



CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY(A)

AICTE Model Curriculum (with effect from 2020-21)

B.E. (Information Technology)

SEMESTER– VI

SEMESTER VI								
S.No	Course Code	Title of the Course	Scheme of Instruction		Scheme of Examination			Credits
			Hours per Week		Duration of SEE in Hours	Maximum Marks		
			L/T	P/D		CIE	SEE	
THEORY								
1	18IT C22	Artificial Intelligence	3	-	3	30	70	3
2	18IT C23	Information Security	2	-	2	20	50	2
3		Core Elective – 3	3	-	3	30	70	3
4		Core Elective – 4	3	-	3	30	70	3
5	18MB C01	Engineering Economics and Accountancy	3	-	3	30	70	3
6		Open Elective - 1	3	-	3	30	70	3
7	18EE M01	Indian Traditional Knowledge	2	-	2	-	50	Non - Credit
7	18IT C24	Artificial Intelligence Lab	-	2	2	15	35	1
8	18IT C25	Information Security Lab	-	2	2	15	35	1
9	18IT C26	Mini Project - IV	-	2	-	50	-	1
		TOTAL	19	6	-	250	520	20

L: Lecture

T: Tutorial

D: Drawing

P: Practical

CIE-Continuous Internal Evaluation

SEE-Semester End Examination

With effect from Academic Year 2020-21

Core Elective-3		
S.No.	Subject Code	Subject Name
1.	18IT E09	Social Media Analytics
2.	18IT E10	Virtual Reality
3.	18IT E11	Soft Computing
4.	18IT E12	Mobile Commerce

Core Elective-4		
S.No.	Subject Code	Subject Name
1.	18IT E13	Data Science with Python
2.	18IT E14	Digital Image Processing and Analysis
3.	18IT E15	Artificial Neural Networks and Deep Learning
4.	18IT E16	Cyber Security

Open Elective-1		
S.No.	Subject Code	Subject Name
1.	18BT O01	Basics of Biology
2.	18EG O02	Gender Sensitization
3.	18ME O04	Research Methodologies
4.	18MT O02	Graph Theory

18IT C22

ARTIFICIAL INTELLIGENCE

Instruction	3 Hours per week
Duration of SEE	3 Hours
SEE	70 Marks
CIE	30 Marks
Credits	3

Course Objectives:

1. Learn problem solving through search techniques.
2. Familiarize with knowledge representation and logical reasoning techniques in AI.
3. Learn probabilistic reasoning models on uncertain data.
4. Acquaint with supervised and reinforcement learning.
5. Learn syntax and semantic analysis of the natural language.

Course Outcomes:

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

1. Understand the basics of AI and analyze various Exhaustive and Heuristic Search Techniques.
2. Apply logical concepts and representation techniques to infer knowledge.
3. Understand quantification of uncertainty and evaluate data using probabilistic reasoning models.
4. Apply the techniques of supervised and reinforcement learning on data.
5. Process Natural Language and perform syntax & semantic analysis.

UNIT-I

Introduction: The Foundations of AI, History of AI. Intelligent agents – Agents and Environments, Good Behavior: The Concept of Rationality, The Nature of Environments, The Structure of Agents.

Solving problems by searching: Problem Solving Agents, Example Problems, Searching for Solutions, Uninformed Search Strategies, Informed Search Strategies, Heuristic Functions.

Adversarial search: Games, Optimal decisions in games, Alpha-Beta Pruning. Constraint Satisfaction Problems- Defining constraint satisfaction Problems.

UNIT-II

Logic Concepts and Logic Programming: Introduction, Propositional Calculus, Propositional Logic, Natural Deduction System, Axiomatic System, Semantic Tableau System in Propositional Logic, Resolution Refutation in Propositional Logic, Predicate Logic, Logic Programming.

Knowledge Representation: Introduction, Approaches to Knowledge Representation, Knowledge Representation using Semantic Network, Extended Semantic Networks for KR, Knowledge Representation using Frames.

UNIT-III

Quantifying Uncertainty: Acting under Uncertainty, Basic Probability Notation, Inference Using Full Joint Distributions, Independence, Bayes' Rule and its Use.

Probabilistic Reasoning: Representing Knowledge in an Uncertain Domain, The Semantics of Bayesian Networks, Efficient Representation of Conditional Distributions, Exact Inference in Bayesian Networks.

Probabilistic Reasoning over Time: Time and Uncertainty, Inference in Temporal Models, Hidden Markov Models, Kalman Filters.

UNIT-IV

Learning from Examples: Forms of Learning, Supervised Learning, Learning Decision Trees, Evaluating and Choosing the Best Hypothesis, The Theory of Learning, Regression and Classification with Linear Models, Artificial Neural Networks, Nonparametric Models, Support Vector Machines.

Learning Probabilistic Models: Statistical Learning, Learning with Complete Data.

Learning with Hidden Variables: The EM Algorithm

Reinforcement Learning: Passive reinforcement learning, direct utility estimation, adaptive dynamic programming, temporal difference learning, active reinforcement learning-Q learning.

UNIT-V

Natural Language Processing: Language Models, Text Classification, Information Retrieval, Information Extraction.

Natural Language for Communication: Phrase Structure Grammars, Syntactic Analysis, Augmented Grammars and Semantic Interpretation.

Text Books:

1. Stuart Russell, Peter Norvig, "Artificial Intelligence: A Modern Approach" , Prentice Hall, 3rd Edition.
2. Saroj Kaushik, "Artificial Intelligence", Cengage Learning India, 2011.

Suggested Reading:

1. Nilsson, N., "Artificial Intelligence: A New Synthesis", San Francisco, Morgan Kaufmann, 1998.
2. Rich, Knight, Nair: "Artificial intelligence", Tata McGraw Hill, Third Edition, 2009.
3. Tom M. Mitchell, "Machine Learning", McGraw Hill, 1997.
4. Kulkarni, Parag, Joshi, Prachi , "Artificial Intelligence : Building Intelligent Systems", PHI, 2015.
5. Peter Jackson, "Introduction to Expert Systems", Third Edition, Pearson Addison Wesley, 1998.

Web Resources:

1. https://onlinecourses.nptel.ac.in/noc19_cs19/
2. <https://www.coursera.org/learn/ai-for-everyone>

18IT C23

INFORMATION SECURITY

Instruction	2 Hours per week
Duration of SEE	2 Hours
SEE	50 Marks
CIE	20 Marks
Credits	2

Course Objectives:

1. To provide basic concepts of Information security and threats its associated attacks.
2. To explore the role of risk management and security technology like firewalls and Intrusion systems.
3. To familiarize with the concepts Cryptographic algorithms and Transport level Security.
4. To acquire knowledge of Electronic mail, IP Security and User Authentication.
5. To introduce how security policy affects the ongoing technical and administrative evaluation.

Course Outcomes:

Upon successful completion of this course, student will be able to:

1. Describe the components of information security and identify threats, attacks that cause harm to organizational assets.
2. Examine the control measures to maintain the level of risk and make use of firewalls and intrusion detection systems to protect the networks.
3. Demonstrate cryptographic algorithms and implement secure communications between web browser and a web server.
4. Inspect on three functional areas like authentication, confidentiality and key management.
5. Compare information security technical and non-technical aspects and aware of employment policies and practices.

UNIT-I

Introduction to Information Security: History of Information Security, What Is Security, CNSS security model, Components of an Information System, Balancing Information Security and Access, Approaches to Information Security Implementation, Security in the Systems Life Cycle, Security Professionals and the Organization.

Need for Security: Business needs, Threats and Attacks, Compromises to Intellectual Property, Deviations in Quality of Service, Espionage or Trespass, Forces of Nature, Human Error or Failure, Information Extortion, Sabotage or Vandalism, Software Attacks, Technical Hardware Failure or Errors, Technical Software Failure or Errors, Technological Obsolescence, Theft.

UNIT-II

Risk management: An Overview of Risk Management, Risk Identification, Risk assessment, Risk Control, Quantitative versus Qualitative Risk Management Practices, Recommended Risk Control Practices.

Security Technology: Introduction, Access Control, Firewalls, Intrusion detection and prevention systems, Honey pots, Honeynets, Padded Cell Systems, Scanning and Analysis Tools.

