(s): O'Reilly
Media, Inc., ISBN: 9781492041412
5. Reza Zadeh and BharathRamsundar, “Tensorflow for Deep Learning”, O’Reilly publishers, 2018

Reference Books:

1. Artificial Neural Networks, Yegnanarayana, B., PHI Learning Pvt. Ltd, 2009.
2. Matrix Computations, Golub, G.,H., and Van Loan,C.,F, JHU Press,2013.
3. Neural Networks: A Classroom Approach, Satish Kumar, Tata McGraw-Hill Education, 2004.
4. https://github.com/fchollet/deep-learning-with-python-notebooks

CA704C **SRI VENKATESWARA UNIVERSITY:: TIRUPATI**
IV B.Tech VII Semester (CSE-AI)
SPEECH PROCESSING (Professional elective-III)

No.of Credits: 3 **Instruction Hours/Week: 3**

Course Objectives:
The main objective of the course is to understand the basic principles of sound and speech production andperception, speech recognition, synthesis and dialogue systems

UNIT-I

Fundamentals of Digital Speech Processing: Anatomy & Physiology of Speech Organs, The process ofSpeech Production, Acoustic Phonetics, Articulatory Phonetics, The Acoustic Theory of Speech ProductionUniform lossless tube model, effect of losses in vocal tract, effect of radiation at lips, Digital models forspeech signals.

UNIT-II

Time Domain Models for Speech Processing: Introduction- Window considerations, Short time energyand average magnitude Short time average zero crossing rate, Speech Vs Silence discrimination usingenergy and zero crossing, Pitch period estimation using a parallel processing approach, The short timeautocorrelation function, The short time average magnitude difference function, Pitch period estimationusing the autocorrelation function.

UNIT-III

Linear Predictive Coding (LPC) Analysis: Basic principles of Linear Predictive Analysis: TheAutocorrelation Method, The Covariance Method, Solution of LPC Equations: Cholesky DecompositionSolution for Covariance Method, Durbin's Recursive Solution for the Autocorrelation Equations,Comparison between the Methods of Solution of the LPC Analysis Equations, Applications of LPCParameters: Pitch Detection using LPC Parameters, Formant Analysisusing LPC Parameters.

UNIT-IV

Homomorphic Speech Processing: Introduction, Homomorphic Systems for Convolution: Properties of theComplex Cepstrum, Computational Considerations, The Complex Cepstrum of Speech, Pitch Detection,Formant Estimation, The Homomorphic Vocoder. Speech Enhancement: Nature of interfering sounds,Speech enhancement techniques: Single Microphone Approach : spectral subtraction, Enhancement by resynthesis, Comb filter, Wiener filter, Multi microphone Approach

UNIT-V

Automatic Speech & Speaker Recognition: Basic pattern recognition approaches,

Parametricrepresentation of speech, Evaluating the similarity of speech patterns, Isolated digit Recognition System,Continuous digit Recognition System. Hidden Markov Model (HMM) for Speech: Hidden Markov Model(HMM) for speech recognition, Viterbi algorithm, Training and testing using HMMS.
Speaker Recognition:Recognition techniques, Features that distinguish speakers, Speaker Recognition Systems: SpeakerVerification System, Speaker Identification System.

Course Outcomes:

By the end of the course, students will be able to

- Understand the speech production and perception process.
- Analyze speech signals in time and frequency domain.
- Design and implement algorithms for processing speech signals.

Text Books:

1. L.R. Rabiner and S. W. Schafer, "Digital Processing of Speech Signals", Pearson Education.
   2. Douglas O'Shaughnessy, "Speech Communications: Human & Machine", 2nd Ed., Wiley India,2000.
   3. L.R Rabinar and R W Jhaung, "Digital Processing of Speech Signals", 1978, Pearson Education.

