COURSE STRUCTURE
AND
DETAILED SYLLABUS

ARTIFICIAL INTELLIGENCE

M.TECH. TWO YEAR DEGREE COURSE

(Applicable for the batches admitted from 2020-21)

VAAGDEVI COLLEGE OF ENGINEERING

(Autonomous)
Bollikunta, Warangal – 506 005
Telangana State, India

VAAGDEVI COLLEGE OF ENGINEERING

AUTONOMOUS

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

M.Tech (ARTIFICIAL INTELLIGENCE)

COURSE STRUCTURE

(R20 Regulations applicable for the batches admitted from Academic Year 2020-21 onwards)

I-SEMESTER

S.No	Course Code	Title of the Course	L	T	P	C
1	M20AI01	Introduction to Artificial Intelligence and Applications	3	0	0	3
2	M20CS14	Soft Computing Techniques	3	0	0	3
3		**Program Elective-I**				
	M20CS03	Cloud computing	3	0	0	3
	M20AI02	Robotic Operating System and Simulation				
	M20CS05	Internet of Things				
4		**Program Elective-II**				
	M20CS19	Genetic Algorithms and Applications	3	0	0	3
	M20AI03	Artificial Neural Networks				
	M20CS08	Network Security and Cryptography				
5	M20CS11	PythonProgramming Lab	0	0	4	2
6		**Program Elective-I Lab**				
	M20CS10	Cloud computing Lab	0	0	4	2
	M20AI04	Robotic Operating System and Simulation Lab				
	M20CS12	Internet of Things Lab				
7	M20MC01	Research Methodology & IPR	2	0	0	2
8	M20AC01	Audit Course-I English for Research Paper Writing	2	0	0	0
		Total Credits	**16**	**0**	**8**	**18**

II-SEMESTER

S.No	Course Code	Course Title	L	T	P	C
1	M20AI05	Advanced in Machine Learning	3	0	0	3
2	M20CS20	Data Science	3	0	0	3
3		**Program Elective-III**				
	M20AI06	Data Pre-processing and Analysis	3	0	0	3
	M20AI07	AI and Speech Processing				
	M20CS17	Digital Forensics				
4		**Program Elective-IV**				
	M20AI08	Computer Vision	3	0	0	3
	M20CS18	Block Chain Technology				
	M20CS02	Software Process and Project Management				
5	M20AI09	Advances in Machine Learning Lab	0	0	4	2
6		**Program Elective-III Lab**				
	M20CS24	Digital Forensics Lab	0	0	4	2
	M20AI10	Data Pre-processing and Analysis Lab				
	M20AI11	AI and Speech Processing Lab				
7	M20AI12	Mini Project with seminar	0	0	4	2
8	M20AC02	**Audit Course-II** Stress Management	2	0	0	0
		Total Credits	**14**	**0**	**10**	**18**

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COURSE STRUCTURE

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III-SEMESTER

S.No	Course Code	Title of the Course	L	T	P	C
1		**Program Elective-V**				
	M20CS26	Natural Language ProcessingTechniques	3	0	0	3
	M20CS27	Cyber Security				
	M20CS28	Deep Learning				
2		**Open Elective**				
	M20MA01	Advanced Optimization	3	0	0	3
	M20CE27	Waste Management				
	M20VL07	Embedded System Design				
3	M20AI13	Project / Dissertation Phase-I	0	0	20	10
		Total Credits	**6**	**0**	**20**	**16**

IV-SEMESTER

S.No	Course Code	Title of the Course	L	T	P	C
1	M20AI14	Project / Dissertation Phase-II	0	0	32	16
		Total Credits	**0**	**0**	**32**	**16**
		Grand Total				**68**

VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(M20AI01) INTRDODUCTION TO ARTIFICIAL INTELLIGENCE AND APLLICATIONS
(CORE COURSE – I)

M.Tech: I-Semester **L/T/P/C**
3/ 0/ 0/ 3

Objectives:

- To learn the difference between optimal reasoning Vs human like reasoning
- To understand the notions of state space representation, exhaustive search, heuristic search along with the time and space complexities
- To learn different knowledge representation techniques
- To understand the applications of AI: namely Game Playing, Theorem Proving, Expert Systems, Machine Learning and Natural Language Processing

UNIT-I

Introduction: What is AI? Foundations of AI, History of AI, Agents and environments, The nature of the Environment, Problem solving Agents, Problem Formulation, Search Strategies

UNIT-II

Knowledge and Reasoning: Knowledge-based Agents, Representation, Reasoning and Logic, Prepositional logic, First-order logic, Using First-order logic, Inference in First-order logic, forward and Backward Chaining

UNIT-III

Learning: Learning from observations, Forms of Learning, Inductive Learning, Learning decision trees, why learning works, Learning in Neural and Belief networks

UNIT-IV

Practical Natural Language Processing: Practical applications, Efficient parsing, Scaling up the lexicon, Scaling up the Grammar, Ambiguity, Perception, Image formation, Image processing operations for Early vision, Speech recognition and Speech Synthesis

UNIT-V

Robotics: Introduction, Tasks, parts, effectors, Sensors, Architectures, Configuration spaces, Navigation and motion planning, Introduction to AI based programming Tools

TEXT BOOKS

1. Stuart Russell, Peter Norvig: “Artificial Intelligence: A Modern Approach”,2nd Edition, Pearson Education, 2007

REFERENCES

1. Artificial Neural Networks B. YagnaNarayana, PHI
2. Artificial Intelligence , 2nd Edition, E.Rich and K.Knight (TMH).
3. Artificial Intelligence and Expert Systems – Patterson PHI.
4. Expert Systems: Principles and Programming- Fourth Edn, Giarrantana/ Riley, Thomson.
5. PROLOG Programming for Artificial Intelligence. Ivan Bratka- Third Edition – Pearson Education.
6. Neural Networks Simon Haykin PHI

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(M20CS14) SOFT COMPUTING TECHNIQUES
(CORE COURSE – II)

M.Tech: I-Semester **L/T/P/C**
3/ 0/ 0/ 3

OBJECTIVES:

- To introduce the ideas of fuzzy sets, fuzzy logic and use of heuristics based on human experience
- To become familiar with neural networks that can learn from available examples and generalize to form appropriate rules for inferencingsystems.
- To provide the mathematical background for carrying out the optimization associated with neural networklearning.
- To familiarize with genetic algorithms and other random search procedures useful while seeking global optimum in self-learningsituations.
- To introduce case studies utilizing the above and illustrate the intelligent behavior of programs based on softcomputing.

UNIT-I: FUZZY SET THEORY

Introduction to Neuro – Fuzzy and Soft Computing – Fuzzy Sets – Basic Definition and Terminology – Set-theoretic Operations – Member Function Formulation and Parameterization – Fuzzy Rules and Fuzzy Reasoning – Extension Principle and Fuzzy Relations – Fuzzy If-Then Rules – Fuzzy Reasoning – Fuzzy Inference Systems – Mamdani Fuzzy Models – SugenoFuzzy Models – Tsukamoto Fuzzy Models – Input Space Partitioning and FuzzyModeling.

UNIT-II: OPTIMIZATION

Derivative-based Optimization – Descent Methods – The Method of Steepest Descent – Classical Newton's Method – Step Size Determination – Derivative-free Optimization – Genetic Algorithms – Simulated Annealing – Random Search – Downhill Simplex Search.

UNIT-III: NEURAL NETWORKS

Supervised Learning Neural Networks – Perceptrons - Adaline – BackpropagationMutilayerPerceptrons – Radial Basis Function Networks – Unsupervised Learning Neural Networks – Competitive Learning Networks – Kohonen Self-Organizing Networks – Learning Vector Quantization – Hebbian Learning.

UNIT-IV: NEURO FUZZY MODELING

Adaptive Neuro-Fuzzy Inference Systems – Architecture – Hybrid Learning Algorithm – Learning Methods that Cross-fertilize ANFIS and RBFN – Coactive Neuro Fuzzy Modeling – Framework Neuron Functions for Adaptive Networks – Neuro Fuzzy Spectrum.

UNIT-V: APPLICATIONS OF COMPUTATIONAL INTELLIGENCE

Printed Character Recognition – Inverse Kinematics Problems – Automobile Fuel Efficiency Prediction – Soft Computing for Color Recipe Prediction.

Course Outcomes:

After the completion of this course the students should be able to :

1. Understand the fuzzy logic, concepts of fuzziness involved in fuzzy settheory.
2. Explain the concepts of fuzzy sets, knowledge representation using fuzzy rules, approximate reasoning, fuzzy inference systems, and fuzzylogic.
3. Build the fundamental theory, concepts of neuralnetworks.
4. Identify different neural network architectures, algorithms, applications along their limitations.
5. Classify different learning rules, architectures to learn several neural network paradigms along with itsapplications.
6. Deploy different applications of these models to solveengineering.

TEXT BOOK:

1. J.S.R.Jang, C.T.Sun and E.Mizutani, "Neuro-Fuzzy and Soft Computing", PHI, 2004, Pearson Education 2004.

REFERENCES:

1. Timothy J.Ross, "Fuzzy Logic with Engineering Applications", McGraw-Hill,1997.
2. Davis E.Goldberg, "Genetic Algorithms: Search, Optimization and Machine Learning", Addison Wesley, N.Y.,1989.
3. S. Rajasekaran and G.A.V.Pai, "Neural Networks, Fuzzy Logic and Genetic Algorithms", PHI, 2003.
4. R.Eberhart, P.Simpsonand R.Dobbins, "Computational Intelligence - PC Tools", AP Professional, Boston,1996.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(M20CS03) CLOUD COMPUTING
(PROGRAM ELECTIVE-I)

M.Tech: I-Semester **L/T/P/C**
3/0/0/ 3

Objectives:

- To learn the new computing model this enables shared resources on demand over the network.
- To learn about the pay-per-use scenarios.
- To learn about the new kind of service models and deployment models.
- To learn about the virtualization technology.
- To learn the python programming or various services and models.
- To develop cloud applications in Python

UNIT-I

Principles of Parallel and Distributed Computing, Introduction to cloud computing, Cloud computing Architecture, cloud concepts and technologies, cloud services and platforms, Cloud models, cloud as a service, cloud solutions, cloud offerings, introduction to Hadoop and Map reduce.

UNIT-II

Cloud Platforms for Industry, Healthcare and education, Cloud Platforms in the Industry, cloud applications. Virtualization, cloud virtualization technology, deep dive: cloud virtualization, Migrating in to cloud computing, Virtual Machines Provisioning and Virtual Machine Migration Services, On the Management of Virtual Machines for cloud Infrastructure, Comet cloud, T-Systems,

UNIT-III

Cloud computing Applications: Industry, Health, Education, Scientific Applications, Business and Consumer Applications, Understanding Scientific Applications for Cloud Environments, Impact of Cloud computing on the role of corporate IT. Enterprise cloud computing Paradigm, Federated cloud computing Architecture, SLA Management in Cloud Computing, Developing the cloud: cloud application Design.