UNIT-III

Cryptography: Introduction, Foundations of Cryptology, Cipher methods, cryptographic Algorithms, Cryptographic Tools, Protocols for Secure Communications.

Transport Level Security: Web Security Considerations, Secure Socket Layer and Transport Layer Security, HTTPS, Secure Shell.

UNIT-IV

Electronic Mail Security: Pretty Good Privacy, S/MIME, DomainKeys Identified Mail.

IP Security: IP Security Overview, IP Security Policy, Encapsulating Security Payload, Combining Security Associations, Internet key exchange.

User Authentication: Kerberos, Federated Identity Management.

UNIT-V

Implementing Information Security: Introduction, Information Security Project Management, Technical Aspects of Implementation, Non technical Aspects of Implementation, Information Systems Security Certification and Accreditation.

Security and Personnel: Introduction ,Positioning and Staffing Security Function, Employment Policies and Practices, Security Considerations for Temporary Employees, Consultants and Other Workers, Internal Control Strategies, Privacy and the Security of Personnel Data.

Information security Maintenance: Introduction, Security Management Maintenance Models, Digital Forensics.

Text Books:

1. Michael E. Whitman, Hebert J Mattord, "Principles of Information Security", 5th Edition, Cengage Learning, 2014.
2. Thomas R Peltier, Justing Peltier, JohnBlackley, "Information Security Fundamentals", Auerbacj Publications, 2010.
3. William Stallings "Cryptography and Network Security Principles and Practice", 6th Edition, Pearson, 2014.

Suggested Reading:

1. Dr.V.K.Jain,"Cryptography and Network Security", 1st Edition, Khanna Book publishing, 2013.
2. Marks Merkow, Jim Breithaupt, "Information Security: Principle and Practices", 2nd Edition, Pearson Education, 2014.

Web Resources:

1. <https://www.sans.org/security-resources/>
2. <https://nptel.ac.in/courses/106106129/>

18IT E09

SOCIAL MEDIA ANALYTICS

(Core Elective - 3)

Instruction	3 Hours per week
Duration of SEE	3 Hours
SEE	70 Marks
CIE	30 Marks
Credits	3

Course Objectives:

1. To introduce Social Media Mining, Graph Essentials and Network Models.
2. To familiarize various algorithms for the study of Communities.
3. Impart knowledge about Mining, Influence and Homophily.
4. To familiarize Recommendation Systems and Behavioral Analytics.
5. To explore various Prediction Systems.

Course Outcomes:

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

1. Describe graph essentials and various network measures and models.
2. Understand community behavior and information diffusion in social media.
3. Comprehend data mining algorithms and measure influence and homophily.
4. Understand the challenges and evaluate the recommendation systems.
5. Apply prediction algorithms for real world problems.

UNIT-I

Introduction: Social Media Mining, New Challenges for Mining.

Graph Essentials: Graph Basics, Graph Representation, Types of Graphs, Connectivity in Graphs, Special Graphs, Graph Algorithms.

Network Measures: Centrality, Transitivity and Reciprocity, Balance and Status, Similarity, Network Models: Properties of Real-World Networks, Random Graphs, Small-World Model, Preferential Attachment Model.

UNIT-II

Community Analysis: Community Detection, Community Evolution, Community Evaluation, Information.

Diffusion in Social Media: Herd Behaviour, Information Cascades, Diffusion of Innovations, Epidemics.

UNIT-III

Data Mining Essentials: Data, Data Preprocessing, Data Mining Algorithms, Supervised Learning, Unsupervised Learning.

Influence and Homophily: Measuring Assortativity, Influence, Homophily, Distinguishing Influence and Homophily.

UNIT-IV

Recommendation in Social Media: Challenges, Classical Recommendation Algorithms, Recommendation Using Social Context, Evaluating Recommendations.

Behavior Analytics: Individual Behavior, Collective Behavior.

UNIT-V

Prediction: Predicting the future, Prediction of learning, Predicting elections, Predicting Box offices, Predicting Stock market, Closing predictions.

Text Books:

1. Zafarani R., Abbasi M.A., Liu H, "Social Media Mining: An Introduction", Cambridge University Press, 2014.
2. Lutz Finger, Soumitra Dutta, "Ask, Measure, Learn: Using Social Media Analytics to Understand and Influence Customer Behavior", O'Reilly Media, 2014.

Suggested Reading:

1. David Easley and Jon Kleinberg, “Networks, Crowds and Markets”, Cambridge University Press, 2010
2. Bing Liu, “Sentiment Analysis: mining opinions, sentiments, and emotions”, Cambridge University Press, 2015.
3. Matthew A. Russell, “Mining the Social Web: Analyzing Data from Facebook, Twitter, LinkedIn, and Other Social Media Sites”, O'Reilly Media 2011.

Web Resources:

1. <http://www.kdd.org/kdd2015/tutorial.html>
2. <http://thinktostart.com/category/social-media/>
3. http://blogs.iit.edu/iit_web/social-media-2/social-media-whats-your-strategy/4

18IT E10

VIRTUAL REALITY
(Core Elective – 3)

Instruction	3 Hours per week
Duration of SEE	3 Hours
SEE	70 Marks
CIE	30 Marks
Credits	3

Course Objectives:

1. To familiarize the students with the fundamentals of Virtual Reality.
2. To impart the knowledge of 2D and 3D orientation for understanding the behavior of VR system with the environment.
3. To introduce the dynamics of the objects.
4. To deal with the factors involved to create virtual environment.
5. To introduce the applications of Virtual Reality Systems.

Course Outcomes:

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

1. Explain the basic concepts of Virtual Reality and 3D Computer Graphics.
2. Demonstrate geometric modeling, transformations and model of interaction of the virtual environment with the system.
3. Apply the dynamics of Virtual Environment and Physical simulation for real time applications.
4. Evaluate the human factors involved in Virtual Hardware and Virtual Software.
5. Develop a Virtual Reality application.

UNIT-I

Introduction to Virtual Reality: Virtual Reality and Virtual Environment: Introduction, Computer graphics, Real time computer graphics, Flight Simulation, Virtual environment requirement, benefits of virtual reality, Historical development of VR, Scientific Landmark.

3D Computer Graphics: Introduction, The Virtual world space, positioning the virtual observer, the perspective projection, human vision, stereo perspective projection, 3D clipping, Colour theory, Simple 3D modelling, Illumination models, Reflection models, Shading algorithms, Radiosity, Hidden Surface Removal, Realism-Stereographic image.

UNIT-II

Geometric Modelling: Geometric Modelling: Introduction, From 2D to 3D, 3D space curves, 3D boundary representation.

Geometrical Transformations: Introduction, Frames of reference, Modelling transformations, Instances, Picking, Flying, Scaling the VE, Collision detection.

Generic VR system: Introduction, Virtual environment, Computer environment, VR technology, Model of interaction, VR Systems.

UNIT-III

Virtual Environment: Animating the Virtual Environment: Introduction. The dynamics of numbers, Linear and Nonlinear interpolation, the animation of objects, linear and non-linear translation, shape & object inbetweening, free from deformation, particle system.

Physical Simulation: Introduction, Objects falling in a gravitational field, Rotating wheels, Elastic collisions, projectiles, simple pendulum, springs, Flight dynamics of an aircraft.

UNIT-IV

VR Hardware and Software: Human factors: Introduction, the eye, the ear, the somatic senses.

VR Hardware: Introduction, sensor hardware, Head-coupled displays, Acoustic hardware. Integrated VR systems.

VR Software: Introduction, Modelling virtual world, Physical simulation, VR toolkits, Introduction to VRML

UNIT-V

VR Applications: Introduction, Engineering, Entertainment, Science, Training. The Future: Virtual environment, modes of interaction.

Text Books:

1. John Vince, "Virtual Reality Systems ", Pearson Education Asia, 2007.
2. Anand R., "Augmented and Virtual Reality", Khanna Publishing House, Delhi.

Suggested Reading:

1. Adams, "Visualizations of Virtual Reality", Tata McGraw Hill, 2000.
2. Grigore C. Burdea, Philippe Coiffe, "Virtual Reality Technology", Wiley Inter Science, 2nd Edition, 2006.
3. Kelly S. Hale, Kay M. Stanney, "Handbook of Virtual Environments: Design, Implementation, and Applications", CRC Press, 2nd Edition, 2014.