Reference Books:

1. Thomas F. Quateri, "Discrete Time Speech Signal Processing: Principles and Practice", 1st Edition.,PE.
   2. Ben Gold & Nelson Morgan, "Speech & Audio Signal Processing", 1st Edition, Wiley

CA704C **SRI VENKATESWARA UNIVERSITY:: TIRUPATI**
IV B.Tech VII Semester (CSE-AI)
INTERNET OF THINGS (Professional Elective-III)

No.of Credits: 3 **Instruction Hours/Week: 3**

Course Objectives:

From the course the student will learn

- The application areas of IOT
- The revolution of Internet in Mobile Devices, Cloud & Sensor Networks
- Building blocks of Internet of Things and characteristics

UNIT-I

The Internet of Things- An Overview of Internet of things, Internet of Things Technology, behind IoTsSources of the IoTs, Examples OF IoTs, Design Principles For Connected Devices, Internet connectivity,**Application Layer Protocols-** HTTP, HTTPS, FTP

UNIT-II

Business Models for Business Processes in the Internet of Things, IoT/M2M systems LAYERS ANDdesigns standardizations, Modified OSI Stack for the IoT/M2M Systems, ETSI M2M domains and Highlevel capabilities, Communication Technologies, Data Enrichment and Consolidation and

DeviceManagement Gateway Ease of designing and affordability.

UNIT-III

Design Principles for the Web Connectivity for connected-Devices, Web Communication protocols forConnected Devices, Message Communication protocols for Connected Devices, Web Connectivity forconnected-Devices.

UNIT-IV

Data Acquiring, Organizing and Analytics in IoT/M2M, Applications/ Services/Business Processes,IOT/M2M Data Acquiring and Storage, Business Models for Business Processes in the Internet Of Things,Organizing Data, Transactions, Business Processes, Integration and Enterprise Systems.

UNIT-V

Data Collection, Storage and Computing Using a Cloud Platform for IoT/M2M Applications/Services, DataCollection, Storage and Computing Using cloud platform Everything as a service and Cloud ServiceModels, IOT cloud-based services ,Nimbits and other platforms Sensor,Participatory Sensing, Actuator, Radio Frequency Identification, and Wireless, Sensor Network Technology,Sensors Technology, Sensing the World.

Course Outcomes:

By the end of the course, student will be able to

- Review Internet of Things (IoT).
- Demonstrate various business models relevant to IoT.
- Construct designs for web connectivity
- Organize sources of data acquisition related to IoT, integrate to enterprise systems.
- Describe IoT with Cloud technologies.

Text Books:

1. Internet of Things: Architecture, Design Principles And Applications, Rajkamal, McGraw Hill HigherEducation
2. Internet of Things, A.Bahgya and V.Madisetti, Univesity Press, 2015

Reference Books:

1. Designing the Internet of Things, Adrian McEwen and Hakim Cassimally, Wiley
2. Getting Started with the Internet of Things, CunoPfister ,Oreilly

CA708L **SRI VENKATESWARA UNIVERSITY:: TIRUPATI**
IV B.Tech VII Semester (CSE-AI)
NATURAL LANGUAGE PROCESSING LAB

No.of Credits: 3 **Instruction Hours/Week: 3**

At least 10 assignments are to be given covering the topics of the courses,"**Natural Language**

Processing Laboratory **“**

CA708L **SRI VENKATESWARA UNIVERSITY:: TIRUPATI**
IVB.Tech VII Semester (CSE-AI)
MOBILE APPLICATION DEVELOPMENT (Skill Course)

No.of Credits: 3 **Instruction Hours/Week: 3**

CourseObjectives

Thecourseis designed to

- Impartbothconceptualandpractical knowledgeonAndroidOS.
- UnderstandanddeveloprobustapplicationsforMobiledevicesonAndroidplatform.

Thecourseshall cover thefollowing topics:

- **Introduction to Android Programming:** What is Android?, Obtaining the RequiredTools,Launching YourFirst Android Application.
- **Using Android Studio for Android Development:** Exploring the IDE, Using CodeCompletion,Debugging YourApplication, Publishing YourApplication.
- **Activities,Fragments,andIntents:**UnderstandingActivities,Linking ActivitiesUsingIntents,Fragments, Displaying Notifications.
- **IntroductiontoAndroidUserInterface:**UnderstandingtheComponentsofaScreen, Adapting to Display Orientation, Managing Changes to Screen Orientation,Utilizing the Action Bar, Creating the User Interface Programmatically, and ListeningforUINotifications.
- **Designing User Interface with Views:** Using Basic Views, Using Picker Views,UsingList Views to Display LongLists, Understanding Specialized Fragments.
- **DisplayingPicturesandMenuswithViews:**UsingImageViewstoDisplayPictures,Using Menus with Views, Using WebView.
- **Data Persistence:** Saving and Loading User Preferences, Persisting Data to Files,Creatingand Using Databases.
- **Content Providers:** Sharing Data in Android, Using a Content Provider, CreatingYourOwn Content Providers, Using theContent Provider.
- **Messaging:**SMS Messaging,Sending Email.
- **Location-Based Services:** Displaying Maps, Getting Location Data, Monitoring aLocation.
- **Networking:**ConsumingWebServices UsingHTTP,ConsumingJSONServices.
- **DevelopingAndroidServices:**CreatingYourOwnServices,EstablishingCommunication Between a Service and an Activity, Binding Activities to Services,UnderstandingThreading.
- **PublishingAndroidApplications:**PreparingforPublishing,DeployingAPKFiles.