UNIT-IV

Python Basics, Python for cloud, cloud application development in python, Cloud Application Development in Python. Programming Google App Engine with Python: A first real cloud Application, Managing Data in the cloud, Google app engine Services for Login Authentication, Optimizing UI and Logic, Making the UI Pretty: Templates and CSS, Getting Interactive. Map Reduce Programming Model and Implementations.

UNIT-V

Cloud management, Organizational Readiness and change management in the cloud age ,Cloud Security,Data security in the cloud, Legal Issues in the Cloud , Achieving Production Readiness for the cloud Services

Course Outcomes:

After the completion of this course the students should be able to :

1. Discuss main concepts, key strengths, and limitations for cloud computing.
2. Develop the architecture along with specific infrastructure on cloud computing, including SaaS, PaaS, IaaS, public cloud, private cloud, hybrid cloud, etc.
3. Explain the issues on cloud computing along with security, privacy, and interoperability.
4. Choose and use the appropriate technology, methods on these issues.
5. Identify problems, and explain, analyze, and evaluate various cloud computing solutions.
6. Provide the appropriate solutions on cloud computing based on the application.

TEXT BOOKS:

1. Cloud Computing: Raj Kumar Buyya , James Broberg, andrzejGoscinski, 2013 Wiley
2. Mastering Cloud Computing: Raj Kumar buyya, Christian Vecchiola,selvi-2013.
3. Cloud Computing: ArshdeepBahga, Vijay Madisetti, 2014, University Press.
4. Cloud computing: Dr Kumar Saurab Wiley India 2011.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(M20AI02) ROBOTIC OPERATING SYSTEM AND SIMULATION
(PROGRAM ELECTIVE-I)

M.Tech: I-Semester **L/T/P/C**
3/ 0/ 0/ 3

Course Outcomes:

- Acquire basic Knowledge on Robots
- Ability to process end effectors and robotic controls.
- Analyse Robot Transformations and Sensors
- Able to understand Robot cell design and applications

Unit – I

Getting started with ROS: Installing ROS, adding repositories, setting up keys, installation, environment setup. Installing fuerte, How to install virtual box and ubuntu.

Unit – II

The ROS Architecture: Understand the ROS File System level, Packages, Stacks, Messages, Services. Understand the ROS Computation Level: Nodes, Topics, Services, Messages, Bags, Master, Parameter Server. Understanding the ROS community level to practice with ROS.

Unit – III

Debugging and Visualization: Debugging ROS nodes, Debugging messages, Inspecting, Plotting Scalar data, Visualization of images, 3D Visualization, saving and playing back data.

Unit - IV

Using Sensors and Actuators with ROS: using a joystick or gamepad, using a laser rangefinder, using the kinect sensor to view in 3D, using servomotors-Dynamixel, using arduino to add more sensors and actuators.

Unit – V

3D Modeling and Simulation: A 3D model of our robot in ROS, explaining the file format, watching the 3D model on rviz, loading meshes to our models, making our robot model movable, physical and collision properties, Xarco, Simulation in ROS.

Text Books:

1. Learning ROS for Robotics Programming by Aaron Martinez and Enrique Fernandaez
2. S.R. Deb, Robotics Technology and flexible automation, Tata McGraw-Hill Education., 2009
3. Mikell P Groover& Nicholas G Odrey, Mitchel Weiss, Roger N Nagel, AshishDutta,
4. Industrial Robotics, Technology programming and Applications, McGraw Hill, 2012.

References:

1. Carl D. Crane and Joseph Duffy, Kinematic Analysis of Robot manipulators, Cambridge University press, 2008.
2. Fu. K. S., Gonzalez. R. C. & Lee C.S.G., “Robotics control, sensing, vision and intelligence”, McGraw Hill Book co, 1987
3. Craig. J. J. “Introduction to Robotics mechanics and control”, Addison- Wesley, 1999.
4. Ray Asfahl. C., “Robots and Manufacturing Automation”, John Wiley & Sons Inc.,1985
5. Learning ROS for Robotics Programming by Aaron Martinez and Enrique Fernandaez

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VAAGDEVI COLLEGE OF ENGINEERING
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(M20CS05) INTERNET OF THINGS
(PROGRAM ELECTIVE-I)

M.Tech:I-Semester **L/T/P/C**
3/ 0/ 0/ 3

Objectives:

- To introduce the terminology, technology and its applications
- To introduce the concept of M2M (machine to machine) with necessary protocols
- To introduce the Python Scripting Language which is used in many IoT devices
- To introduce the Raspberry PI platform, that is widely used in IoT applications
- To introduce the implementation of web based services on IoT devices

UNIT-I:

Introduction to Internet of Things –Definition and Characteristics of IoT , Physical Design of IoT – IoT Protocols, IoT communication models, IoT Communication APIs, IoTenabaled Technologies – Wireless Sensor Networks, Cloud Computing, Big data analytics, Communication protocols, Embedded Systems, IoT Levels and Templates, Domain Specific IoTs – Home, City, Environment, Energy, Retail, Logistics, Agriculture, Industry, health and Lifestyle

UNIT-II:

IoT and M2M – Software defined networks, network function virtualization, difference between SDN and NFV for IoT, Basics of IoT System Management with NETCOZF, YANG- ETCONF, YANG, SNMP NETOPEER

UNIT-III:

Introduction to Python - Language features of Python, Data types, data structures, Control of flow, functions, modules, packaging, file handling, data/time operations, classes, Exception handling Python packages - JSON, XML , HTTPLib , URLLib , SMTPLib .

UNIT-IV:

IoT Physical Devices and Endpoints - Introduction to Raspberry PI-Interfaces (serial, SPI, I2C)
Programming – Python program with Raspberry PI with focus of interfacing external gadgets, controlling output, reading input from pins.

UNIT V

IoT Physical Servers and Cloud Offerings – Introduction to Cloud Storage models and communication APIs Web server – Web server for IoT, Cloud for IoT, Python web application framework Designing a REST ful web API

Course Outcomes:

After the completion of this course the students should be able to :

1. Describe the basic terminology, latest technology along with its applications.
2. Discuss the protocols based on the concepts such as machine to machine.
3. Illustrate the IOT devices using Python Scripting Language.
4. Develop an application with Raspberry PI platform which can be widely used in many applications of IoT devices.
5. Implement it widely that can be used in many applications of IoT devices.
6. Design a web application framework on REST ful web API.

TEXT BOOKS:

1. Internet of Things - A Hands-on Approach, ArshdeepBahga and Vijay
Madisetti, Universities Press, 2015, ISBN: 9788173719547
2. Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014, ISBN: 9789350239759

REFERENCE BOOKS:

1. Machine Learning Methods in the Environmental Sciences, Neural Networks, William W Hsieh, Cambridge Univ Press.
2. Richardo. Duda, Peter E. Hart and David G. Stork, pattern classification, John Wiley &Sons Inc.,2001.
3. Chris Bishop, Neural Networks for Pattern Recognition, Oxford University Press, 1995.
4. Machine Learning by Peter Flach , Cambridge.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(M20CS19)GENETIC ALGORITHMS AND APPLICATIONS
(PROGRAM ELECTIVE-II)

M.Tech: I-Semester **L/T/P/C**
3/ 0/ 0/ 3

Course Objective:

- Fundamentals and introduction concepts of genetic algorithms.
- Basic Concepts and aspects of evolutionary algorithms (EAs), in particular GA, GP, ES.
- It also concentrates on the basic concepts of representation of operators and overall control. Many examples and applications are dealt on the concepts of genetic programming using python in important applications.

UNIT I:

Basics of Genetic Algorithms: what are genetic Algorithms, Differences from Traditional Algorithms, Advantages of Genetic Algorithms and Limitations.**Understanding the key components of Genetic Algorithms:** Basic Flow of a Genetic Algorrithm, Selection Methods, Cross Over Methods, Mutation Methods, Real-coded Genetic Algorithms.

UNIT II:

Solving Problems with Genetic Algorithms: Using the DEAP Framework Technical Requirements, using the creator Module, Toolbox Class, Solving One max problem with DEAP, Using Built-in Algorithms, **Combinatorial Optimization Technical Requirements:** Optimizing the egg hoder function, Himmelbaus function, Simionescu's Function and Constrained Optimization

UNIT III:

Artificial Intelligence Applications of Genetic Algorithms: Supervised Machine Learning, Feature Selection, Selecting Features for Friedman-1 Regression Problem, Selecting features for the classification Zoo dataset. Architecture Optimization of Deep Learning Networks.

UNIT IV:

Reinforcement Learning with Genetic Algorithms: Reinforcement Learning, OpenAI gym, solving the mountain car environment, carpole environment.

UNIT V:Other Evolutionary and bio-inspired Computation Techniques: Genetic Programming, Particle swarm Optimization, Other related Techniques

Course Outcome: Upon completion of this course, students will be able to:

1. Explain the principles of Evolutionary Computation and Genetic Algorithms.
2. Apply the concepts of Evolutionary Computation Methods to find solutions for complex problems.
3. Describe the applications of Genetic Programming
4. Analyze with different parameters on Evolutionary Algorithms.
5. Understand the different methods in Machine Learning and Genetic Algorithms.
6. Summarize the current scenario of research and application in Evolutionary Genetic Algorithms and Computing

Text/Reference Books:

1. Hands-on Genetic Algorithms with Python, EyalWirsanky.
2. Genetic Algorithms in search, Optimization & Machine Learning by D E Goldberg.
3. Multi-Objective Optimization Using Evolutionary Algorithms by K.Debwicz (eds.)
4. Handbook on Evolutionary Computation by T. Baeck, D. B. Fogel and Z. Michalewicz(eds).

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(M20CS08) NETWORK SECURITY AND CRYPTOGRAPHY
(PROGRAM ELECTIVE-II)

M.Tech: I-Semester **L/T/P/C**
3/ 0/ 0/ 3

Course Objectives:
- To explain the objectives of information security and importance and application of each of confidentiality, integrity, authentication and availability. Understand various cryptography concepts and techniques.
- To illustrate various symmetric key and asymmetric key cryptographic algorithms.
- To define the basic requirements of message authentication, hashing algorithms andKerberos.
- To describe E-Mail Security with PGP, S/MIME and enhancements made to IPv4 byIPSec.
- To discuss the requirements of SSL, TLS, SET and understand intrusion detection,Firewalls.