Web Resource:

1. <https://nptel.ac.in/courses/106106138/>

18IT E11

SOFT COMPUTING
(Core Elective – 3)

Instruction	3 Hours per week
Duration of SEE	3 Hours
SEE	70 Marks
CIE	30 Marks
Credits	3

Course Objectives:

1. To familiarize with Artificial neural networks and supervised learning.
2. To introduce Memory networks, unsupervised learning and special networks.
3. To present Fuzzy sets, fuzzy relations and membership functions.
4. To familiarize with defuzzification, fuzzy measures and reasoning.
5. To facilitate the learning concepts of Genetic Algorithm and its applications.

Course Outcomes:

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

1. Understand ANN and various supervised learning networks.
2. Understand and compare architectures and training of associative memory networks, unsupervised learning networks and special networks.
3. Comprehend fuzzy sets, relations and membership functions.
4. Understand the process of defuzzification, apply fuzzy arithmetic and fuzzy rules for approximate reasoning.
5. Understand fuzzy decision making and apply various genetic algorithms.

UNIT-I

Artificial Neural Networks: Fundamental concepts, Evolution of neural networks, basic model of Artificial neural networks, Important terminology of ANNs, McCulloch-pitts neuron model, Linear separability, Hebb Network **Supervised Learning Network:** Perceptron networks, adaptive linear neuron (Adaline), Multiple adaptive linear neuron, Back propagation network, Radial basis Function network.

UNIT-II

Associative Memory Networks: Training algorithms for pattern Association, Associative memory network, Heteroassociative memory network: theory, architecture, Bidirectional Associative Memory: architecture, Discrete Bidirectional associative memory, Continuous BAM, Analysis of hamming distance, Energy function and storage capacity, Hopfield networks: Discrete Hopfield network, continuous Hopfield network. **Unsupervised Learning Networks:** Fixed Weight Competitive Nets, Kohonen Self-Organizing Feature Maps: architecture, training algorithm, Learning Vector Quantization: architecture, training algorithm, Adaptive Resonance Theory Network: theory, ART 1. **Special networks:** Simulated Annealing Networks, Boltzmann machine, Gaussian machine.

UNIT-III

Introduction to Fuzzy Logic, classical sets and fuzzy sets: Introduction to Fuzzy logic, Classical sets: Operations on classical sets, properties, Fuzzy sets: Operations, Properties. **Classical relations and Fuzzy Relations:** Fuzzy relations, Tolerance and Equivalence relations, **Membership functions:** Fuzzification, Membership value assignments: Inference, rank ordering, angular fuzzy sets.

UNIT-IV

Defuzzification: Lamda Cuts for fuzzy sets and fuzzy relations, defuzzification methods, **Fuzzy arithmetic and Fuzzy measures:** Fuzzy arithmetic, Extension principle, Fuzzy measures, Measures of fuzziness, Fuzzy integrals, **Fuzzy rule base and Approximate Reasoning:** Truth values and tables in fuzzy logic, Fuzzy propositions, Formation of rules, Decomposition of compound rules, Aggregation of fuzzy rules, Fuzzy reasoning, Fuzzy inference system, Overview of fuzzy expert system.

UNIT-V

Fuzzy decision making: Individual Decision Making, Multiperson, multi objective, multi attribute, Fuzzy Bayesian decision making, **Genetic Algorithm:** Introduction, basic terminology, Genetic algorithm vs

Traditional algorithm, simple GA, general genetic algorithm, Operators in GA, Stopping condition, Constraints, Schema theorem, Classification of genetic algorithm, Holland classifier systems, genetic programming, applications of genetic algorithm.

Text Book:

1. S. N. Sivanandam, S.N.Deepa, “Principles of Soft Computing”, Wiley India, 2008.

Suggested Reading:

1. Limin Fu, “Neural Networks in Computer Intelligence”, McGraw Hill, 1995.
2. Timoty J. Ross, “Fuzzy Logic with Engineering Applications”, McGraw Hill, 1997.
3. N.P. Padhy, S.P. Simon, “Soft Computing: With Matlab Programming”, Oxford University Press, Academic 2015.
4. J.S.R. Jang, C.T. Sun, E.Mizutani, “Neuro-Fuzzy and Soft Computing: A Computational Approach to Learning and Machine Intelligence”, Prentice Hall India, 1997.

Web Resources:

1. https://onlinecourses.nptel.ac.in/noc18_cs13/preview
2. https://www.tutorialspoint.com/artificial_intelligence/artificial_intelligence_neural_networks.htm

18IT E12

MOBILE COMMERCE

(Core Elective – 3)

Instruction	3 Hours per week
Duration of SEE	3 Hours
SEE	70 Marks
CIE	30 Marks
Credits	3

Course Objectives:

1. To introduce fundamentals of E-Commerce.
2. To examine strategies used by businesses used to improve purchasing, logistics, and other supporting activities.
3. To impart knowledge on technical infrastructure and security needed for M-Commerce.
4. To facilitate different e-payment options.
5. To acquaint with various security issues in E-Commerce.

Course Outcomes:

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

1. Understand electronic commerce and the stakeholders and their capabilities and limitations in the strategic convergence of technology and business.
2. Assess e-commerce strategies and applications, including online marketing, e-government, e-learning and global e-commerce.
3. Describe the concepts of M-Commerce and its applications.
4. Categorize advantages and disadvantages of different online payment options and choose an appropriate E-commerce Solution.
5. Identify the importance of security, privacy, and ethical issues as they relate to E-Commerce.

UNIT-I

Introduction: Definition, Objectives, Advantages and disadvantages, Forces driving E-Commerce, Traditional commerce Vs. E-Commerce, E-Commerce opportunities for industries, Growth of E-Commerce. E-Commerce Models: Business to consumer, Business to Business, Consumer to Consumer, other models – Brokerage Model, Aggregator Model, Info-mediary Model, Community Model and value chain Model.

UNIT-II

Introduction: The Fundamental Functional Platform of M-Commerce – Applications - The Value Chain Supporting M-Commerce Transactions. Services and Applications in Horizontal and Vertical Markets: Personal Organizers-Location Based Services and Applications - M-Commerce Portals- Communication and Messaging- M-Commerce Data Synchronization - Education-Gaming Services.

UNIT-III

A Framework for the study of Mobile Commerce, NTT DoCoMo's I-Mode, Wireless Devices For Mobile Commerce, Towards A Classification Framework For Mobile Location Based Services, Wireless Personal And Local Area Networks, The Impact Of Technology Advances On Strategy Formulation In Mobile Communications Networks.

UNIT -IV

Electronic Payment Systems: Special features required in payment systems, Types of E-payment systems, E-Cash, E-cheque, credit card, Smart Card, Electronic Purses.
E-Marketing, E-Customer Relationship Management, E-Supply Chain Management.

UNIT-V

Security Issues in E-Commerce: Security risk of E-Commerce, Types of threats, Security tools and risk management approach, Cyber laws, Business Ethics, IT Acts.

Text Books:

1. Ravi Kalakota & A.B. Winston, "Frontiers of Electronic Commerce", 1st Edition, Pearson Education, 2005.
2. E.BrianMennecke, J.TroyStrader, "Mobile Commerce: Technology, Theory and Applications", Idea Group Inc., IIRM press, 2003.

Suggested Reading:

1. Bharat Bhaskar, "Electronic Commerce – Framework Technologies and Applications", 3rd Edition, Tata McGraw Hill, 2008.
2. Paul May, "Mobile Commerce: Opportunities, Applications, and Technologies of Wireless Business" Cambridge University Press March 2001.
3. Dr.Pandey, Saurabh Shukla, "E-commerce and Mobile commerce Technologies", Sultan chand, 2011.

Web Resources:

1. Mobile Commerce World (www.mobilecommerceworld.com) Industry news.
2. Clarke, R. (1998) Electronic Data Interchange (EDI): An Introduction.
www.anu.edu.au/people/Roger.Clarke/EC/EDIIntro.htm
3. The worldwide Mobile Marketing Association (www.mmaglobal.com) has case studies and statistics of adoption.