Text Books:

1. J. F. DiMarzio, Beginning Android Programming with Android Studio, John Wiley &Sons,Inc.,Fourth Edition, 2017.
2. Wei-Meng Lee, Beginning Android™ 4 Application Development, John Wiley &Sons,Inc., 2012.

Reference Books:

1. Ian Darwin, Android Cookbook: Problems and Solutions for Android Developers,O’Reilly,SecondEdition, 2017.
2. Bill Phillips, Chris Stewart and Kristin Marsicano, Android Programming: The

BigNerdRanchGuide, Big Nerd Ranch,ThirdEdition, 2017.
3. Wei-Meng Lee, Android™ Application Development Cookbook: 93 Recipes forBuildingWinning Apps,John Wiley & Sons, Inc.,2013.
4. Peter Späth, Pro Android with Kotlin: Developing Modern Mobile Apps, Apress,2018.
5. Neil Smyth, Android Studio 3.0 Development Essentials – Android 8 Edition, NeilSmyth/ Payload Media, Inc., 2017.

Course Outcomes:

Havingsuccessfullycompletedthiscoursethestudentswillbeableto:

- DemonstratetheirskillsofusingAndroidsoftwaredevelopmenttools
- Demonstrate knowledge on mobile platforms, mobile user interface and user interfacedesignrequirements.

Developmobileapplicationsandpublish indifferentmobileplatforms

CAHN 01 SRI VENKATESWARA UNIVERSITY :: TIRUPATI
B.Tech (Honors in CSA) – CBCS Regulations-2020
DISTRIBUTED DATABASES

No.of Credits: 4 Instruction Hours/Week: 3L+1T

Course Objectives:

- To expose the need for distributed database technology to confront with the deficiencies of the centralized database systems.
- To introduce basic principles and implementation techniques of distributed database systems.
- To familiarize students with the principles and knowledge of parallel databases.

UNIT -I

Introduction: History of Distributed DBMS, Data Delivery Alternatives, Promises of Distributed DBMSs, Design Issues, Distributed DBMS Architectures. Distributed and Parallel Database Design: Data Fragmentation, Allocation, Combined Approaches, Adaptive Approaches, Data Directory. Distributed Data Control: View Management, Access Control, Semantic Integrity Control.

UNIT- II

Distributed Query Processing: Overview, Data Localization, Join Ordering in Distributed Queries, Distributed Cost Model, Distributed Query Optimization, Adaptive Query Processing. Distributed Transaction Processing: Background and Terminology, Distributed Concurrency Control, Distributed Concurrency Control Using Snapshot Isolation, Distributed DBMS Reliability, Modern Approaches to Scaling Out Transaction Management.

UNIT- III

Data Replication: Consistency of Replicated Databases, Update Management Strategies, Replication Protocols, Group Communication, Replication and Failures. Database Integration - Multidatabase Systems: Database Integration, Multidatabase Query Processing. Parallel Database Systems: Objectives, Parallel Architectures, Data Placement, Parallel Query Processing, Load Balancing, Fault-Tolerance, Database Clusters.

UNIT- IV

Peer-to-Peer Data Management: Infrastructure, Schema Mapping in P2P Systems, Querying Over P2P Systems, Replica Consistency, Blockchain. Big Data Processing: Distributed Storage Systems, Big Data Processing Frameworks, Stream Data Management, Graph Analytics Platforms, Data Lakes.

UNIT -V

NoSQL, NewSQL, and Polystores: Motivations for NoSQL, Key-Value Stores, Document Stores, Wide Column Stores, Graph DBMSs, Hybrid Data Stores, Polystores. 3 Web Data Management: Web Graph Management, Web Search, Web Querying, Question Answering Systems, Searching and Querying the Hidden Web, Web Data Integration. Course Outcomes: After completion of the course the students will be able to • Design and implement distributed databases. • Handle query processing in a distributed database system. • Comprehend transaction management and analyze various approaches to concurrency control in distributed databases. • Design and implement various algorithms and techniques for deadlock and recovery in distributed databases.