UNIT – I
Security Concepts: Introduction, Types of Security attacks, Security services, Security Mechanisms, A model for Network Security, Cryptography Concepts and Techniques:Introduction, plain text and cipher text, substitution techniques, transposition techniques,encryption and decryption, symmetric and asymmetric key cryptography, Steganography.(Text Book: Page no: 9 – 52)

UNIT – II
Symmetric key Ciphers: Block Cipher principles, Feistel Cipher Structure, DES algorithm, AESalgorithm, Multiple Encryption and Triple DES, Block cipher operation, Stream ciphers, RC4.Asymmetric key Ciphers: Principles of public key cryptosystems, RSA algorithm,DiffieHellman Key Exchange. (Text Book: Page no: 63 – 291)

UNIT – III
Cryptographic Hash Functions: Message Authentication, Secure Hash Algorithm (SHA-512).Message authentication codes: Authentication requirements, HMAC, Digital signatures. KeyManagement and Distribution: Symmetric Key Distribution Using Symmetric & AsymmetricEncryption, Distribution of Public Keys, Kerberos, X.509 Authentication Service.(Text Book : Page no: 313-490)

UNIT – IV
E-Mail Security: Pretty Good Privacy, S/MIME IP Security: IP Security overview, IP Securityarchitecture, Authentication Header, Encapsulating security payload, combining securityassociations. (Text Book: Page no: 590-650)

UNIT – V
Web Security: Requirements, Secure Socket Layer (SSL) and Transport Layer Security(TLS),Secure Electronic Transaction (SET), Intruders, Firewall Design principles, Trusted Systems,Intrusion Detection Systems(Online Chapters and Appendices: Chapter 22,Chapter 23),WirelessNetwork Security. (Text Book: Page no: 522-585)

Course Outcomes:
After the completion of this course, the students should be able to
1. Identifies various types of vulnerabilities, attacks, mechanisms and security services.
2. Compare and contrast symmetric and asymmetric encryption algorithms.
3. Implementation of message authentication, hashing algorithms and able to understand kerberos.
4. Explore the attacks and controls associated with IP, transport level, web and E-mail security.
5. Develop intrusion detection system, solutions for wireless networks and designing of various types of firewalls.

6. Understand the various wireless network vulnerabilities and implements different types of cryptographic techniques to improve wireless network security.

TEXT BOOK:

1. Cryptography and Network Security - Principles and Practice: William Stallings,Pearson Education, 6th Edition

REFERENCE BOOKS:

1. Cryptography and Network Security: C K Shyamala, N Harini, Dr T RPadmanabhan, Wiley India, 1st Edition.
2. Cryptography and Network Security :ForouzanMukhopadhyay, McGraw Hill, 3 rdEdition
3. Information Security, Principles, and Practice: Mark Stamp, Wiley India.
4. Principles of Computer Security: WM. Arthur Conklin, Greg White, TMH
5. Introduction to Network Security: Neal Krawetz, CENGAGE Learning
6. Network Security and Cryptography: Bernard Menezes, CENGAGE Learning

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VAAGDEVI COLLEGE OF ENGINEERING
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(M20AI03) ARTIFICIAL NEURAL NETWORKS
(PROGRAM ELECTIVE-II)

M.Tech: I-Semester **L/T/P/C**
3/ 0/ 0/ 3

Objectives:
- To Survey of attractive applications of Artificial Neural Networks.
- To practical approach for using Artificial Neural Networks in various technical, organizational and economic applications

UNIT I: INTRODUCTION:
History Of Neural Networks, Structure And Functions Of Biological And Artificial Neuron, Neural Network Architectures, Characteristics Of ANN, Basic Learning Laws and Methods.

UNIT II: SUPERVISED LEARNING:
Single Layer Neural Network and architecture, McCulloch-Pitts Neuron Model, Learning Rules, Perceptron Model, Perceptron Convergence Theorem, Delta learning rule, ADALINE, Multi-Layer Neural Network and architecture, MADALINE, Back Propagation learning, Back Propagation Algorithm.

UNIT III: UNSUPERVISED LEARNING-1:
Outstar Learning, Kohenen Self Organization Networks, Hamming Network And MAXNET, Learning Vector Quantization, Mexican hat.

UNIT IV: UNSUPERVISED LEARNING-2:
Counter Propagation Network -Full Counter
Propagation network, Forward Only Counter Propagation Network, Adaptive Resonance Theory (ART) - Architecture, Algorithms.

UNIT V : ASSOCIATIVE MEMORY NETWORKS :
Introduction, Auto Associative Memory ,Hetero Associative Memory, Bidirectional Associative Memory(BAM) -Theory AndArchitecture, BAM Training Algorithm, Hopfield Network: Introduction, Architecture Of Hopfield Network.

TEXT BOOKS:
1. B.Yegnanarayana" Artificial neural networks" PHI ,NewDelhi.
2. S.N.Sivanandam ,S.N.Deepa, "Introduction to Neural Networks using MATLAB 6.0", TATA MCGraw- Hill publications.
3. J .M. Zurada ,"Introduction to Artificial neural systems" –Jaico publishing.

REFERENCE BOOKS:
1. S.Rajasekaran and G.A.Vijayalakshmipai "Neural Networks.Fuzzy Logic and genetic Algorithms".
3. James A Freeman and Davis Skapura" Neural Networks Algorithm, applications and programming Techniques ", Pearson Education, 2002.
4. Simon Hakins "Neural Networks " Pearson Education.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(M20MC01) RESEARCH METHODOLOGY & IPR

M.Tech:I Semester **L/T/P/C**
2/ 0/ 0/ 2

Prerequisites: English

Course Objectives:

- To develop an understanding of IPR/ research methodology in the process of creation of patents through research.
- To develop further research capabilities.
- To learn better report writing skills and Patenting.

UNIT I:

RESEARCH METHODOLOGY: Objectives and Motivation of Research, Significance of Literature review, Types of Research, Research Approaches, and Research Methods verses Methodology, Research and Scientific Method, Importance of Research Methodology, Research Process, Criteria of Good Research.

UNIT II:

RESEARCH DESIGN: Meaning of Research Design, Need of Research Design, Feature of a Good Design Important Concepts Related to Research Design, Different Research Designs, Basic Principles of Experimental Design, Data collection methods, Collection of primary data, Secondary data, Data organization, Methods of data grouping, Diagrammatic representation of data, Graphic representation of data.

UNIT III:

RESEARCH REPORT WRITING: Format of the Research report, Synopsis, Dissertation, References/Bibliography/ Webliography, Research Proposal Preparation: Writing a Research Proposal and Research Report, Writing Research Grant Proposal.

UNITIV:

NATURE OF INTELLECTUAL PROPERTY: Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development.

UNIT V:

PATENT RIGHTS: Scope of Patent Rights. Licensing and transfer of technology.Patent information and databases. New Developments in IPR: Administration of Patent System.

Course Outcomes:

After the completion of this course the students should be able to :

1. Acquire knowledge on Research Design and statistical methods in research.
2. Analyze the various methods in Data Collection, Data Organization and different approaches of Data Representation.
3. Understand all the basic concepts required to prepare
    a. Research synopsis
    b. Dissertation
    c. Writing a good research proposal
4. Interpret the Scope of Patent Rights and Administration of Patent System.

TEXT BOOKS:

1. C.R Kothari, “Research Methodology, Methods &Technique”.New Age International Publishers, 2004.
2. R. Ganesan, “Research Methodology for Engineers”, MJP Publishers, 2011.

3. Robert P. Merges, Peter S. Menell, Mark A. Lemley, “Intellectual Property in New Technological Age”, Aspen Publishers, 2016.
4. T. Ramappa, “Intellectual Property Rights Under WTO”, S. Chand, 2008.
5. Satarkar, S.V,.“Intellectual property rights and copy right”. ESS Publications, 2000.

REFERENCES:

1. Ranjit Kumar, “Research Methodology: A Step by Step Guide for beginners”, SAGE Publications Ltd.
2. Halbert, “Resisting Intellectual Property”, Taylor & Francis Ltd ,2007

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(M20AC01)ENGLISH FOR RESEARCH PAPER WRITING
(AUDIT COURSE-I)

M.Tech:I-Semester **L/T/P/C**
2/ 0/ 0/ 0

Course Objectives:

- To understand the nuances of language and vocabulary in writing a Research Paper.
- To develop the content, structure and format of writing a research paper.
- To give the practice of writing a Research Paper.
- To enable the students to evolve original research papers without subjected to plagiarism.

UNIT I:

ACADEMIC WRITING: What is Research? - Meaning & Definition of a research paper– Purpose of a research paper – Scope – Benefits – Limitations – outcomes.

UNIT II:

RESEARCH FORMAT: Title – Abstract – Introduction – Discussion - Findings – Conclusion – Style of Indentation – Font size/Font types – Indexing – Citation of sources.

UNIT III:

RESEARCH METHODOLOGY: Methods (Qualitative – Quantitative) – Literature Review – Who did what – Criticizing, Paraphrasing & Plagiarism.

UNIT IV:

PROCESS OF WRITING A RESEARCH PAPER: Choosing a topic - Thesis Statement – Outline – Organizing notes - Language of Research – Word order, Paragraphs – Writing first draft –Revising/Editing - Typing the final draft

UNIT V:

HOW TO & WHERE TO GET PUBLISHED: Reputed Journals – National/International – ISSN No, No. of volumes, Scopes Index/UGC Journals – Free publications - Paid Journal publications – /Advantages/Benefits

Course Outcomes:

After the completion of this course the students should be able to :

1. Obtain complete knowledge on Definition of a research paper, Purpose of writing any research paper , its Scope and Benefits.
2. Understand the standard English formats .for scripting the best research paper.
3. Analyze all the Qualitative and Quantitative Research Methodologies and the ethics of plagiarism.
4. Explain the detailed process of writing and publishing any research paper and perform a case study on paper writing.

TEXT BOOKS:

1. MLA Hand book for writers of Research Papers, East West Press Pvt. Ltd, New Delhi, 7th Edition.
2. C. R Kothari, Gaurav, Garg, Research Methodology Methods and Techniques, New Age International Publishers. 4th Edition.
3. LauriRozakis, Schaum's Quick Guide to Writing Great Research Papers, Tata McGraw Hills Pvt. Ltd, New Delhi.
4. N. Gurumani, Scientific Thesis Writing and Paper Presentation, MJP Publishers

REFERENCES:

1. NPTEL: https://onlinecourses.nptel.ac.in/noc18_mg13/preview

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(M20CS11) PYTHON PROGRAMMING LAB

M.Tech: I-Semester **L/T/P/C**
3/ 0/ 0/ 3

Objectives:

The purpose of the course is to make students

- To develop Python programs with conditionals and loops.
- To develop Python functions and call them.
- To develop and use Python data structures – lists, tuples, dictionaries.
- To do input/output with files in Python.
- To get exposure to various problems solving approaches of computer science

Week 1:

a. Write a program to perform the arithmetic operators. Find out the student total marks and average
b. Write a program to apply type conversion techniques in python. Convert from string to int, intto float, float to string

Week 2:

a. Write a program to display whether a student passed in a single subject or not using if statement
b. Write a program to display the grade of a student based on the average of 3 subject marks using if-elif statement

Week 3:

a. Write a program to display the reverse of a given number using while loop and for loop
b. Write a program to display the factorial of a given number using while loop and for loop

Week 4:

a. Write a program to display the prime numbers between 2 and n using while loop and for loop
b. Write a program to print the average marks of 10 students using loops(input 3 subjects for each student)

Week 5:

a. Write a program to define a function to display the grade of a student by using positional arguments(rno,sub1,sub2,sub3)
b. Write a program to define a function to display total bill for a shopping by taking customer name and number of items as keyword arguments.