18IT E13

DATA SCIENCE WITH PYTHON

(Core Elective – 4)

Instruction	3 Hours per week
Duration of SEE	3 Hours
SEE	70 Marks
CIE	30 Marks
Credits	3

Course Objectives:

1. To facilitate learning fundamentals of Numpy, Pandas and various file formats.
2. To familiarise with data pre-processing operations.
3. To introduce time series data and inferential statistics.
4. To acquire knowledge about visualisation and prediction.
5. To explore various case studies.

Course Outcomes:

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

1. Understand the usage of Numpy, Pandas libraries and various file formats.
2. Apply data pre-processing and visualization techniques on the data.
3. Perform time series data analysis and apply inferential statistics.
4. Visualize the data and apply prediction techniques.
5. Understand Collaborative filtering, clustering and ensemble models.

UNIT-I

NumPy Basics: Arrays and Vectorized Computation, Getting Started with pandas, Data Loading, Storage, and File Formats.

UNIT-II

Data Cleaning and Preparation, Data Wrangling: Join, Combine, and Reshape, Plotting and Visualization, Data Aggregation and Group Operations.

UNIT-III

Time Series, Advanced Pandas, Introduction to Modeling Libraries in Python, Data Analysis Examples, Inferential Statistics.

UNIT-IV

Finding a Needle in a Haystack, Making Sense of Data through Advanced Visualization, Performing Predictions with a Linear Regression, Estimating the Likelihood of Events.

UNIT-V

Generating Recommendations with Collaborative Filtering, Pushing Boundaries with Ensemble Models, Applying Segmentation with k-means Clustering, Analyzing Unstructured Data with Text Mining.

Text Books:

1. William McKinney, “Python for Data Analysis Data Wrangling with Pandas, NumPy and IPython”, 2nd Edition, O’Reilly Media, 2017.
2. Samir Madhavan, “Mastering Python for Data Science”, Packt Publishing, 2015.

Suggested Reading:

1. Joel Grus, “Data Science from Scratch”, O’Reilly Media, 2015.
2. John V. Guttag, “Introduction to Computation and Programming Using Python– with Application to Understanding Data”, The MIT Press, 2nd Edition, 2016.
3. Alberto Boschetti, Luca Massaron, “Python Data Science Essentials: A practitioner's guide covering essential data science principles, tools, and techniques”, 3rd Edition, 2018.

With effect from Academic Year 2020-21

Web Resources:

1. <https://www.analyticsvidhya.com/>
2. <https://www.kaggle.com>
3. <https://www.dataschool.io/>

18IT E14

DIGITAL IMAGE PROCESSING AND ANALYSIS

(Core Elective-4)

Instruction	3 Hours per week
Duration of SEE	3 Hours
SEE	70 Marks
CIE	30 Marks
Credits	3

Course Objectives:

1. To introduce the fundamental concepts and applications of digital image processing.
2. To impart knowledge on the image processing concepts: intensity transformations, spatial filtering, smoothing and sharpening in both spatial and frequency domains, image restoration and reconstruction.
3. To familiarize the image analysis concepts: morphological image processing, image segmentation, image representation and description, and object recognition.
4. To introduce colour image processing techniques.
5. To deal with various image compression methods.

Course Outcomes:

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

1. Explain the fundamental concepts and applications of digital image processing techniques.
2. Demonstrate intensity transformations, spatial filtering, smoothing and sharpening in both spatial and frequency domains, image restoration and reconstruction.
3. Develop an object recognition system using morphological image processing, image segmentation, image representation and description, and object recognition techniques.
4. Illustrate the various colour image processing techniques with applications.
5. Evaluate various image compression methods for compression ratio.

UNIT-I

Basics: Introduction: Fundamental Steps in Digital Image Processing, Components of an Image Processing System, Elements of visual perception, Image Sampling and Quantization - Basic Concepts in Sampling and Quantization, Representing Digital Images, Spatial and Intensity Resolution.

Some Basic Relationships between Pixels - Neighbours of a Pixel; Adjacency, Connectivity, Regions, and Boundaries, Distance Measures.

Intensity Transformations: Some Basic Intensity Transformation Functions - Image Negatives, Log Transformations, Power-Law (Gamma) Transformations, Piecewise-Linear Transformation Functions, Histogram Processing - Histogram Equalization, Histogram Matching (Specification), Local Histogram Processing.

UNIT- II

Spatial Filtering: Fundamentals of Spatial Filtering - The Mechanics of Spatial Filtering, Spatial Correlation and Convolution; Smoothing Spatial Filters - Smoothing Linear Filters, Order-Statistic (Nonlinear) Filters; Sharpening Spatial Filters – Foundation, Using the Second Derivative for Image Sharpening—The Laplacian, Unsharp Masking and Highboost Filtering.

Filtering in the Frequency Domain: The 2-D Discrete Fourier Transform and its inverse; Some Properties of the 2-D Discrete Fourier Transform - Relationships between Spatial and Frequency Intervals, Translation and Rotation, Periodicity, Symmetry Properties, Fourier Spectrum and Phase Angle, The 2-D Convolution Theorem; The Basics of Filtering in the Frequency Domain - Frequency Domain Filtering Fundamentals, Correspondence between Filtering in the Spatial and Frequency Domains; Image Smoothing Using Frequency Domain Filters - Ideal Low pass Filters, Butterworth Low pass Filters, Gaussian Low pass Filters; Image Sharpening Using Frequency Domain Filters - Ideal High pass Filters, Butterworth High pass Filters, Gaussian High pass Filters, Unsharp Masking, Highboost Filtering.

UNIT- III

Image Restoration and Reconstruction: A Model of the Image Degradation/Restoration Process, Noise Models - Spatial and Frequency Properties of Noise, Some Important Noise Probability Density Functions, Periodic Noise, Estimation of Noise Parameters; Restoration in the Presence of Noise Only—Spatial Filtering –

Mean Filters, Order-Statistic Filters, Adaptive Filters; Periodic Noise Reduction by Frequency Domain Filtering – Band reject Filters, Band pass Filters; Linear, Position-Invariant degradation; Estimating the Degradation Function - Estimation by Image Observation, Estimation by Experimentation, Estimation by Modelling; Inverse Filtering; Minimum Mean Square Error (Wiener) Filtering; Morphological Image Processing: Preliminaries; Erosion and Dilation; Opening and Closing.

UNIT- IV

Image Segmentation: Fundamentals; Points, Line and Edge Detection - Detection of Isolated Points, basic edge detection, edge linking and boundary detection; Thresholding – foundation, basic global thresholding, optimum global thresholding using otsu's method; Region-based Segmentation - region growing, region splitting and merging; Segmentation using Morphological Watersheds - background, dam construction, watershed segmentation algorithm.

Representation and Description: Representation - Boundary (Border) Following, Chain Codes, Polygonal Approximations Using Minimum-Perimeter Polygons, Signatures, Boundary Descriptors - Some Simple Descriptors, Shape Numbers, Fourier Descriptors, Statistical Moments, Regional Descriptors - Some Simple Descriptors, Topological Descriptors, Texture.

Object Recognition: Patterns and Pattern Classes, Recognition Based on Decision-Theoretic Methods – Matching, Optimum Statistical Classifiers, Neural Networks.

UNIT-V

Colour Image Processing: Colour Fundamentals; Colour Models - RGB Colour Model, CMY and CMYK Colour Models, The HSI Colour Model; Pseudo Colour Image Processing - Intensity Slicing, Intensity to Colour Transformations; Basics of Full-Colour Image Processing; Smoothing and Sharpening.

Image Compression: Fundamentals-Coding Redundancy, Spatial and Temporal Redundancy, Irrelevant Information, Measuring Image Information, Fidelity Criteria, Image Compression Models; Some Basic Compression Methods - Huffman Coding, Arithmetic Coding, LZW Coding, Block Transform Coding.

Text Book:

1. Rafael C Gonzalez and Richard E Woods, "Digital Image Processing", Pearson Education, 3rd Edition.

Suggested Reading:

1. Vipula Singh, "Digital Image Processing with MatLab and lab View", Elsevier.
2. Thomas B. Moeslund, "Introduction to Video and Image Processing: Building Real Systems and Applications", Springer, 2012.
3. Milan Sonka, Vaclav Halvac and Roger Boyle, "Image Processing, Analysis, and Machine Vision", 2nd Edition, Thomson Learning Publishers.
4. Kenneth R.Castleman, "Digital Image Processing", Pearson Education, 2006.