Text Books:

1. M. Tamer Ozsu and Patrick Valduriez, "Principles of Distributed Database Systems", Fourth Edition, Springer, 2020.

Reference Books:

1. Stefano Ceri and Giuseppe Pelagatti, Distributed Databases: Principles and Systems, McGraw Hill Education, 2017.
2. Saeed K. Rahimi and Frank S. Haug, Distributed Database Management Systems: A Practical Approach, Wiley.
3. ChhandaRay, Distributed Database Systems, First Edition, Pearson Education India.
4. Sachin Deshpande, Distributed Databases, Dreamtech Press.
5. David Bell and Jane Grimson, Distributed Database Systems, First Edition, AddisonWesley, 1992.
6. Hector Garcia-Molina, Jeffrey D. Ullman, JenniferWidom: Database Systems: The Complete Book, Second Edition, Pearson Education

CAHN 02 SRI VENKATESWARA UNIVERSITY :: TIRUPATI

B.Tech (Honors in CSA) – CBCS Regulations-2020

ADVANCED OPERATING SYSTEMS

No.of Credits: 4 Instruction Hours/Week: 3L+1T

Course Objectives:

- Familiarize the students with the basics of hardware and software issues in distributed computing systems.
- Understand issues related to Synchronization, mutual exclusion, naming, synchronization, consistency and replication,
- Introduce the concepts of distributed file systems, distributed shared virtual memory fault tolerance and deadlocks in distributed systems.

UNIT- I

Distributed systems – Introduction, Hardware concepts, Software concepts and Design issues. Layered protocols, Asynchronous transfer mode networks, Client server model, Remote procedure call, Group communication.

UNIT -II

Clock synchronization, Mutual exclusion, Election algorithms, Atomic transactions, Deadlocks in distributed systems. Threads, System models, Processor allocation, Scheduling in distributed systems.

UNIT- III

Fault tolerance, Real-time distributed systems, Distributed file systems – Design, Implementation and Trends. Distributed shared memory – Introduction and shared memory concept.

UNIT- IV

DSM Consistency models, Page-based distributed shared memory. Case study Amoeba – Introduction, Objects and capabilities, Process management, Memory management, Communication and Servers.

UNIT- V

Multimedia operating systems – Introduction, Multimedia files, Video compression, Audio compression, Multimedia process scheduling, Multimedia file system paradigms, File placement, Caching, Disk scheduling for multimedia.

Text Books: 1. Tanenbaum A S, Distributed Operating Systems, Pearson Education, 2005. 2. Tanenbaum A S, Modern Operating Systems, 3rd Edition, Pearson Education, 2008.

Reference Books:

1. Andrew S Tanenbaum Maarten Van Steen, Distributed Systems: Principles and Paradigms, Pearson, 2006.

Course Outcomes:

After completion of the course the students will be able to

- Understand the design principles in distributed operating systems and the architectures for distributed systems
- Implement clock synchronization, concurrency control, deadlock detection, load balancing related to distributed operating systems.
- Efficiently handle the issues of Mutual Exclusion and Deadlock detection and recovery in distributed operating systems.
- Design and implement distributed file systems and Distributed shared virtual memory.

CAHN 03 SRI VENKATESWARA UNIVERSITY :: TIRUPATI
B.Tech (Honors in CSA) – CBCS Regulations-2020
BLOCK CHAIN TECHNOLOGY

No.of Credits: 4 Instruction Hours/Week: 3L+1T

Course Objectives:

To understand block chain technology and Cryptocurrency works

UNIT- I

Introduction: Introduction, basic ideas behind block chain, how it is changing the landscape of digitalization, introduction to cryptographic concepts required, Block chain or distributed trust, Currency, Cryptocurrency, How a Cryptocurrency works, Financial services, Bitcoin prediction markets.

UNIT- II

Hashing, public key cryptosystems, private vs public block chain and use cases, Hash Puzzles, Extensibility of Block chain concepts, Digital Identity verification, Block chain Neutrality, Digital art, Block chain Environment

UNIT- III

Introduction to Bitcoin : Bitcoin Block chain and scripts, Use cases of Bit coin, Block chain scripting language in micropayment, escrow etc Downside of Bit coin mining, Block chain Science: Grid coin, Folding coin, Block chain Genomics, Bit coin MOOCs.