Week 6:

a. Write a program to define a function to calculate the area of a circle using default arguments
b. Write a program to display the reverse of a given number using recursive function.

Week 7:

a. Write a program to convert a decimal number to binary number using recursive function.
b. Write a program to perform the arithmetic operations using the functions to each opearation. (add(),sub(),mul(),div())

Week 8:

a. Write a program to perform bubble sort on a list without using the sort().
b. Write a program to display the elements of a list in reverse order without using the reverse()

Week 9:

a. Write a program to find a student name from the list of students
b. Write a program to perform addition of 2 matrices using nested lists

Week 10:

a. Write a program to perform multiplication of 2 matrices using nested lists

b. Write a program to demonstrate the tuple operations

Week 11:

a. Write a program to create a list and eliminate the duplicate values from the list

b. Write a program to crate 2 sets and perform union, intersection, set difference and symmetric difference operations on sets.

Week 12:

a. Write a program to create a students dictionary with the rno as key and a list as the values of a key (name,sub1,sub2,sub3) and display a memo with total, avg, result and grade

b. Write a program to create a package Shapes and perform the area calculation for different shapes(use one function for each shape)

Week 13:

a. Write a program to create a package Calculator and perform various arithmetic operations (use one function for each operation like add(),mul(),sub(),div())

b. Write a program to create module with packages like Shapes and Calculator and import the module into program, access the functions defined the in the module.

Week 14:

a. Write a program to create a file and save the details of a students (rno,name,sub1,sub2,sub3)

b. Write a program to open a file of students and display the students details in tabular format like rno,name,sub1,sub2,sub3,total,avg,result,grade

Week 15:

a. Write a program to perform demonstrate filename not exist exception

b. Write a program to demonstrate the variable not available exception

Week 16:

a. Write a program to demonstrate arithmetic exception

b. Write a program to create a lambda function to display whether a person is eligible for voting or not.

Course Outcomes:

1. Expressing the Core Python scripting elements such as variables and flow control structures.
2. Apply Python functions to facilitate code reuse
3. Extending how to work with lists and sequence data.
4. Implement file operations such as read and write and Adapting the code robust by handling errors and exceptions properly.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(M20CS10) CLOUD COMPUTING LAB
(PROGRAM ELECTIVE – I LAB)

M.Tech:I-Semester **L/T/P/C**

0/0/4/ /2

Objectives:

- To learn the new computing model this enables shared resources on demand over the network.
- To learn about the pay-per-use scenarios.
- To learn about the new kind of service models and deployment models.
- To learn about the virtualization technology.
- To learn the python programming or various services and models.
- To develop cloud applications in Python

Experiments:

Week 1: Introduction to basic cloud computing concepts.
Week 2: Draw a neat diagram of cloud computing Architecture.
Week 3:Find procedure to run the virtual machine of different configuration. Check how many virtual machines can be utilized at particular time.
Week 4:Find procedure to attach virtual block to the virtual machine and check whether it holds the data even after the release of the virtual machine.
Week 5: Install a C compiler in the virtual machine and execute a sample program.
Week 6: Show the virtual machine migration based on the certain condition from one node to the other.
Week 7: Find procedure to install storage controller and interact with it.
Week 8: Installation and Configuration of Hadoop.
Week 9: Find procedure to set up the one node Hadoopcluster.
Week 10: Mount the one node Hadoop cluster using FUSE.
Week 11: Write a program to use the API's of Hadoop to interact with it.
Week 12: Using Hadoop for counting word frequency with map reduce.
Week 13: Write a word count program to demonstrate the use of Map and Reduce tasks
Week 14: Installation & Configuration of Oracle Virtual box for windows xp& android.
Week 15: Installing open Solaris as a guest OS to Sun xVMVirtual Box using the 7-Zip archive tool
Week 16: Evaluation of performance of services over cloud: Google App &Amazon web services.

Course Outcomes:

After the completion of this course the students should be able to :

1. Develop the architecture along with specific infrastructure on cloud computing, including SaaS, PaaS, IaaS, public cloud, private cloud, hybrid cloud,etc.
2. Explain the issues on cloud computing along with security, privacy,and interoperability**.**
3. Identify problems, and explain, analyze, and evaluate various cloud computingsolutions.
4. Provide the appropriate solutions on cloud computing based on theapplication.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(M20AI04) ROBOTIC OPERATING SYSTEM AND SIMULATION LAB
(PROGRAM ELECTIVE – I LAB)

M.Tech:I-Semester **L/T/P/C**
0/0/4/2

Week1. Installation of ROS

Week 2. How to install virtual box and ubuntu

Week 3. Create ROS packages

Week 4. Program to create ROS Nodes

Week 5. How to interact with topics

Week 6. Learning how to use services

Week 7. Program to demonstrate more messages- once, throttle and combinations

Week 8. Program to demonstrate fire wire cameras

Week 9. Program to demonstrate #D Visualization

Week 10. How to move a turtle in turtlesim using joystick data

Week 11. How the laser sends data in ROS and accessing data and modifying it.

Week 12. Program to demonstrate Kinect

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(M20CS12) INTERNET OF THINGS LAB
(PROGRAM ELECTIVE – I LAB)

M.Tech:I-Semester **L/T/P/C**
0/0 / 4/ 2

Objectives:

- To introduce the terminology, technology and itsapplications
- To introduce the concept of M2M (machine to machine) with necessaryprotocols
- To introduce the Python Scripting Language which is used in many IoTdevices
- To introduce the Raspberry PI platform, that is widely used in IoTapplications
- To introduce the implementation of web based services on IoTdevices

Week-1:
Start Raspberry Pi and try various Linux commands in command terminal window:
ls, cd, touch, mv, rm, man, mkdir, rmdir, tar, gzip, cat, more, less, ps, sudo, cron,chown,chgrp, ping etc.

Week-2:
Run some python programs on Pi like:

a) Read your name and print Hello message withname
b) Read two numbers and print their sum, difference, productand division.
c) Word and character count of a givenstring
d) Area of a given shape (rectangle, triangle and circle) reading shape and appropriate values from standard input Print a name 'n' times, where name and n are read from standard input, using for and whileloops.
e) Handle Divided by ZeroException.
f) Print current time for 10 times with an interval of 10seconds.
g) Read a file line by line and print the word count of eachline.

Week-3:
Light an LED through Python program

Week-4:
Get input from two switches and switch on corresponding LEDs

Week-5:
Flash an LED at a given on time and off time cycle, where the two times are taken from a file.

Week-6:
Flash an LED based on cron output (acts as an alarm)

Week-7:
Switch on a relay at a given time using cron, where the relay's contact terminals are connected to a load.

Week-8:
Access an image through a Pi web cam.

Week-9: Control a light source using web page.

Week-10:
Implement an intruder system that sends an alert to the given email.

Week-11:

Get the status of a bulb at a remote place (on the LAN) through web.

Week-12:

Get an alarm from a remote area (through LAN) if smoke is detected. The student should have hands on experience in using various sensors like temperature, humidity, smoke, light, etc. and should be able to use control web camera, network, and relays connected to thePi.

Course Outcomes:

After the completion of this course the student should be able to

1. Demonstrate the starting of Raspberry Pi and practice Linux commands in command terminal window.
2. Develop and run all basic python programs on RaspberryPi
3. Build real time applications on Light an LED using Pythonprogramming
4. Experiment with implementation of intruder system and various sensors like temperature, humidity,smoke.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(M20AI05) ADVANCES IN MACHINE LEARNING

M.Tech:II-Semester **L/T/P/C**
3/ 0/ 0/ 3

Course Objectives:

- To introduce the foundations of Artificial NeuralNetworks
- To acquire the knowledge on Deep LearningConcepts
- To learn various types of Artificial NeuralNetworks
- To gain knowledge to apply optimizationstrategies

Course Outcomes:

- Ability to understand the concepts of NeuralNetworks
- Ability to select the Learning Networks in modeling real worldsystems
- Ability to use an efficient algorithm for DeepModels
- Ability to apply optimization strategies for large scaleapplications

UNIT - I

Artificial Neural Networks Introduction, Basic models of ANN, important terminologies, Supervised Learning Networks, Perceptron Networks, Adaptive Linear Neuron, Back- propagation Network. Associative Memory Networks.Training Algorithms for pattern association, BAM and Hopfield Networks.

UNIT - II

Unsupervised Learning Network- Introduction, Fixed Weight Competitive Nets, Maxnet, Hamming Network, Kohonen Self-Organizing Feature Maps, Learning Vector Quantization, Counter Propagation Networks, Adaptive Resonance Theory Networks. Special Networks- Introduction to various networks.

UNIT - III

Introduction to Deep Learning, Historical Trends in Deep learning, Deep Feed - forward networks, Gradient-Based learning, Hidden Units, Architecture Design, Back-Propagation and Other DifferentiationAlgorithms

UNIT - IV

Auto-encoders and unsupervised learning ,Ÿ Stacked auto-encoders and semi-supervised learning and Ÿ Regularization - Dropout and Batch normalization

UNIT - V

Optimization for Train Deep Models

Challenges in Neural Network Optimization, Basic Algorithms, Parameter Initialization Strategies, Algorithms with Adaptive Learning Rates, Approximate Second-Order Methods, Optimization Strategies and Meta-Algorithms

Applications: Large-Scale Deep Learning, Computer Vision, Speech Recognition, Natural Language Processing

TEXT BOOKS:

1. Deep Learning: An MIT Press Book By Ian Goodfellow and YoshuaBengio and AaronCourville
2. Neural Networks and Learning Machines, Simon Haykin, 3rd Edition, Pearson Prentice Hall.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(M20CS20) DATA SCIENCE

M.Tech:II-Semester **L/T/P/C**
3/ 0/ 0/ 3

Course Objectives :

Modern scientific, engineering, and business applications are increasingly dependent on data, existing traditional data analysis technologies were not designed for the complexity of the modern world. Data Science has emerged as a new, exciting, and fast-paced discipline that explores novel statistical, algorithmic, and implementation challenges that emerge in processing, storing, and extracting knowledge from BigData.

UNIT-I:

INTRODUCTION TO DATA SCIENCE: Data science process – roles, stages in data science project – working with data from files – working with relational databases – exploring data – managingdata– cleaningandsamplingformodelingandvalidation–introductiontoNoSQL.

UNIT-II:

MODELING METHODS: Choosing and evaluating models – mapping problems to machine learning, evaluating clustering models, validating models – cluster analysis – K-means algorithm, NaïveBayes– MemorizationMethods–Linearandlogisticregression–unsupervisedmethods.

UNIT-III:

INTRODUCTION TO R: Reading and getting data into R – ordered and unordered factors – arrays and matrices – lists and data frames – reading data from files – probability distributions – statistical models in R - manipulating objects – data distribution.

UNIT-IV:

MAP REDUCE: Introduction – distributed file system – algorithms using map reduce, Matrix- Vector Multiplication by Map Reduce – Hadoop - Understanding the Map Reduce architecture - Writing HadoopMapReduce Programs - Loading data into HDFS - Executing the Map phase - Shuffling and sorting - Reducing phase execution.