Web Resources:

1. www.imageprocessingplace.com
2. <https://in.mathworks.com/discovery/digital-image-processing.html>
3. <https://imagemagick.org/>
4. <https://nptel.ac.in/courses/117105079/>

18IT E15

ARTIFICIAL NEURAL NETWORKS AND DEEP LEARNING

(Core Elective-4)

Instruction	3 Hours per week
Duration of SEE	3 Hours
SEE	70 Marks
CIE	30 Marks
Credits	3

Course Objectives:

1. To familiarize with Artificial Neural Networks and the process of learning.
2. To introduce the concept of perceptron.
3. To give insights into Back propagation and Self organising maps.
4. To present the basics of Neuro dynamics and neuro dynamical models.
5. To introduce the concepts of Convolutional neural networks and Recurrent Neural Networks.

Course Outcomes:

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

1. Understand Neural Networks and various learning processes.
2. Apply single and multilayer perceptrons for problem solving.
3. Understand the process of learning in Back propagation and Self Organizing maps.
4. Comprehend neuro dynamical models.
5. Build Convolutional neural networks and work on recurrent neural networks.

UNIT – I

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

UNIT – II

Single Layer Perceptron: Adaptive Filtering Problem, Unconstrained Optimization Techniques, Linear Least-Square Filters, Least-Mean-Square Algorithm, Learning Curves, Learning Rate Annealing Techniques, Perceptron, Perceptron Convergence Theorem, Relation Between Perceptron and Bayes Classifier for a Gaussian Environment.

Multilayer Perceptrons: Back Propagation Algorithm, XOR Problem, Heuristics for making the back-propagation algorithm perform better, Output Representation and Decision Rule, Computer Experiment, Feature Detection.

UNIT – III

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

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

UNIT – IV

Neuro Dynamics: Dynamical Systems, Stability of Equilibrium States, Attractors, Neuro Dynamical Models, Manipulation of Attractors as a Recurrent Network Paradigm Hopfield Models – Hopfield Models, Computer Experiment-I.

UNIT – V

Convolutional Neural Networks: Neurons in Human Vision, The Shortcomings of Feature Selection, Filters and Feature Maps, Full Description of the Convolutional Layer, Max Pooling, Full Architectural Description of Convolution Networks, Building a Convolutional Network, Visualizing Learning in Convolutional Networks, Learning Convolutional Filters for Other Problem Domains.

Recurrent Neural Networks: Long Short-Term Memory (LSTM) Units, TensorFlow Primitives for RNN Models, Solving seq2seq Tasks with Recurrent Neural Networks, Augmenting Recurrent Networks with Attention, Dissecting a Neural Translation Network.

Text Books:

1. Simon Haykin, “Neural Networks a Comprehensive Foundation”, 2nd Edition, PHI, 1999.
2. Nikhil Buduma, Nicholas Lacascio “Fundamentals of Deep Learning”, 1st Edition, O’Reilly Media Inc., 2017.

Suggested Reading:

1. Li Min Fu, “Neural Networks in Computer Intelligence”, TMH, 2003.
2. Yoshua Bengio, Ian Goodfellow, Aaron Courville, “Deep Learning”, MIT Press, 2016.
3. C.M.Bishop, “Neural Networks and Pattern Recognition”, Oxford University Press (Indian Edition), 2003.

Web Resources:

1. <https://nptel.ac.in/courses/117105084/>
2. <http://deeplearning.net/>
3. <https://adeshpande3.github.io/A-Beginner%27s-Guide-To-Understanding-Convolutional-Neural-Networks/>

18IT E16

CYBER SECURITY
(Core Elective – 4)

Instruction	3 Hours per week
Duration of SEE	3 Hours
SEE	70 Marks
CIE	30 Marks
Credits	3

Course Objectives:

1. To present basic concepts of Cybercrime and Cyberattacks.
2. To introduce security challenges presented by mobile devices.
3. To impart knowledge on Tools and Methods used in Cybercrime.
4. To present fundamentals concepts in Cyber Forensics.
5. To familiarize about regulatory framework for Cybersecurity.

Course Outcomes:

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

1. Describe legal and global perspectives of Cybercrimes and inspect how criminals plan the attacks.
2. Identify attacks, security policies and credit card frauds in mobile and wireless computing Era.
3. Examine phishing techniques, keyloggers, spywares, password cracking methods and types of thefts used in cybercrimes.
4. Demonstrate the need for computer forensics, relevance of OSI layer model and implications for evidential aspects.
5. Evaluate the cost of cybercrimes, web threats, IPR issues, organizational guidelines for Internet usage and safe computing.

UNIT-I

Introduction to Cybercrime: Definition and origins of the word, Cybercrime and Information security, who are cybercriminals, Classification of Cybercrimes, Legal Perspectives, Indian Perspective, Cybercrime and the Indian ITA 2000, A Global Perspective on Cybercrimes, Cybercrime Era.

Cyberoffenses: Introduction, How Criminals plan the attacks, Social Engineering, CyberStalking, Cybercafe and Cybercrimes, Botnets, Attack vector, Cloud computing.

UNIT-II

Cybercrime Mobile and Wireless Devices: Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit Card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry settings for Mobile Devices, Authentication Service Security, Attack on Mobile/Cell Phones, Mobile Devices: Security Implications for Organizations, Organizational Measures for Handling Mobile Devices-Related Security Issues, Organizational security policies and measures in Mobile Computing Era, Laptops.

UNIT-III

Tools and Methods Used in Cybercrime: Introduction, Proxy servers and Anonymizers, Phishing, Password Cracking, Keyloggers and Spywares, Virus and Worms, Trojan Horses and Backdoors, Steganography, DoS and DDos Attacks, SQL Injection, Buffer Overflow, Attacks on wireless Networks.

Phishing and Identity Theft: Introduction, Phishing, Identity Theft.

UNIT-IV

Understanding Computer Forensics: Introduction, Historical Background of Cyberforensics, Digital Forensics Science, The Need for Computer Forensics, Cyberforensics and Digital Evidence, Forensics Analysis of E-mail, Digital Forensics Life cycle, Chain of Custody Concept, Network Forensics, Approaches a computer Forensics Investigation, Computer Forensics and Steganography, Relevance of the OSI 7 Layer model to computer Forensics, Forensics and social Networking Sites, Computer Forensics from Compliance perspective, Challenges in Computer Forensics, Special tools and Techniques, Forensics Auditing, Antiforensics.

UNIT-V

Cybersecurity Organizational Implications: Introduction, Cost of Cybercrimes and IPR Issues, Web Threats for Organizations, Security and Privacy Implications from Cloud Computing, Social Media Marketing, Social Computing and the Associated challenges for Organizations, Protecting People's Privacy in the Organization, Organizational Guidelines for Internet Usage, Safe Computing Guidelines and Computer Usage Policy, Incident Handling, Forensics Best practices for Organizations.

Text Books:

1. Nina Godbole, Sunit Belapure, "Cyber Security understanding Cyber Crimes, Computer forensics and Legal Perspectives", Wiley India Pvt.Ltd., 2013.
2. Harsh Bothra, "Hacking Be A Hacker with Ethics", Khanna Publishers 2017.

Suggested Reading:

1. William Stallings "Cryptography and Network Security Principles and Practice, 6th Edition, Pearson 2014.
2. Dr.V.K.Jain,"Cryptography and Network Security", 1st Edition, Khanna Book publishing New Delhi 2013.
3. Nina Godbole,"Information Systems Security Security Management, Metrics, Frameworks and Best Practices", Wiley, 2nd Edition, 2012.

Web Resources:

1. <https://www.nist.gov/>
2. <https://www.sans.org/>
3. <https://www.udemy.com/the-complete-cyber-security-course-end-point-protection/>

18MB C01

ENGINEERING ECONOMICS AND ACCOUNTANCY

Instruction	3 Hours per week
Duration of SEE	3 Hours
SEE	70 Marks
CIE	30 Marks
Credits	3

Course Objectives:

The Objectives of the course are:

1. To demonstrate the importance of Managerial Economics in Decision Making.
2. To explain the concept of Accountancy and provide basic knowledge on preparation of Final accounts.
3. To understand the importance of Project Evaluation in achieving a firm's Objective.