UNIT- IV

Ethereal continued, IOTA, The real need for mining, consensus, Byzantine Generals Problem, and Consensus as a distributed coordination problem, Coming to private or permissioned block chains, Introduction to Hyper ledger, Currency, Token, Campus coin, Coin drop as a strategy for Public adoption, Currency Multiplicity, Demurrage currency

UNIT-V

Technical challenges, Business model challenges, Scandals and Public perception, Government Regulations, Uses of Block chain in E-Governance, Land Registration, Medical Information Systems.

Text Books:

1. Block chain Blue print for Economy by Melanie Swan
2. Block chain Basics: A Non-Technical Introduction in 25 Steps 1st Edition, by Daniel Drescher

Course Outcomes:

After the completion of the course, student will be able to

- Demonstrate the block chain basics, Crypto currency
- To compare and contrast the use of different private vs. public block chain and use cases
- Design an innovative Bit coin Block chain and scripts, Block chain Science on varies coins
- Classify Permission Block chain and use cases – Hyper ledger, Corda
- Make Use of Block-chain in E-Governance, Land Registration, Medical Information Systems and others

CAHN 04 SRI VENKATESWARA UNIVERSITY:: TIRUPATI
B.Tech (Honors in CSA) – CBCS Regulations-2020
ROBOTICS

No.of Credits: 4 Instruction Hours/Week: 3L+1T

UNIT- I

Introduction to Robotic Process Automation: Scope and techniques of automation, Robotic process automation, What can RPA do, Benefits of RPA, Components of RPA, RPA platforms, The future of automation. RPA Basics: History of Automation, What is RPA, RPA vs Automation, Processes & Flowcharts, Programming Constructs in RPA, What Processes can be Automated, Types of Bots, Workloads which can be automated, RPA Advanced Concepts, Standardization of processes, RPA Development methodologies, Difference from SDLC, Robotic control flow architecture, RPA business case, RPA Team, Process Design Document/Solution Design Document, Industries best suited for RPA, Risks & Challenges with RPA, RPA and emerging ecosystem.

UNIT- II

RPA Tool Introduction and Basics: Introduction to RPA Tool: The User Interface, Variables, Managing Variables, Naming Best Practices, The Variables Panel, Generic Value Variables, Text Variables, True or False Variables, Number Variables, Array Variables, Date and Time Variables, Data Table Variables, Managing Arguments, Naming Best Practices, The Arguments Panel, Using Arguments, About Imported Namespaces, Importing New Namespaces, Control Flow, Control Flow Introduction, If Else Statements, Loops, Advanced Control Flow, Sequences, Flowcharts, About Control Flow, Control Flow Activities, The Assign Activity, The Delay Activity, The Do While Activity, The If Activity, The Switch Activity, The While Activity, The For Each Activity, The Break Activity, Data Manipulation, Data Manipulation Introduction, Scalar variables, collections and Tables, Text Manipulation, Data Manipulation, Gathering and Assembling Data

UNIT- III

Advanced Automation Concepts & Techniques: Recording Introduction, Basic and Desktop Recording, Web Recording, Input/ Output Methods, Screen Scraping, Data Scraping, Scraping advanced techniques, Selectors, Defining and Assessing Selectors, Customization, Debugging, Dynamic Selectors, Partial Selectors, RPA Challenge, Image, Text & Advanced Citrix Automation, Introduction to Image & Text Automation, Image based automation, Keyboard based automation, Information Retrieval, Advanced Citrix Automation challenges, Best Practices, Using tab for Images, Starting Apps, Excel Data Tables & PDF, Data Tables in RPA, Excel and Data Table basics, Data Manipulation in excel, Extracting Data from PDF, Extracting a single piece of data, Anchors,

UNIT- IV

Handling User Events & Assistant Bots, Exception Handling: What are assistant bots, Monitoring system event triggers, Hotkey trigger, Mouse trigger, System trigger, Monitoring image and element triggers, An example of monitoring email, Example of monitoring a copying event and blocking it, Launching an assistant bot on a keyboard event. Exception Handling: Debugging and Exception Handling, Debugging Tools, Strategies for solving issues, Catching errors.