UNIT-V:

DELIVERING RESULTS: Documentation and deployment – producing effective presentations – Introduction to graphical analysis – plot() function – displaying multivariate data – matrix plots – multiple plots in one window - exporting graph - using graphics parameters. Case studies.

Course Outcomes:

After the completion of this course the students should be able to :

1. Describe a Data Science, skill sets available for a data scientist.
2. Discuss the terms Statistical Inference, its significance to explore data analysis.
3. Understand Data Science Process and its components interact.
4. Adapt APIs tools to understand the Web data.
5. Illustrate EDA and the Data Science as a case study.
6. Plan a effective visualization on given data.

REFERENCES

1. Nina Zumel, John Mount, “Practical Data Science with R”, Manning Publications,2014.
2. Jure Leskovec, AnandRajaraman, Jeffrey D. Ullman, “Mining of Massive Datasets”, Cambridge University Press,2014.
3. Mark Gardener, “Beginning R - The Statistical Programming Language”, John Wiley & Sons, Inc.,2012.4.W.N.Venables,D.M.SmithandtheRCoreTeam,“AnIntroductiontoR”,2013.

4. Tony Ojeda, Sean Patrick Murphy, Benjamin Bengfort, AbhijitDasgupta, “Practical Data Science Cookbook”, Packt Publishing Ltd.,2014.
5. Nathan Yau, “Visualize This: The FlowingData Guide to Design, Visualization, and Statistics”, Wiley,2011.
6. Boris lublinsky, Kevin t. Smith, Alexey Yakubovich, “Professional Hadoop Solutions”, Wiley, ISBN: 9788126551071,2015.
http://www.johndcook.com/R_language_for_programmers.html
http://bigdatauniversity.com
http://home.ubalt.edu/ntsbarsh/stat-data/topics.htm#rintroduction

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(M20CS17) DIGITAL FORENSICS
(PROGRAM ELECTIVE-III)

M.Tech:II-Semester **L/T/P/C**
3/ 0/ 0/ 3

Objectives:

- To focus on the procedures for identification, preservation, and extraction of electronic evidence, auditing and investigation of network and host system intrusions, analysis and documentation of information gathered, and preparation of expert testimonial evidence.
- To provide hands on experience on various forensic tools and resources for system administrators and information system security officers.

UNIT-I

Introduction: Introduction of Cybercrime: Types, The Internet spawns crime, Worms versus viruses, Computers' roles in crimes, Introduction to digital forensics, Introduction to Incident - Incident Response Methodology- Steps - Activities in Initial Response, Phase after detection of an incident

UNIT -II

Initial Response and forensic duplication 2.1 Initial Response & Volatile Data Collection from Windows system- Initial Response & Volatile Data Collection from Unix system - Forensic Duplication: Forensic duplication: Forensic Duplicates as Admissible Evidence, Forensic Duplication Tool Requirements, Creating a Forensic. 2.2 Duplicate/Qualified Forensic Duplicate of a Hard Drive.

UNIT -III

Preserving and Recovering Digital Evidence 3.1 File Systems: FAT, NTFS - Forensic Analysis of File Systems – Storage Fundamentals: Storage Layer, Hard Drives Evidence Handling: Types of Evidence, Challenges in evidence handling, Overview of evidence handling procedure.

UNIT -IV

Network Forensics Intrusion detection; Different Attacks in network, analysis Collecting Network Based Evidence - Investigating Routers - Network Protocols - Email Tracing- Internet Fraud.

UNIT -V

System investigation 5.1 Data Analysis Techniques - Investigating Live Systems (Windows &Unix) Investigating 5.2 Hacker Tools - Ethical Issues – Cybercrime.

Course Outcomes:

After the completion of this course the students should be able to :

1. Discuss digital forensics related to investigative process.
2. Explain the legal issues to prepare, perform digital forensic analysis based on theinvestigator's position.
3. Demonstrate the techniques, usage of digital forensics tools.
4. Elaborate digital forensics in detail.
5. Analyze the state of the practice, gaps in technology, policy, and legal issues.
6. Develop techniques used on Data Analysis, cybercrime.

Text Books:

1. Kevin Mandia, Chris Prosise, “Incident Response and computer forensics”, Tata McGrawHill,2006
2. Peter Stephenson, "Investigating Computer Crime: A Handbook for Corporate Investigations", Sept 1999
3. EoghanCasey, "Handbook Computer Crime Investigation's Forensic Tools and

Technology", Academic Press, 1st Edition,2001

References:

1. Skoudis. E., Perlman. R. Counter Hack: A Step-by-Step Guide to Computer Attacks and Effective Defenses.Prentice Hall Professional Technical Reference.2001
2. Norbert Zaenglein, "Disk Detective: Secret You Must Know to Recover Information From a Computer", Paladin Press,2000
3. Bill Nelson, Amelia Philips and Christopher Steuart, “Guide to computer forensics investigation “Course technology, 4thedition

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(M20AI06) DATA PREPROCESSING AND ANALYSIS
(PROGRAM ELECTIVE-III)

M.Tech:II-Semester **L/T/P/C**
3/ 0/ 0/ 3

COURSE OBJECTIVE:

- Familiarize students with the basic and advanced techniques of information visualization and
- scientific visualization,
- To learn key techniques of the visualization process
- A detailed view of visual perception, the visualized data and the actual visualization,
- interaction and distorting techniques

Unit 1:
Introduction of visual perception, visual representation of data, Gestalt principles, information overloads. Creating visual representations, visualization reference model, visual mapping, visual analytics, Design of visualization applications.

Unit 2:
Classification of visualization systems, Interaction and visualization techniques misleading, Visualization of one, two and multi-dimensional data, text and text documents.

Unit 3:
Visualization of groups, trees, graphs, clusters, networks, software, Metaphorical visualization.

Unit 4:
Visualization of volumetric data, vector fields, processes and simulations, Visualization of maps, geographic information, GIS systems, collaborative visualizations, Evaluating visualizations.

Unit 5:
Recent trends in various perception techniques, various visualization techniques, data structures used in data visualization.

References:
1. WARD, GRINSTEIN, KEIM,.Interactive Data Visualization: Foundations, Techniques, and Applications.Natick : A K Peters, Ltd. 2. E. Tufte, The Visual Display of Quantitative Information, Graphics Press.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(M20AI07) AI AND SPEECH PROCESSING
(PROGRAM ELECTIVE-III)

M.Tech:II-Semester **L/T/P/C**
3/ 0/ 0/ 3

Objectives:

- To analyze a speech signal in terms of its frequency content.
- To understand the basics of human speech production mechanism.
- To understand which speech coding methods are used for what reasons.
- To implement LPC Analysis.

UNIT I

FUNDAMENTALS OF DIGITAL SPEECH PROCESSING: Anatomy & physiology of speech organs, The process of speech production, The acoustic theory of speech production, Digital models for speech signals.

UNIT II

TIME DOMAIN MODELS FOR SPEECH PROCESSING: Introduction- Window considerations, Short time energy and average magnitude short time average zero crossing rate, Speech Vs Silence discrimination using Average energy and zero crossing, Pitch period estimation using parallel processing approach, The short time autocorrelation function, The short time average magnitude difference function, Pitch period estimation using the autocorrelation
function.

UNIT III

LINEAR PREDICTIVE CODING (LPC) ANALYSIS: Basic principles of linear predictive analysis: The Autocorrelation method, The covariance method, solution of LPC equations: Cholesky Decomposition, solution for covariance method, Durbin's recursive solution for the Autocorrelation equations, Comparison between the methods of solution of the LPC parameters, Formant analysis using LPC parameters. HOMOMORPHIC SPEECH PROCESSING: Introduction, Homomorphic systems for convolution: Properties of the complex cepstrum, computational considerations, The complex cepstrum of speech, pitch detection, Formant estimation, The homomorphicvocoder. SPEECH SYNTHESIS Formant Speech Synthesis –Concatenative Speech Synthesis – Prosodic Modification of Speech– Source Filter Models For Prosody Modification

UNIT IV

AUTOMATIC SPEECH RECOGNITION: Basic pattern recognition approaches, parametric representation 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, Adapting to variability in speech, Language models.

UNIT V

SPEAKER RECOGNITION: Recognition techniques, Features that distinguish speakers, speaker recognition systems: speaker verification system, Speaker identification system. SPEECH ENHANCEMENT: Nature of interfering sounds, speech enhancement techniques, spectral subtraction, Enhancement by re-synthesis.

TEXT BOOKS:

1. L.R.Rabiner and S.W.Schafer. Digital processing of speech signals,Pearson.
2. Douglas. O. Shaughnessy, speech communication, second edition Oxford universitypress,2000.
3.Fundamentals of speech recognition- L.R. Rabinar and B.H.Juang

REFERENCES:

1. Discrete Time Speech Signal Processing-Thomas F. Quateri1/e,Pearson.
2. Speech & Audio signal processing- Ben Gold & Nelson Morgan,1/e,Wiley.

VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(M20AI08) COMPUTER VISION
(PROGRAM ELECTIVE-IV)

M.Tech:II-Semester **L/T/P/C**
3/ 0/ 0/ 3

Course Outcome:

After learning the course the students should be able to:

- To implement fundamental image processing techniques required for computer vision
- Understand Image formation process
- To perform shape analysis
- Extract features form Images and do analysis of Images
- Generate 3D model from images
- To develop applications using computer vision techniques
- Understand video processing, motion computation and 3D vision and geometry

UNIT I:

Introduction:

Image Processing, Computer Vision and Computer Graphics , What is Computer Vision - Low-level, Mid-level, High-level , Overview of Diverse Computer Vision Applications: Document Image Analysis, Biometrics, Object Recognition, Tracking, Medical Image Analysis, Content-Based Image Retrieval, Video Data Processing, Multimedia, Virtual Reality and Augmented Reality.

UNIT-II:

Image Formation Models : Monocular imaging system , Radiosity: The 'Physics' of Image Formation, Radiance, Irradiance, BRDF, coloretc, Orthographic & Perspective Projection,• Camera model and Camera calibration, Binocular imaging systems, Multiple views geometry, Structure determination, shape from shading , Photometric Stereo, Depth from Defocus , Construction of 3D model from images.

UNIT III:

Image Processing and Feature Extraction: Image preprocessing, Image representations (continuous and discrete) , Edge detection

Motion Estimation : Regularization theory , Optical computation , Stereo Vision , Motion estimation , Structure from motion

Shape Representation and Segmentation : Contour based representation, Region based representation, Deformable curves and surfaces , Snakes and active contours, Level set representations , Fourier and wavelet descriptors , Medial representations , Multiresolution analysis.

UNIT IV:

Object recognition : Hough transforms and other simple object recognition methods, Shape correspondence and shape matching, Principal component analysis , Shape priors for recognition.

Image Understanding : Pattern recognition methods, HMM, GMM and EM.