Course Outcomes:

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

1. Apply fundamental knowledge of Managerial economics concepts and tools.
2. Analyze various aspects of Demand Analysis, Supply and Demand Forecasting.
3. Understand production and cost relationships to make best use of resources available.
4. Apply accountancy concepts and conventions and preparation of final accounts.
5. Evaluate Capital and Capital Budgeting decision based on any technique.

Unit-I

Introduction to Managerial Economics: Introduction to Economics and its evolution - Managerial Economics - its Nature and Scope, Importance; Relationship with other Subjects. Its usefulness to Engineers; Basic concepts of Managerial economics - Incremental, Time perspective, Discounting Principle, Opportunity Cost, Equimarginal Principle, Contribution, Negotiation Principle.

Unit-II

Demand and Supply Analysis: Demand Analysis - Concept of Demand, Determinants, Law of demand - Assumptions and Exceptions; Elasticity of demand - Price, Income and Cross elasticity - simple numerical problems; Concept of Supply - Determinants of Supply, Law of Supply; Demand Forecasting - Methods.

Unit-III

Production and Cost Analysis: Theory of Production - Production function - Isoquants and Isocosts, MRTS, Input-Output Relations; Laws of returns; Internal and External Economies of Scale.
Cost Analysis: Cost concepts – Types of Costs, Cost-Output Relationship – Short Run and Long Run; Market structures – Types of Competition, Features, Price Output Determination under Perfect Competition, Monopoly and Monopolistic Competition; Break-even Analysis – Concepts, Assumptions, Limitations, Numerical problems.

Unit-IV

Accountancy: Book-keeping, Principles and Significance of Double Entry Book Keeping, Accounting Concepts and Conventions, Accounting Cycle, Journalization, Subsidiary books, Ledger accounts, Trial Balance concept and preparation of Final Accounts with simple adjustments. Ratio Analysis.

Unit-V

Capital and Capital Budgeting: Capital and its Significance, Types of Capital, Estimation of Fixed and Working capital requirements, Methods and sources of raising finance. Capital Budgeting, Methods: Traditional and Discounted Cash Flow Methods - Numerical problems.

Text Books:

1. Mehta P.L., "Managerial Economics: Analysis, Problems and Cases", Sultan Chand & Son's Educational publishers, 2016.
2. Maheswari S.N. "Introduction to Accountancy", Vikas Publishing House, 11th Edition, 2013.
3. Panday I.M. "Financial Management", 11th edition, Vikas Publishing House, 2015.

With effect from Academic Year 2020-21

Suggested Reading:

1. Varshney and KL Maheswari, Managerial Economics, Sultan Chand, 2014.
2. M.Kasi Reddy and S.Saraswathi, Managerial Economics and Financial Accounting, Prentice Hall of India Pvt Ltd, 2007.
3. A.R.Aryasri, Managerial Economics and Financial Analysis, McGraw-Hill, 2013.

18BT O01

BASICS OF BIOLOGY
(Open Elective – 1)

Instruction	3 Hours per week
Duration of SEE	3 Hours
SEE	70 Marks
CIE	30 Marks
Credits	3

Course Objectives: This course aims to:

1. Impart knowledge of origin and evolution of biological organisms.
2. Understand the structure and functions of human organ systems.
3. Understand the principles behind medical devices for diagnosis of human health and environment protection.
4. Give an insight of biological information, relationship and genome sequencing of various organisms.

Course Outcomes:

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

1. Explain the theories of origin and evolution of life.
2. Describe the anatomical structure and physiological functions of the human organ systems.
3. Outline the principle and applications of medical devices.
4. Discuss the technology advancements in improving human health and environment
5. Explain the biological information, sequencing and evolutionary relationship among organisms.

UNIT-I

Introduction to Biology: Classical Vs Modern Biology; Importance of Biological Science and Historical developments; Origin of Life, Urey Miller Experiment, Spontaneous Generation Theory; Three Domains of Life; Principle and Applications of Microscope (Light and Electron Microscope), Prokaryotic and Eukaryotic Cell- Structure and their differences.

UNIT-II

Human organ systems and their functions -I: Introduction to various organ systems of human body and their functions; Skeletal System-Bones, Tendon, Ligaments, principle and applications in knee replacement; Nervous System - Structure of Brain, Spinal Cord, Neuron, Neurotransmitters, Synapse, Alzheimer's - a case study, principle and applications of Imaging Techniques (CT & MRI scans); Circulatory System - Heart structure and functions, principle and applications of cardiac devices (Stent and Pacemaker), Artificial heart, blood components and typing, haemocytometer.

UNIT-III

Human Anatomy and Functions-II: Respiratory Systems - Lung structure and function, principle and applications of Peak Flow Meter, ECMO (Extra Corporeal Membrane Oxygenation); Excretory Systems-Kidney structure and function, principle and applications of Dialysis; Prenatal diagnosis; Assisted reproductive techniques- IVF, Surrogacy.

UNIT-IV

Medical Biotechnology and Bioremediation: Cells of Immune System, Etiology of cancer, Cancer treatment (Radiation Therapy); Stem Cells and its Clinical applications; Scaffolds and 3D printing of organs; Bio sensors and their applications; Parts of bioreactor and its types; Bioremediation.

UNIT-V

Bioinformatics: Nucleic acid composition, Genetic Code, Amino acid, Polypeptide, Levels of protein structure, Homolog, Ortholog and Paralog, Phylogenetics, Genome Sequencing, Human Genome Project, Next generation sequencing.

With effect from Academic Year 2020-21

Text Books:

1. Campbell, N.A., Reece, J.B., Urry, Lisa, Cain, M.L., Wasserman, S.A., Minorsky, P.V., Jackson, R.B. "Biology: A Global Approach", 11th Edition, Pearson Education Ltd. 2017
2. Shier, David, Butler, Jackie, Lewis, Ricki., "Hole's Human Anatomy & Physiology", 13th Edition, McGraw Hill 2017.
3. Dubey RC "A Text book of Biotechnology" 5th Edition, S Chand and Company limited, 2014.
4. Bernard R. Glick, T. L. Delovitch, Cheryl L. Patten, "Medical Biotechnology", 1st Edition, ASM Press, 2014.

18EG O02

GENDER SENSITIZATION
(Open Elective – 1)

Instruction	3 Hours per week
Duration of SEE	3 Hours
SEE	70 Marks
CIE	30 Marks
Credits	3

Course Objectives

This course will introduce the students to:

1. Sensibility regarding issues of gender in contemporary India.
2. A critical perspective on the socialization of men and women.
3. Popular debates on the politics and economics of work while helping them reflect critically on gender violence.

Course Outcomes

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

1. Understand the difference between “Sex” and “Gender” and be able to explain socially constructed theories of identity.
2. Recognize shifting definitions of “Man” and “Women” in relation to evolving notions of “Masculinity” and “Femininity”.
3. Appreciate women’s contributions to society historically, culturally and politically.
4. Analyze the contemporary system of privilege and oppressions, with special attention to the ways gender intersects with race, class, sexuality, ethnicity, ability, religion, and nationality.
5. Demonstrate an understanding of personal life, the workplace, the community and active civic engagement through classroom learning.

UNIT – I

Understanding Gender:

Gender: Why Should We Study It? (*Towards a World of Equals: Unit -1*)

Socialization: Making Women, Making Men (*Towards a World of Equals: Unit -2*)

Introduction. Preparing for Womanhood. Growing up Male. First lessons in Caste. Different Masculinities.

UNIT – II

Gender And Biology:

Missing Women: Sex Selection and Its Consequences (*Towards a World of Equals: Unit -4*)

Declining Sex Ratio. Demographic Consequences.

Gender Spectrum: Beyond the Binary (*Towards a World of Equals: Unit -10*)

Two or Many? Struggles with Discrimination.