UNIT- V

Deploying and Maintaining The Bot: Publishing using publish utility, Creation of Server, Using Server to control the bots, Creating a provision Robot from the Server, Connecting a Robot to Server,

Deploy the Robot to Server, Publishing and managing updates, Managing packages, Uploading packages, Deleting packages

Text Books:

1. Alok Mani Tripathi, “Learning Robotic Process Automation”, Packt Publishing, 2018.

Reference Books:

1. Frank Casale , Rebecca Dilla, Heidi Jaynes , Lauren Livingston, “Introduction to Robotic Process Automation:a Primer”, Institute of Robotic Process Automation,1st Edition 2015.

2. Richard Murdoch, Robotic Process Automation: Guide To Building Software Robots, Automate RepetitiveTasks& Become An RPA Consultant”, Independently Published, 1 st Edition 2018.

3. Srikanth Merianda, ”Robotic Process Automation Tools, Process Automation and their benefits: Understanding RPA and Intelligent Automation”, Consulting Opportunity Holdings LLC, 1 st Edition 2018. 4. Lim Mei Ying, “Robotic Process Automation with Blue Prism Quick Start Guide: Create software robots andautomate business processes”, Packt Publishing, 1 st Edition 2018.

Course Outcomes:

At the end of the course, the student will be able to,

- Describe RPA, where it can be applied and how it's implemented.
- Describe the different types of variables, Control Flow and data manipulation techniques.
- Identify and understand Image, Text and Data Tables Automation.
- Describe how to handle the User Events and various types of Exceptions and strategies.
- Understand the Deployment of the Robot and to maintain the connection.

CAHN 05 SRI VENKATESWARA UNIVERSITY:: TIRUPATI
B.Tech (Honors in CSA) – CBCS Regulations-2020
EXPERT SYSTEMS

No.of Credits: 4 Instruction Hours/Week: 3L+1T

Course objectives:

The main objective of the course is to provide a concise introduction to the fundamental concepts in Expert system design and development

.

UNIT- I

Introduction to Expert Systems: The meaning of an expert system, problem domain and knowledge domain, the advantages of an expert system, general stages in the development of an expert system, general characteristics of an expert system, history and uses of expert systems today, rule-based expert systems, procedural and nonprocedural paradigms, characteristics of artificial neural systems.

UNIT- II

The Representation of Knowledge: The study of logic, difference between formal logic and informal logic, meaning of knowledge, how knowledge can be represented, semantic nets, how to translate semantic nets into PROLOG, how to use logic and set symbols to represent

knowledge, the meaning of propositional and first order predicate logic, quantifiers, imitations of propositional and predicate logic.

UNIT- III

Methods of Inference: Trees, lattices, and graphs, state and problem spaces, AND-OR trees and goals, methods of inference, rules of inference, limitations of propositional logic, logic systems, resolution rule of inference, resolution systems, and deduction, shallow and causal reasoning, applying resolution to firstorder predicate logic, forward and backward chaining, additional methods of reference, Meta knowledge, the Markov decision process.

UNIT- IV

Reasoning Under Uncertainty: The meaning of uncertainty and theories devised to deal with it, types of errors attributed to uncertainty, errors associate, with induction, features of classical probability, hypothetical reasoning and backward induction, temporal reasoning, Markov chains, odds of belief, sufficiency and necessity, role of uncertainty in inference chains, implications of combining evidence, role of inference nets in expert systems

UNIT-V

Design of Expert Systems: How to select an appropriate problem, the stages in the development of an expert system, types of errors to expect in the development stages, the role of the knowledge engineer in the building of expert systems, the expected life cycle of an expert system,

Text Book:

1. Joseph C. Giarratano , Expert Systems : Principles and Programming, 4th Edition,cengage learning, 2004
2. Dan w. Patterson, Introduction to Artificial Intelligence and Expert Systems, 1st Edition, Pearson, 2015.

Reference Books:

1. Durkin, J., Expert systems Design and Development, Macmillan, 1994
2. Elias M. Awad, Building Expert Systems, West Publishing Company 1996
3. Peter Jackson, Introduction to Expert Systems, Addison Wesley Longman, 1999.ISBN 0-20187686-

Course outcomes:

By the end of the course, the student will be able to • define and describe expert system and its main constituents. •determine knowledge representation method and inference mechanism for a given problem • design and create expert system suitable for solving particular problem

CAHN 06 SRI VENKATESWARA UNIVERSITY:: TIRUPATI
B.Tech (Honors in CSA) – CBCS Regulations-2020
DEEP LEARNING

No.of Credits: 4 Instruction Hours/Week: 3L+1T

Course Objectives:

The course is designed to

- Learn some advanced topics such as recurrent neural networks, long short term memory cells and convolutional neural networks.
- Learn deep recurrent and memory networks and deep Turing machines
- Understand different types of deep learning network models.