UNIT V:

Applications: Photo album – Face detection – Face recognition – Eigen faces – Active appearance and 3D shape models of faces Application: Surveillance – foreground-background separation – particle filters – Chamfer matching, tracking, and occlusion – combining views from multiple cameras – human gait analysis Application: In-vehicle vision system: locating roadway – road markings – identifying road signs – locating pedestrians.

Reference Books:

1. Computer Vision - A modern approach, by D. Forsyth and J. Ponce, Prentice Hall Robot Vision, by B. K. P. Horn, McGraw-Hill.
2. Introductory Techniques for 3D Computer Vision, by E. Trucco and A. Verri, Publisher: PrenticeHall.
3. R. C. Gonzalez, R. E. Woods. Digital Image Processing. Addison Wesley Longman, Inc., 1992.
4. D. H. Ballard, C. M. Brown. Computer Vision.Prentice-Hall, Englewood Cliffs, 1982.
5. Richard Szeliski, Computer Vision: Algorithms and Applications (CVAA). Springer, 2010
6. Image Processing, Analysis, and Machine Vision. Sonka, Hlavac, and Boyle. Thomson.
7. E. R. Davies, Computer & Machine Vision, Fourth Edition, Academic Press, 2012
8. Simon J. D. Prince, Computer Vision: Models, Learning, and Inference, Cambridge University Press, 2012
9. Mark Nixon and Alberto S. Aquado, Feature Extraction & Image Processing for Computer Vision, Third Edition, Academic Press, 2012.

VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(M20CS18) BLOCK CHAIN TECHNOLOGY
(PROGRAM ELECTIVE-IV)

M.Tech:II-Semester **L/T/P/C**
3/ 0/ 0/ 3

Objectives:
The objective of this course is to introduce blockchain technology, its history, development and usage with required fundamentals and in the light of blockchain applications.

UNIT I:
Blockchain 101:Distributed systems, the history of blockchain, introduction to blockchain, Features of blockchain, Applications of blockchain technology, tiers of blockchain technology, types of blockchain, CAP theorem and blockchain, benefits and limitations of blockchain (pages 1-34**),** Decentralization using blockchain, methods of decentralization (pages 34-39)

UNIT II:
Cryptographic primitives, asymmetric cryptography, public and private keys, cryptographic primitives hash functions, elliptic curve digital signature algorithm (ECDSA)(56-105)

UNIT III:
BIT COIN: Bitcoin, transactions, blockchain, the bitcoin network wallets (111-148)
Alternatives to Proof of work, difficulty adjustment and retargeting algorithms, bitcoin limitations.(163-176), Smart contracts(198-210),

UNIT IV Introducing solidity (297-308), introducing Web3, (309-353)

UNIT V: Hyperledger: projects, Hyperledger as a protocol, Fabric Hyperledger fabric (355-369) Scalability and other challenges: scalability, privacy, security (443-459).

Course Outcomes:
After the completion of this course the students should be able to
1. Introduce the fundamentals of blockchain, history, technology and decentralization.
2. Revise cryptographic concepts and its use in blockchain.
3. Define bitcoin and understand structure of blockchain
4. Understand alternatives to proof of work
5. Introduce smart contracts, solidity and Web3 to implement blockchain
6. Understand applications of blockchain and its challenges

Text book:
1. Mastering Blockchain, March 2017,byimranbasher,packt publishing.

References:
1. Joseph Bonneau et al, SoK: Research perspectives and challenges for Bitcoin and cryptocurrency, IEEE Symposium on security and Privacy, 2015 (article available for free download) { curtain raiser kind of generic article, written by seasoned experts and pioneers}.
2. J.A.Garay et al, The bitcoin backbone protocol - analysis and applications EUROCRYPT 2015 LNCS VOl 9057, (VOLII), pp 281-310. (Also available at eprint.iacr.org/2016/1048). (serious beginning of discussions related to formal models for bitcoin protocols).
3. R.Pass et al, Analysis of Blockchain protocol in Asynchronous networks , EUROCRYPT 2017, (eprint.iacr.org/2016/454) . A significant progress and consolidation of several principles).
4. R.Pass et al, Fruitchain, a fair blockchain, PODC 2017 (eprint.iacr.org/2016/916).
5. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, and Steven Goldfeder. Bitcoin and cryptocurrency technologies: a comprehensive introduction. Princeton University Press, 2016. (Free download available)

VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(M20CS02) SOFTWARE PROCESS AND PROJECT MANAGEMENT
(PROGRAM ELECTIVE-IV)

M.Tech:II-Semester **L/T/P/C**
3/ 0/ 0/ 3

Objectives:

- Describe and determine the purpose and importance of project management from the perspectives of planning, tracking and completion of project.
- Compare and differentiate organization structures and project structures.
- Implement a project to manage project schedule, expenses and resources with the application of suitable project management tools.

UNIT-I

Software Process Maturity Software maturity Framework**,** Principles of Software Process Change, Software Process Assessment, The Initial Process, The Repeatable Process, The Defined Process, The Managed Process, The Optimizing Process.

Process Reference Models Capability Maturity Model (CMM)**,** CMMI, PCMM, PSP, TSP.

UNIT-II

Software Project Management Renaissance Conventional Software Management, Evolution of Software Economics, Improving Software Economics, The old way and the new way.

Life-Cycle Phases and Process artifacts Engineering and Production stages, inception phase, elaboration phase, construction phase, transition phase, artifact sets, management artifacts, engineering artifacts and pragmatic artifacts, model based software architectures.

UNIT-III

Workflows and Checkpoints of process Software process workflows, Iteration workflows, Major milestones, Minor milestones, Periodic status assessments.

Process Planning Work breakdown structures, Planning guidelines, cost and schedule estimating process, iteration planning process, Pragmatic planning.

UNIT-IV

Project Organizations Line-of- business organizations, project organizations, evolution of organizations, process automation.

Project Control and process instrumentation The seven core metrics, management indicators, quality indicators, life-cycle expectations, Pragmatic software metrics, and metrics automation.

UNIT-V

CCPDS-R Case Study and Future Software Project Management Practices Modern Project Profiles, Next-Generation software Economics, Modern Process Transitions.

Course Outcomes:

After the completion of this course the students should be able to :

1. Discuss and plan to execute projects based on required standards.
2. Understand the range of tools used on project management**.**
3. Analyze the concepts related on project governance and methodologies.
4. Apply critical analysis on solving problems and planning process.
5. Describe planning, Risk and issues management.
6. Plan process, pragmatic planning service delivery and quality assurance

TEXT BOOKS:

1. Managing the Software Process, *Watts S. Humphrey*, Pearson Education.
2. Software Project Management, *Walker Royce,* Pearson Education.

REFERENCE BOOKS:

1. Effective Project Management: Traditional, Agile, Extreme, Robert Wysocki, Sixth edition, Wiley India, rp2011.
2. An Introduction to the Team Software Process, Watts S. Humphrey, Pearson Education, 2000
3. Process Improvement essentials, James R. Persse, O'Reilly, 2006
4. Software Project Management, Bob Hughes & Mike Cotterell, fourth edition, TMH, 2006
5. Applied Software Project Management, Andrew Stellman& Jennifer Greene, O'Reilly, 2006.
6. Head First PMP, Jennifer Greene & Andrew Stellman, O'Reilly, 2007
7. Software Engineering Project Managent, Richard H. Thayer & Edward Yourdon, 2nd edition, Wiley India, 2004.
8. The Art of Project Management, Scott Berkun, SPD, O'Reilly, 2011.
9. Applied Software Project Management, Andrew Stellman& Jennifer Greene, SPD, O'Reilly, rp2011.
10. Agile Project Management, Jim Highsmith, Pearson education, 2004.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(M20AC02) STRESS MANAGEMENT
(AUDIT COURSE-II)

M.Tech:II-Semester **L/T/P/C**
2/ 0/ 0/ 0

UNIT-I:

UNDERSTANDING STRESS Meaning – Symptoms – Work Related Stress – Individual Stress – Reducing Stress -sources of stress –consequence of stress-burnout-symptoms of Burnout- stress verses Burnout-model of stress-strategies for coping stress (individual and organizational strategies) – casestudy

UNIT-II:

TIME MANAGEMENT Techniques – Importance of Planning the day –developing concentration – Prioritizing Beginning at the start – Techniques for conquering procrastination – Sensible delegation – Taking the right breaks – Learning to say"No"

UNIT-III:

CAREER PLATEAU Career plateau – Identifying Career plateaus – Structural and Content - Plateauing – Making a fresh start – Importance of Sabbaticals – Counseling out – Executive leasing Sustaining a marketable Career.

UNIT-IV:

CRISIS MANAGEMENT Implications – People issues – Structure issues – Environmental issues – Learning to keep calm - Preventing interruptions – Controlling crisis – Pushing new ideas – Empowerment – Work place Humour, Developing a sense of Humour – Learning to laugh – role of group cohesion and team spirit.

UNIT-V:

SELF DEVELOPMENT Improving personality – Leading with Integrity – Enhancing Creativity – Effective decision making – Sensible Communication – The Listening Game – Managing Self – Mediation for peace – Yoga for Life

Course Outcomes:

After the completion of this course the students should be able to :

1. Maintain a stress awareness log. Include identification of causes, symptoms, and analysis of effects.
2. Gather information on current stress management techniques and evaluate personal relevance.
3. Practice specific techniques, track effectiveness, and revise to meet personal preferences.
4. Choose an adaptable stress management plan for academic success incorporating selected techniques.

TEXT BOOKS

1. Bhatia R.L., The Executive Track: An Action Plan for Self Development Wheeler Publishing, New Delhi
3. Charavathy.S.K, "Human Values for Manager", McGraw Hill/Henely Management Series

REFERENCES

1. Jeffr Davison, Managing Stress, Prentice Hall of India, NewDelhi
2. Jerrold S Greenberg, Comprehensive Stress Management, Jain Books,2009

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(M20AI09) ADVANCES IN MACHINE LEARNING LAB

M.Tech:II-Semester **L/T/P/C**
0/0/4/2

Course Objectives:
The objective of this lab is to get an overview of the various machine learning techniques and can able to demonstrate them using python.

Course Outcomes: After the completion of the course the student can able to:
1. understand complexity of Machine Learning algorithms and their limitations;
2. understand modern notions in data analysis-oriented computing;
3. be capable of confidently applying common Machine Learning algorithms in practice and implementing their own;
4. Be capable of performing experiments in Machine Learning using real-world data.