UNIT – III

Gender and Labour:

Housework: the Invisible Labour (*Towards a World of Equals: Unit -3*)

“My Mother doesn’t Work.” “Share the Load.”

Women’s Work: Its Politics and Economics (*Towards a World of Equals: Unit -7*)

Fact and Fiction. Unrecognized and Unaccounted work. Additional Reading: Wages and Conditions of Work.

UNIT-IV

Issues Of Violence

Sexual Harassment: Say No! (*Towards a World of Equals: Unit -6*)

Sexual Harassment, not Eve-teasing- Coping with Everyday Harassment- Further Reading: “Chupulu”.

Domestic Violence: Speaking Out (*Towards a World of Equals: Unit -8*)

Is Home a Safe Place? -When Women Unite [Film]. Rebuilding Lives. Additional Reading: New Forums for Justice.

Thinking about Sexual Violence (*Towards a World of Equals*: Unit -11)

Blaming the Victim-“I Fought for my Life....” - Additional Reading: The Caste Face of Violence.

UNIT – V

Gender: Co - Existence

Just Relationships: Being Together as Equals (*Towards a World of Equals*: Unit -12)

Mary Kom and Onler. Love and Acid just do not Mix. Love Letters. Mothers and Fathers.

Additional Reading: Rosa Parks-The Brave Heart.

Textbook:

1. A. Suneetha, Uma Bhargubanda, Duggirala Vasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Tharu “Towards a World of Equals: A Bilingual Textbook on Gender” published by Telugu Akademi, Hyderabad, Telangana State, 2015.

Suggested Reading:

1. Menon, Nivedita. Seeing like a Feminist. New Delhi: Zubaan-Penguin Books, 2012
2. Abdulali Sohaila. “**I Fought For My Life...and Won.**” Available online at:
<http://www.thealternative.in/lifestyle/i-fought-for-my-lifeand-won-sohaila-abdulal/>

Web Resources:

1. <https://aifs.gov.au/publications/gender-equality-and-violence-against-women/introduction>
2. <https://theconversation.com/achieving-gender-equality-in-india>

Note: Since it is an Interdisciplinary Course, Resource Persons can be drawn from the fields of English Literature or Sociology or Political Science or any other qualified faculty who has expertise in this field from engineering departments.

18ME 003

RESEARCH METHODOLOGIES

(Open Elective – 1)

Instruction	3 Hours per week
Duration of SEE	3 Hours
SEE	70 Marks
CIE	30 Marks
Credits	3

Course Objectives:

1. To make the students to formulate the research problem
2. To identify various sources for literature review and data collection.
3. To prepare the research design.
4. To equip the students with good methods to analyze the collected data.
5. To explain how to interpret the results and report writing.

Course Outcomes:

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

1. Define research problem.
2. Review and assess the quality of literature from various sources.
3. Understand and develop various research designs.
4. Analyze problem by statistical techniques: ANOVA, F-test, Chi-square.
5. Improve the style and format of writing a report for technical paper/ Journal report.

UNIT-I

Research methodology: Objectives and motivation of research, types of research- descriptive vs. analytical, applied vs. fundamental, quantitative vs. qualitative, conceptual vs. empirical, research approaches, significance of research, research methods vs. methodology, research process, criteria of good research, problems encountered by researchers in India, technique involved in defining a problem

UNIT-II

Literature survey: Importance of literature survey, sources of information-primary, secondary, tertiary, assessment of quality of journals and articles, information through internet.

UNIT-III

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, steps in sample design.

UNIT-IV

Data collection: Collection of primary data, Secondary data, measures of central tendency-mean, mode, median, measures of dispersion- range, mean deviation, standard deviation, measures of asymmetry (skewness), important parametric tests -z, t, F, Chi-Square, ANOVA significance.

UNIT-V

Research report formulation and presentation: Synopsis, dissertation, technical paper and journal paper, writing research grant proposal, making presentation with the use of visual aids, writing a proposal for research grant.

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. Vijay Upagade and Aravind Shende, "Research Methodology", S. Chand & Company Ltd., New Delhi, 2009.

Suggested Reading:

1. G. Nageswara Rao, "Research Methodology and Quantitative methods", BS Publications, Hyderabad, 2012.
2. Naval Bajjai, "Business Research Methods", Pearson Education, 2011.

18MT O02

GRAPH THEORY
(Open Elective – 1)

Instruction	3 Hours per week
Duration of SEE	3 Hours
SEE	70 Marks
CIE	30 Marks
Credits	3

Course Objectives:

1. To discuss the basic and core concepts in Graph, Euler Graph and its path.
2. To explain the Matching and Covering in Bipartite Graph.
3. To demonstrate how Matching are used in Principles, Models underlying theory.
4. To explain One-Way Traffic, Rankings in a tournament.
5. To discuss Algorithmic approach to solve Network flow problems.

Course Outcomes:

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

1. Identify the concepts of the Graph Theory in related problems.
2. Determine the solutions in Matching and Covers, Maximum Matching in Bipartite Graph.
3. Calculate the solutions for Matching and Faster Bipartite Matching, Matching in general graphs and related Algorithms.
4. Apply the Knowledge of Job sequencing, One-Way Traffic, Rankings to solve real time problems.
5. Solve combinatorial optimization problems pertaining to Network flow.
6. Construct solutions to real world problems.

UNIT-I

Introduction to Graphs & its Applications: Basics of Paths, Cycles, and Trails, Connection, Bipartite Graphs, Eulerian Circuits, Vertex Degrees and Counting, Degree-sum formula, The Chinese –Postman- Problem and Graphic Sequences.

UNIT-II

Matchings: Matchings and Covers, Hall's Condition, Min-Max Theorem, Independent Sets, Covers and Maximum Bipartite Matching, Augmenting Path Algorithm.

UNIT-III

Matchings & its Applications: Weighted Bipartite Matching, Hungarian Algorithm, Stable Matchings and Faster Bipartite Matching, Factors & Perfect Matching in General Graphs, Matching in General Graphs: Edmonds' Blossom Algorithm.

UNIT-IV

Directed graphs & its Applications: Directed Graphs, Directed Paths, Directed Cycles, Applications - A Job Sequencing Problem, Designing an Efficient Computer Drum, Making a Road System One-way, Ranking the Participants in a Tournament.

UNIT-V

Networks & its Applications: Flows, cuts, Ford-Fulkerson labelling algorithm, the max-flow min-cut theorem, Applications-Menger's theorems, Feasible flows.

Text Books:

1. J.A. Bondy and U.S.R. Murty, "Graph Theory with Applications, Springer", 2008.
2. D.B. West, "Introduction to Graph Theory", Prentice-Hall of India/Pearson, 2009.
3. N. Deo, "Graph Theory with Applications to Engineering and Computer Science", PHI publication, 3rd Edition, 2009.

Suggested Reading:

1. R. Diestel, "Graph Theory", Springer, 2000.
2. F. Harary, "Graph Theory", Narosa, print 2013.

3. C.L. Liu, “Elements of Discrete Mathematics”, Tata McGraw Hill, 2nd Edition, 2000.

18EE M01

INDIAN TRADITIONAL KNOWLEDGE

Instruction	2 Hours per week
Duration of SEE	2 Hours
SEE	50 Marks
Credits	0

Course Objectives:

1. To get a knowledge in Indian Culture.
2. To Know Indian Languages and Literature and the fine arts in India.
3. To explore the Science and Scientists of Medieval and Modern India.

Course Outcomes:

After completion of this course, students will be able to:

1. Understand the culture, civilization, and heritage of Ancient, Medieval and Modern India.
2. Distinguish various Languages and Literature existing in India.
3. Discuss and Compare Philosophy and Religion in Indian since ancient times.
4. Explore various Fine arts in Indian History, and Illustrate the development of Science and Technology in India.
5. Describe the Indian Education System, and recognize the efforts of scientist to the development of India.

UNIT-I

Introduction to Culture: Culture, civilization, culture and heritage, general characteristics of culture, importance of culture in human literature, Indian Culture, Ancient India, Medieval India, Modern India.

UNIT-II

Indian Languages, Culture and Literature:

Indian Languages and Literature-I: the role of Sanskrit, significance of scriptures to current society, Indian philosophies, other Sanskrit literature, literature of south India.