UNIT- I

Introduction to Machine Learning: Learning Algorithms, Capacity, Overfitting and Underfitting, Hyperparameters and Validation Sets, Estimators, Bias and Variance, Maximum Likelihood Estimation, Bayesian Statistics, Supervised Learning Algorithms, Unsupervised Learning Algorithms, Stochastic Gradient Descent, Building a Machine Learning Algorithm, Challenges Motivating Deep Learning.

UNIT- II

Review of fundamental learning techniques, Feed forward neural network - Artificial Neural Network, activation function, multi-layer neural network, Training Neural Network: Risk minimization, loss function, back propagation, regularization, model selection, and optimization. Conditional Random Fields: Linear chain, partition function, Markov network, Belief propagation, Training CRFs, Hidden Markov Model, Entropy.

UNIT- III

Deep Feedforward Networks: Example: Learning XOR, Gradient-Based Learning, Hidden Units, Architecture Design, Back-Propagation and Other Differentiation Algorithms, Historical Notes. Regularization for Deep Learning: Parameter Norm Penalties, Norm Penalties as Constrained Optimization, Regularization and Under-Constrained Problems, Dataset Augmentation, Noise Robustness, Semi-Supervised Learning, Multi-Task Learning, Early Stopping, Parameter Tying and Parameter Sharing, Sparse Representations, Bagging and Other Ensemble Methods, Dropout, Adversarial Training, Tangent Distance, Tangent Prop, and Manifold Tangent Classifier.

UNIT- IV

Optimization for Training Deep Models: How Learning Differs from Pure Optimization, Challenges in Neural Network Optimization, Basic Algorithms, Parameter Initialization Strategies, Algorithms with Adaptive Learning Rates, Approximate Second-Order Methods, Optimization Strategies and Meta-Algorithms. Convolutional Networks: The Convolution Operation, Motivation, Pooling, Convolution and Pooling as an Infinitely Strong Prior, Variants of the Basic Convolution Function, Structured Outputs, Data Types, Efficient Convolution Algorithms, Random or Unsupervised Features, 11 The Neuroscientific Basis for Convolutional Networks, Convolutional Networks and the History of Deep Learning.

UNIT- V

Sequence Modeling: Recurrent and Recursive Nets, Unfolding Computational Graphs, Recurrent Neural Networks, Bidirectional RNNs, Encoder-Decoder Sequence-to-Sequence Architectures, Deep Recurrent Networks, Recursive Neural Networks, The Challenge of Long-Term Dependencies, Echo State Networks, Leaky Units and Other Strategies for Multiple Time Scales, The Long Short-Term Memory and Other Gated RNNs, Optimization for Long-Term Dependencies, Explicit Memory. Practical Methodology: Performance Metrics, Default Baseline Models, Determining Whether to Gather More Data, Selecting Hyperparameters, Debugging Strategies, Example: Multi-Digit Number Recognition. Applications: Large-Scale Deep Learning, Computer Vision, Speech Recognition, Natural Language Processing, Other Applications.

Course Outcomes:

After completion of the course the students will be able to •Explain different types of deep learning network models • Apply optimization techniques to improve the performance of deep neural networks. • Implement tools on Deep Learning techniques.

Text Books:

1. Ian Goodfellow, YoshuaBengio and Aaron Courville, Deep Learning, MIT Press, 2016.

Reference Books:

1. Christopher M. Bishop, Pattern Recognition and Machine Learning, Springer, 2006.
2. Yegnanarayana, Artificial Neural Networks, B., PHI Learning Pvt. Ltd, 2009.
3. Raúl Rojas, Neural Networks: A Systematic Introduction, Springer, 1996.
4. Golub, G.,H., and Van Loan,C.,F, Matrix Computations, JHU Press,2013.
5. Satish Kumar, Neural Networks: A Classroom Approach, Tata McGraw-Hill Education, 2004.

6. M Tim Jones, Artificial Intelligence - A Systems Approach, Infinity Science Press, 2008.
7. Russel S, Norvig P, Artificial Intelligence: A Modern Approach, 3rd edition, Pearson Education, 2010