List of Experiments

Week1. The probability that it is Friday and that a student is absent is 3 %. Since there are 5 school days in a week, the probability that it is Friday is 20 %. What is theprobability that a student is absent given that today is Friday? Apply Baye's rule in python to get the result. (Ans: 15%)

Week2. Extract the data from database using python

Week3.Implement k-nearest neighbours classification using python

Week4.Given the following data, which specify classifications for nine combinations of VAR1 and VAR2 predict a classification for a case where VAR1=0.906 and VAR2=0.606, using the result of k- means clustering with 3 means (i.e., 3 centroids)

VAR1	VAR2	CLASS
1.713	1.586	0
0.180	1.786	1
0.353	1.240	1
0.940	1.566	0
1.486	0.759	1
1.266	1.106	0
1.540	0.419	1
0.459	1.799	1
0.773	0.186	1

Week5. The following training examples map descriptions of individuals onto high, medium and low credit-worthiness.
medium skiing design single twenties no ->highRisk high golf trading married forties yes ->lowRisk
low speedway transport married thirties yes ->medRisk medium football banking single thirties yes ->lowRisk high flying media married fifties yes ->highRisk
low football security single twenties no ->medRisk medium golf media single thirties yes ->medRisk medium golf transport married forties yes ->lowRisk high skiing banking single thirties yes ->highRisk low golf unemployed married forties yes ->highRisk

Input attributes are (from left to right) income, recreation, job, status, age-group, home-owner. Find the unconditional probability of `golf' and the conditional probability of `single' given `medRisk' in the dataset?

Week6. Implement linear regression using python.

Week7. Implement Naïve Bayes theorem to classify the English text

Week8. Implement an algorithm to demonstrate the significance of genetic algorithm

Week9. Implement the finite words classification system using Back-propagation algorithm

VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(M20CS24) DIGITAL FORENSICS LAB
(PROGRAM ELECTIVE – III LAB)

M.Tech:II-Semester **L/T/P/C**
0/0/4/2

Objectives:

- To focus on the procedures for identification, preservation, and extraction of electronic evidence, auditing and investigation of network and host system intrusions, analysis and documentation of information gathered, and preparation of expert testimonial evidence.
- To provide hands on experience on various forensic tools and resources for system administrators and information system security officers.

Week 1: Mr.X has lost his data on his device. Analyse different processes and Retrieve the lost data?

Week 2: Study and Perform various metadata techniques

Week 3:. (a). Study and Perform email investigation techniques
(b). Perform various mobile forensic techniques

Week 4: (a). Perform how to grab the ip address of a suspect
(b). Study and Perform how to trace aip address

Week 5:. Perform how to capture packets from a mobile phone

Week 6: Perform various Network forensic analysis in detail

Week 7: Perform Hashing process

Week 8: Perform various Open-source intelligence techniques

Week 9: (a). Study and Understand Cyber-Forensics experimentation methodology
(b). Develop a Certification Process for Cyber Forensic Technologies

Week 10: (a). Comparison of files using HEX editor and FC command
(b). Perform extraction of browser artifacts
(c) File carving using TESTDISK and PHOTOREC

Course Outcomes:

After the completion of this course the students should be able to :

1. Understand the methods available for retrieving the lost data.
2. Classify the various mobile forensic techniques and how to handle them.
3. Identify the different Open-source intelligence techniques
4. Demonstrate how to develop certification for Cyber Forensic.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(M20AI10) DATA PRE-PROCESSING AND ANALYSIS LAB
(PROGRAM ELECTIVE – III LAB)

M.Tech:II-Semester **L/T/P/C**
0/0/4/2

Week 1: Filling missing values

Week 2: Boxplots, Bubble plots and Heap Maps.

Week 3: Sample Parametric test.

Week 4: Bayesian Probability.

Week 5: Polynomial Regession.

Week 6: KNN Classification.

Week 7: Implementation of Agglomerative Clustering.

Week 8: Trajectory Probability.

Week 9: The Seasonal Autoregressive Integrated Moving Average model.

Week 10 : Forecasting using SVR.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(M20AI11) AI WITH SPEECH PROCESSING LAB
(PROGRAM ELECTIVE – III LAB)

M.Tech:II-Semester **L/T/P/C**
0/0/4/2

Experiments:

Week 1. Extracting information from text

Week 2. Apply Binarization data preprocessing techniques on sample data

Week 3. Apply Mean removal data preprocessing techniques on sample data

Week 4. Apply min and max scaling on sample data

Week 5. How to encode the labels and show the performance of encoded labels

Week 6. Converting speech to text

Week 7. Converting text to speech

Week 8. Apply normalization data preprocessing technique on real estate data

Week 9. Program to build a Linear Regressor

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(M20AI12)MINI PROJECT WITH SEMINAR

M.Tech: II-Semester **L/T/P/C**
0/0/2 /2

VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(M20CS26)NATURAL LANGUAGE PROCESSING TECHNIQUES
(PROGRAM ELECTIVE-V)

M.Tech:III-Semester **L/T/P/C**
3/0/0 /3

Objectives:

- able to explain and apply fundamental algorithms and techniques in the area of natural language processing(NLP)
- Understand approaches to syntax and semantics in NLP.
- Understand current methods for statistical approaches to machine translation.
- Understand language modelling.
- Understand machine learning techniques used in NLP.

UNIT I:

Introduction to Natural language

The Study of Language, Applications of NLP, Evaluating Language Understanding Systems, Different Levels of Language Analysis, Representations and Understanding, Organization of Natural language Understanding Systems, Linguistic Background: An outline of English Syntax.

UNIT II:

Grammars and Parsing

Grammars and Parsing- Top- Down and Bottom-Up Parsers, Transition Network Grammars, Feature Systems and Augmented Grammars, Morphological Analysis and the Lexicon, Parsing with Features, Augmented Transition Networks.

UNIT III:

Grammars for Natural Language

Grammars for Natural Language, Movement Phenomenon in Language, Handling questions in Context Free Grammars, Hold Mechanisms in ATNs, Gap Threading, Human Preferences in Parsing, Shift Reduce Parsers, Deterministic Parsers.

UNIT IV:

Semantic Interpretation

Semantic & Logical form, Word senses & ambiguity, The basic logical form language, Encoding ambiguity in the logical Form, Verbs & States in logical form, Thematic roles, Speech acts & embedded sentences, Defining semantics structure model theory.

Language Modeling

Introduction, n-Gram Models, Language model Evaluation, Parameter Estimation, Language Model Adaption, Types of Language Models, Language-Specific Modeling Problems, Multilingual and Crosslingual Language Modeling.

UNIT V:

Machine Translation

Survey: Introduction, Problems of Machine Translation, Is Machine Translation Possible, Brief History, Possible Approaches, Current Status.

Anusaraka or Language Accessor: Background, Cutting the Gordian Knot, The Problem, Structure of Anusaraka System, User Interface, Linguistic Area, Giving up Agreement in Anusarsaka Output, Language Bridges.

Multilingual Information Retrieval

Introduction, Document Preprocessing, Monolingual Information Retrieval, CLIR, MLIR, Evaluation in Information Retrieval, Tools, Software and Resources.

Multilingual Automatic Summarization

Introduction, Approaches to Summarization, Evaluation, How to Build a Summarizer, Competitions and Datasets.

Course Outcomes:

1. Understand approaches to syntax and semantics in NLP.
2. Understand approaches to discourse, generation, dialogue and summarization within NLP.
3. Understand current methods for statistical approaches to machine translation.
4. Understand machine learning techniques used in NLP, including hidden Markov models
5. Understand the Language model and probabilistic context-free grammars, clustering and unsupervised methods, log-linear and discriminative models.
6. Understand the Machine Translation, multilingual information, multi lingual automatic summerization.

TEXT BOOKS:

1. James Allen, Natural Language Understanding, 2nd Edition, 2003, Pearson Education.
2. Multilingual Natural Language Processing Applications: From Theory To Practice-Daniel M.Bikel and ImedZitouni , Pearson Publications.
3. Natural Language Processing, A paninian perspective, Akshar Bharathi, Vineetchaitanya, Prentice –Hall of India.

REFERENCES BOOKS:

1. Charniack, Eugene, Statistical Language Learning, MIT Press, 1993.
2. Jurafsky, Dan and Martin, James, Speech and Language Processing, 2nd Edition, Prentice Hall,2008.
3. Manning, Christopher and Henrich, Schutze, Foundations of Statistical Natural Language Processing, MIT Press,1999.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(M20CS27) CYBER SECURITY
(PROGRAM ELECTIVE-V)

M.Tech:III-Semester **L/T/P/C**
3/ 0/ 0/ 3

Prerequisites: Operating System, Data Communications and Computer Networks, Network Security and Cryptography.

Course Objectives:

- To introduce the methodologies and framework of ethical hacking for enhancing the security.
- To learn about cybercrimes and how they are planned.
- To learn the vulnerabilities of mobile and wireless devices.
- To learn about the cyber Law and legal perspectives.

UNIT – I

Introduction to Cybercrime: Introduction, Cybercrime and Information Security, Who are Cybercriminals, Classifications of Cybercrimes, Cyber-crime: The legal Perspectives and Indian Perspective, Cybercrime and the Indian ITA 2000, A Global Perspective on Cybercrimes.
(Text Book : Page no : 1 – 39)

UNIT – II

Cyber Offenses: How Criminals Plan Them: Introduction, How Criminals plan the Attacks, Social Engineering, Cyber stalking, Cyber cafe and Cybercrimes, Botnets: The Fuel for Cybercrime, Attack Vector, Cloud Computing.
(Text Book : Page no : 45 –78)

UNIT – III

Cyber-crime : Mobile and Wireless devices-Trend mobility-authentication service security-Attacks on mobile phones-mobile phone security Implications for organizations-Organizational measurement for Handling mobile-Security policies and measures in mobile computing era.
(Text Book : Page no : 81-119)

UNIT – IV

Tools and Methods Used in Cybercrime: Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking, Key loggers and Spywares, Virus and Worms, Trojan Horse and Backdoors, Steganography, DoS and DDoS attacks, SQL Injection, Buffer Overflow.
(Text Book : Page no :125-170)

UNIT – V

Cyber Security: Organizational Implications, Introduction, Cost of Cybercrimes and IPRissues, Web threats for Organizations, Security and Privacy Implications, Social media marketing: Security Risks and Perils for Organizations, Social Computing and the associated challenges for Organizations.
(Text Book : Page no :495-522)

Course Outcomes:

After the completion of this course, the students should be able to

1. Outline key terms and concepts in cyber law, intellectual property and cyber crimes.
2. Explore the vulnerabilities, threats and cybercrimes posed by criminals.
3. Identify various security challenges phased by mobile devices.
4. Identify various types of tools and methods used in cybercrime, develops the secure

counter methods to maintain security protection.

5. Analyze and evaluate the cyber security needs of an organization.
6. Design operational and strategic cyber security risk management policies in order to adequately protect an organization's critical information and assets.

TEXT BOOK:

1. **Cyber Security:** Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Nina Godbole and Sunil Belapure, Wiley INDIA.

REFERENCE BOOKS:

1. Cyber Security Essentials, James Graham, Richard Howard and Ryan Otson, CRCPress.
2. Introduction to Cyber Security, Chwan-Hwa (john) Wu, J. David Irwin. CRC Press T&F Group

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(M20CS28)DEEP LEARNING
(PROGRAM ELECTIVE-V)

M.Tech:III-Semester **L/T/P/C**
3/ 0/ 0/ 3

Course Objectives:

- To introduce the foundations of Artificial Neural Networks
- To acquire the knowledge on Deep Learning Concepts
- To learn various types of Artificial Neural Networks
- To gain knowledge to apply optimization strategies

UNIT - I

Deep Feedforward Networks: Example: Learning XOR, Gradient-Based Learning, Hidden Units, Architecture Design, Back-Propagation and Other Differentiation Algorithms, Historical Notes

UNIT - II

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 - III

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

UNIT - IV

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, TheNeuro-scientific Basis for Convolutional Networks, Convolutional Networks and the History of Deep Learning

UNIT - V

Applications:

Large-Scale Deep Learning, Computer Vision, Speech Recognition, Natural Language Processing, Other Applications.