Indian Languages and Literature-II: Northern Indian languages & literature.

UNIT-III

Religion and Philosophy: Religion and Philosophy in ancient India, Religion and Philosophy in Medieval India, Religious Reform Movements in Modern India (selected movements only).

UNIT-IV

Fine arts in India (Art, Technology & Engineering): Indian Painting, Indian handicrafts, Music, divisions of Indian classic music, modern Indian music, Dance and Drama, Indian Architecture (ancient, medieval and modern), Science and Technology in India, development of science in ancient, medieval and modern India.

UNIT-V

Education system in India: Education in ancient, medieval and modern India, aims of education, subjects, languages, Science and Scientists of Ancient India, Science and Scientists of Medieval India, Scientists of Modern India.

Text Books:

1. Kapil Kapoor, Text and Interpretation: The India Tradition, ISBN: 81246033375, 2005.
2. Science in Samskrit, Samskrita Bharti Publisher, ISBN-13: 978-8187276333, 2007.
3. S. Narain, Examinations in ancient India, Arya Book Depot, 1993.
4. Satya Prakash, Founders of Sciences in Ancient India, Vijay Kumar Publisher, 1989.
5. M. Hiriyanna, Essentials of Indian Philosophy, Motilal Banarsidass Publishers, ISBN-13: 978 8120810990, 2014.

Suggested Reading:

1. Kapil Kapoor, Language, Linguistics and Literature: The Indian Perspective, ISBN-10: 8171880649, 1994.

2. Karan Singh, A Treasury of Indian Wisdom: An Anthology of Spiritual Learn, ISBN: 978-0143426158, 2016.

18IT C24

ARTIFICIAL INTELLIGENCE LAB

Instruction	2 Hours per week
Duration of SEE	2 Hours
SEE	35 Marks
CIE	15 Marks
Credits	1

Course Objectives:

1. To familiarize with search and game playing strategies.
2. To introduce logic programming concepts through Prolog.
3. To learn probabilistic reasoning on uncertain data.
4. To familiarize with supervised learning algorithms.
5. To introduce Natural Language Processing

Course Outcomes:

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

1. Build intelligent agent for search.
2. Implement logic programming.
3. Apply probabilistic reasoning on data.
4. Apply the techniques of supervised and reinforcement learning on data.
5. Perform NLP operations with and without NLTK.

List of Programs

1. Implementation of uninformed and informed search techniques.
2. Implementation of game search.
3. Installation of prolog and demonstration of basic operations.
4. Design of a Bayesian network from given data.
5. Demonstration of supervised learning algorithms.
6. Demonstration of reinforcement learning.
7. Design an Artificial Neural Network by implementing the Back propagation algorithm and test the same using appropriate data sets.
8. Implementation of simple chatbot.
9. Demonstration of the following operations on text data.
 - a. Removal of punctuations in the given string.
 - b. Generation of string tokens.
10. Demonstration of the following operations using NLTK.
 - a. Removal of stop words for a given passage from a text file.
 - b. Stemming for a given sentence.
 - c. POS tagging for a given sentence to classify text data.

Text Books:

1. Saroj Kaushik, "Artificial Intelligence", Cengage Learning India, 2011.
2. Russell, Norvig, "Artificial intelligence - A Modern Approach", Pearson Education, 3rd Edition, 2015.

Suggested Reading:

1. Rich, Knight, Nair: "Artificial intelligence", Tata McGraw Hill, 3rd Edition, 2009.
2. Nicole Bauerle, Ulrich Rieder, "Markov Decision Process with Applications to Finance", Springer, 2011.
3. Nilsson, N., "Artificial Intelligence: A New Synthesis", Morgan Kaufmann, 1st Edition, 1998.

Web Resources:

1. https://ai.berkeley.edu/project_overview.html
2. <http://aima.cs.berkeley.edu/>

18IT C25

INFORMATION SECURITY LAB

Instruction	2 Hours per week
Duration of SEE	2 Hours
SEE	35 Marks
CIE	15 Marks
Credits	1

Course Objectives:

1. To provide basic cryptography techniques for securing the data.
2. To impart knowledge on symmetric and Asymmetric encryption techniques.
3. To facilitate understanding of digital signatures and key management.
4. To deal with the configuration and use of technologies designed to segregate the organization's systems from the insecure Network.
5. To familiarize with various security threats that modern organizations face.

Course Outcomes:

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

1. Demonstrate encryption and decryption methods using substitution, transposition and product ciphers.
2. Develop the code using symmetric and asymmetric encryption algorithms like AES, Blowfish and Diffie Hellman key exchange.
3. Build the program to calculate the message digest of a text using Hash algorithms like MD5 and SHA1.
4. Construct the code using digital signature algorithm to solve data integrity problems.
5. Experiment with rootkits, Wireshark, Nmap to troubleshoot network problems and to develop and test software.

List of Programs

1. Program to implement encryption and decryption using the following:
a) Substitution cipher b) Transposition Cipher c) Product Cipher
2. Program to implement AES Algorithm.
3. Program to implement Blowfish algorithm.
4. Program to implement the Diffie-Hellman Key exchange algorithm.
5. Program to calculate the message digest of a text using the SHA-1 algorithm.
6. Program to calculate the message digest of a text using the MD5 algorithm.
7. Program to implement Digital Signature algorithm.
8. Demonstrate intrusion detection system using SNORT tool or any other software.
9. Installation of rootkits and study about the variety of options.
10. Implement Wireshark to capture the packets and interfaces.
11. Setup a honey pot and monitor the honeypot on network using KF sensor.
12. Demonstrate how to managing securing policies using tcpdump, dumpcap using Wireshark.
13. Demonstration of pentest tools using Nmap, Wireshark.

Text Books:

1. Michael Gregg, "Build Your Own Security Lab", Wiley Publishing, Inc., 2008.
2. Michael E. Whitman, Herbert J. Mattord, Andrew Green, "Hands on Information Security lab manual", Cengage Learning, Fourth edition, December 27, 2013.

Suggested Readings:

1. Alfred Basta, Wolf Halton, "Computer Security, concepts, issues and implementation", Cengage Learning India Pvt Ltd, 2008.
2. William Stallings, "Cryptography and Network Security principles and practice", 5th Edition, Pearson Education, Inc., publishing as Prentice Hall 2011.

Web Resources:

1. <https://www.sans.org/security-resources/blogs>
2. <http://opensecuritytraining.info/HTID.html>
3. <http://cyber.gatech.edu/research>
4. <https://www.udemy.com/topic/penetration-testing/>
5. <https://nmap.org/>
6. <https://www.bornfortech.net/best-rootkit-remover/>
7. <https://www.snort.org/>
8. <https://www.wireshark.org/>

18IT C26**MINI PROJECT – IV**

Instruction	2 Hours per week
Duration of SEE	-
SEE	-
CIE	50 Marks
Credits	1

Course Objectives:

1. To enable students to learn by doing.
2. To develop capability to analyse and solve real world problems.
3. To develop innovative ideas among the students

Course Outcomes:

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

1. Interpret Literature with the purpose of formulating a project proposal.
2. Planning, analyzing, Designing and implement a software project using SDLC model.
3. Find the solution of identified problem with the help of modern Technology and give priority to real time scenarios.
4. Plan to work as a team and to focus on getting a working project done and submit a report with in a stipulated period of time.
5. Final Seminar, as oral Presentation before departmental Committee.

The Students are required to implement a project from opted subject in the core elective - 4. During the implementation of the project, Personnel Software Process (PSP) has to be followed. Report of the project work is to be submitted at the end of the Semester for evaluation.

Schedule

S.No	Programming concepts are to be taught related to the courses choosen from core elective – 4	4 weeks
1.	Problem Identification / Selection	2 weeks
2.	Preparation of Abstract	1 week
3.	Design, Implementation & Testing of the Project	5 weeks
4.	Documentation & Project Presentation	2 weeks

Guidelines for the Award of marks

S.No.	Description	Max. Marks
1.	Weekly Assesment	20
2.	PPT Preparation	05
3.	Presentation	10
4.	Question and Answers	05
5.	Report Preparation	10

Final Mini Project demonstration and PPT presentation is to be evaluated for the entire class together by all the faculty handling Mini Project for that class.