Course Outcomes:

1. Ability to understand the concepts of Neural Networks
2. Ability to understand the concepts of Deep Learning
3. Ability to select the Learning Networks in modeling real world systems
4. Ability to use an efficient algorithm for Deep Models
5. Ability to apply optimization strategies for large scale applications
6. Ability to apply the Deep Learning models for Speech Recognition, NLP and Other Applications

Text Book:

1. Goodfellow, YoshuaBengio, Aaron Courville, Deep Learning (Adaptive Computation and Machine Learning series), MIT Press.

Reference Books:

1. Li Deng and Dong Yu, Deep Learning Methods and Applications, Foundations and Trends®in Signal Processing Volume 7 Issues 3-4, ISSN: 1932-8346.
2. Dr. N.D. Lewis, Deep Learning Made Easy with R A Gentle Introduction for Data Science.Create Space Independent Publishing Platform (January 10, 2016).
3. François Chollet, JJ Allaire, MEAP Edition Manning Early Access Program Deep Learningwith R Version 1, Copyright 2017 Manning Publications.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(M20MA01)ADVANCED OPTIMIZATION
(OPEN ELECTIVE)

M.Tech:III-Semester **L/T/P/C**
3/ 0/ 0/ 3

Course Objectives

- To understand the theory of optimization methods and algorithms developed for solving various types of optimization problems.
- To develop and promote research interest in applying optimization techniques in problems of Engineering and Technology.
- To apply the mathematical results and numerical techniques of optimization theory to concrete Engineering problems.

UNIT-I:
Single Variable Non-Linear Unconstrained Optimization: One dimensional Optimization methods:-Uni-modal function, elimination methods, ,, Fibonacci method, golden section method, interpolation methods – quadratic & cubic interpolation methods.

UNIT-II:
Multi variable non-linear unconstrained optimization: Direct search method – Univariant method - pattern search methods – Powell's- Hook -Jeeves, Rosenbrock search methods- gradient methods, gradient of function, steepest decent method, Fletcher Reeves method, variable metric method.

UNIT-III:
Linear Programming: Formulation – Sensitivity analysis. Change in the constraints, cost coefficients, coefficients of the constraints, addition and deletion of variable, constraints. Simulation – Introduction – Types- steps – application – inventory –queuing systems

UNIT-IV:
Integer Programming: Introduction – formulation – Gomory cutting plane algorithm – Zero or one algorithm, branch and bound method Stochastic programming: Basic concepts of probability theory, random variables- distributions-mean, variance, correlation, co variance, joint probability distribution-stochastic linear, dynamicprogramming.

UNIT-V:
Geometric Programming: Polynomials – arithmetic – geometric inequality – unconstrained G.P constrained G.P (<= TYPE ONLY) Non-traditional optimization Techniques: Genetic Algorithms- Steps-Solving simple problems Comparitions of similarities and dissimilarities between traditional and non-traditional techniques Particle Swarm Optimization (PSO)- Steps(Just understanding)- Simulated Annealing-Steps-Simpleproblems.

Course Outcomes:

After the completion of this course the students should be able to :

1. Describe problem clearly, identify and analyzetheindividual functions.
2. Analyze study on solving optimization problem.
3. Translate verbal formula on optimization problem.
4. Design algorithms, reliably to find an approximate solution.
5. Compare the performance of an algorithm.
6. Discovery, study, understandand solve optimization techniques using algorithms.

REFERENCES:

1. Optimization theory & Applications / S.S. Rao/ New AgeInternational.
2. Engineering Optimization-Kalyan Deb/PHI
3. Introductory to operation Research / Kasan& Kumar /Springar
4. Optimization Techniques theory and practice / M.C.Joshi, K.M. Moudgalya/Narosa
5. Publications
6. Operation Research / H.A. Taha/TMH
7. Optimization in operations research / R.L Rardin 8. Optimization Techniques /Benugundu&Chandraputla / PearsonAsia

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

(M20CE27)WASTE MANAGEMENT
(OPEN ELECTIVE)

M.Tech:III-Semester **L/T/P/C**
3/ 0/ 0/ 3

Course Objective: This course covers various aspects of hazardous waste, biomedical waste and E-waste such as collection, segregation, recovery, labeling requirements, storage areas, treatment and disposal facilities.

UNIT-I:
Sources, Composition and characteristic of hazardous waste, Hazardous Waste (Management and Handling) Rules, 1989 and amendments, Federal Hazardous Waste Regulations under RCRA, Superfund, CERCLA and SARA. Toxicology, public health impact, Protocols, issues and challenges in transportation of hazardous waste.

UNIT-II:
Municipal Solid Waste Management – Fundamentals Sources; composition; generation rates; collection of waste; separation, transfer and transport of waste; treatment and disposal options Radioactive Waste Management – Fundamentals Sources, measures and health effects; nuclear power plants and fuel production; waste generation from nuclear power plants; disposal options

UNIT-III:
Characterization of medical waste- Bio-medical wastes (Management and Handling) Rules, 1998, Amendments and guidelines, segregation, packaging, storage, transport of infectious waste. Techniques of Biomedical waste management. Health and safety rules. Protocols, issues and challenges in transportation of Biomedical waste.

UNIT-IV:
Treatment method- Autoclave, Hydroclave, Microwave, Chemical Disinfection, Solidification and stabilization, Bioremediation, Thermal Conversion Technologies, accumulation and storage of hazardous waste, land disposal of hazardous waste, other treatment and disposal method. Common Hazardous Waste Treatment facilities (TSDF).

UNIT-V:
E-waste: Introduction, toxicity due to hazardous substances in e-waste and their impacts, domestic e-waste disposal, e-waste management, technologies for recovery of resource from electronic waste, guidelines for environmentally sound management of e-waste, occupational and environmental health perspectives of recycling e-waste inIndia.

Course Outcomes:
After the completion of this course the students should be able to :

1. Compare the subject from the technical, legal and economical points.
2. Learn solid waste management.
3. Describe environment for sound management.
4. Understand a municipal solid waste management system.
5. Plan a solid waste management system for decision makers.
6. Design an incineration facility.

Reference Books:

- TchobanoglousG.,TheisenH.,ViquelS.A.,"IntegratedSolidWasteManagement:Engineering,
- PrinciplesandManagementissues",TataMcGrawHillPublishingCompanyLtd.,NewDelhi.
- CPHEEO Manual on Municipal Solid WasteManagement.
- Peavy H.S., Rowe D.R., Tchobanoglous G., "Environmental Engineering", Tata McGraw Hill Publishing Company Ltd., NewDelhi.
- Cunningham W.P., Cunningham M.A., "Principles of Environmental Science", Tata McGraw Hill Publishing Company Ltd., NewDelhi.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONMOUS)

(M20VL07) EMBEDDED SYSTEM DESIGN
(OPEN ELECTIVE)

M.Tech:III-Semester **L/T/P/C**
3/ 0/ 0/ 3

Course Objectives:

To explain various embedded system applications and design requirements.

- To construct embedded system hardware.
- To develop software programs to control embedded system.
- To generate product specification for embedded system.

UNIT-I:

Introduction to Embedded Systems: Embedded Systems, Processor Embedded into a System, Embedded Hardware Units and Devices in a System, Embedded Software, Complex System Design, Design Process in Embedded System, Formalization of System Design, Classification of Embedded Systems

UNIT-II:

8051 and Advanced Processor Architecture: 8051 Architecture, 8051 Micro controller Hardware, Input/output Ports and Circuits, External Memory, Counter and Timers, Serial data Input/output, Interrupts, Introduction to Advanced Architectures, Real World Interfacing, Processor and Memory organization - Devices and Communication Buses for Devices Network: Serial and parallel Devices & ports, Wireless Devices, Timer and Counting Devices, Watchdog Timer, Real Time Clock, Networked Embedded Systems, Internet Enabled Systems, Wireless and Mobile System protocols

UNIT-III:

Embedded Programming Concepts: Software programming in Assembly language and High Level Language, Data types, Structures, Modifiers, Loops and Pointers, Macros and Functions, object oriented Programming, Embedded Programming in C++ & JAVA

UNIT-IV:

Real – Time Operating Systems: OS Services, Process and Memory Management, Real – Time Operating Systems, Basic Design Using an RTOS, Task Scheduling Models, Interrupt Latency, Response of Task as Performance Metrics - RTOS Programming: Basic functions and Types of RTOSES, RTOS VxWorks, Windows CE

UNIT-V:

Embedded Software Development Process and Tools: Introduction to Embedded Software Development Process and Tools, Host and Target Machines, Linking and Locating Software, Getting Embedded Software into the Target System, Issues in Hardware-Software Design and Co- Design - Testing, Simulation and Debugging Techniques and Tools: Testing on Host Machine, Simulators, LaboratoryTools

Course Outcomes:

After the completion of this course the students should be able to :

1. Describe embedded systems, design, technology to explain its metrics or challenges.
2. Designcustomsingle–purposeprocessorsusingcombinationalaswellassequentiallogic.
3. Discuss about optimizing single – purpose processors. Discuss about the basic architecture and operation of general purpose processors.
4. Define and distinguish between a timer and a counter, various types of timers and UniversalAsynchronousReceiver/Transmitter.ExplaincontrollersforLCD,KeypadandStepper

Motor.

5. Discuss common memory types ROM, RAM, advanced RAM. Explain microprocessor interfacing and arbitration methods, various protocols like serial, parallel.
6. Explain basics of interrupts, architectures like Round Robin, Real – Time Operating System architecture.

TEXT BOOK:

1. Embedded Systems, Raj Kamal, Second EditionTMH.
2. Introduction to Embedded Systems byK.V.Shibu.

REFERENCE BOOKS:

1. Embedded/Real-Time Systems, Dr. K.V.K.K. Prasad, dream Tech press
2. The 8051 Microcontroller and Embedded Systems, Muhammad Ali Mazidi, Pearson.
3. The 8051 Microcontroller, Third Edition, Kenneth J. Ayala, Thomson.
4. An Embedded Software Primer, David E. Simon, Pearson Education.
5. Micro Controllers, Ajay V Deshmukhi, TMH.
6. Microcontrollers, Raj Kamal, Pearson Education.
7. Introduction to Embedded Systems, Shibu K. V,TMH.

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONMOUS)

(M20AI13) PROJECT/DISSERTATION PHASE – I

M.Tech:III-Semester

L/T/P/C
0/0/20/10

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VAAGDEVI COLLEGE OF ENGINEERING
(AUTONMOUS)

(M20AI14) PROJECT/DISSERTATION PHASE – II

M.Tech: IV-Semester

L/T/P/C
0/0/32/16