IT-801 – Information Security

Branch: Information Technology, VIII Semester
Course: Information Security

Unit I: Basic of Cryptography, secret key cryptography, Types of attack, Substitution ciphers, Transposition ciphers, block ciphers and steam ciphers, Confusion and Diffusion, Data encryption standard, round function, modes of operation, cryptanalysis, brute force attack, Security Goals (Confidentiality, Integrity, Availability).

Unit II: Public key Cryptography, Modulo arithmetic, Greatest common divisor, Euclidean algorithm, RSA algorithm, hash function, attack on collision resistance, Diffie hellman key exchange, Digital signature standard, elliptic curve cryptography.

Unit III: Authentication: One way Authentication, password based, certificate based, Mutual Authentication, shared secret based, Asymmetric based, Authentication and key agreement, centralized Authentication, eavesdropping, Kerberos, IP security overview:- security association & Encapsulating security payload, tunnel and transfer modes, internet key exchange protocol, Secure Socket Layer (SSL), Transport Layer Security (TLS).

Unit IV: Software vulnerabilities: Phishing Attacks, buffer overflow vulnerability, Format String attack, Cross Site Scripting, SQL injection Attacks, Email security:- Security services of E-mail, Establishing keys, Privacy, Authentication of the source, Message integrity, Non-Repudiation, Viruses, Worms, Malware.


References:-
Forouzan, “Cryptography & Network Security”, TMH
Atual Kahate, “Cryptography and Network Security”, TMH.

List of Experiment:-
- Study of Network Security fundamentals - Ethical Hacking, Social Engineering practices.
- System threat attacks - Denial of Services.
- Sniffing and Spoofing.
- Web Based Password Capturing.
- Virus and Trojans.
- Anti-Intrusion Technique – Honey pot.
- Symmetric Encryption Scheme – RC4.
- Block Cipher – S-DES, 3-DES.
- Asymmetric Encryption Scheme – RSA.
- IP based Authentication.
IT-802 – Soft Computing

Branch: Information Technology, VIII Semester  
Course: Soft Computing

Unit I: Introduction to Neural Network: Concept, biological neural network, evolution of artificial neural network, McCulloch-Pitts neuron models, Learning (Supervise & Unsupervise) and activation function, Models of ANN - Feed forward network and feed back network, Learning Rules-Hebbian, Delta, Perceptron Learning and Window-Hoff, winner take all.

Unit II: Supervised Learning: Perceptron learning, Single layer/multilayer, linear Separability, Adaline, Madaline, Back propagation network, RBFN. Application of Neural network in forecasting, data compression and image compression.

Unit III: Unsupervised learning: Kohonen SOM (Theory, Architecture, Flow Chart, Training Algorithm) Counter Propagation (Theory, Full Counter Propagation NET and Forward only counter propagation net), ART (Theory, ART1, ART2). Application of Neural networks in pattern and face recognition, intrusion detection, robotic vision.


Unit V: Genetic Algorithm: Introduction to GA, Simple Genetic Algorithm, terminology and operators of GA (individual, gene, fitness, population, data structure, encoding, selection, crossover, mutation, convergence criteria). Reasons for working of GA and Schema theorem, GA optimization problems including JSPP (Job shop scheduling problem), TSP (Travelling salesman problem), Network design routing, timetabling problem. GA implementation using MATLAB.

References:-  
Jack M. Zurada, “Introduction to Artificial Neural Network System” JAIco Publication.  
Simon Haykins, “Neural Network- A Comprehensive Foundation”  

List of Experiment:-  
- Form a perceptron net for basic logic gates with binary input and output.  
- Using Adaline net, generate XOR function with bipolar inputs and targets.  
- Calculation of new weights for a Back propagation network, given the values of input pattern, output pattern, target output, learning rate and activation function.  
- Construction of Radial Basis Function Network.  
- Use of Hebb rule to store vector in auto associative neural net.  
- Use of ART algorithm to cluster vectors.  
- Design fuzzy inference system for a given problem.  
- Maximize the function $y = 3x^2 + 2$ for some given values of $x$ using Genetic algorithm.  
- Implement Travelling salesman problem using Genetic Algorithm.  
- Optimisation of problem like Job shop scheduling using Genetic algorithm.
IT830- Component Based Software Engineering

Branch : Information Technology, VIII Semester
Course: Component Based Software Engineering


Unit V: Component Technologies: Overview of the CORBA Component Model, Transactional COM+, Designing Scalable Applications, The Enterprise JavaBeans Component Model, Choosing Between COM+, EJB, and CCM, Software Agents as Next Generation Software Components

References:-
**IT831-Real Time Systems**

**Branch**: Information Technology, VIII Semester  
**Course**: Real Time Systems

**Unit I**: Introduction to real time systems, structure, issues, task classes, performance measures for real time systems-their properties, traditional measures, cost functions and hard deadlines. Estimation of program run time-source code analysis, accounting for pipelining and caches.

**Unit II**: Task Assignment and Scheduling-Rate monotonic scheduling algorithm, Preemptive earliest deadline first algorithm, Using primary and alternative tasks. Task Assignment-Utilization balancing algorithm, next fit for RM(Rate monitoring) scheduling, Bin packing assignment algorithm for EDF, Myopic offline scheduling(MOS) algorithm, Focused addressing and bidding(FAB) algorithm, Buddy strategy, Assignment with precedence conditions.

**Unit III**: Programming Languages & Tools- Desired language characteristics,, data typing, control structures, hierarchical decomposition, packages, run time error handling, Overloading and genetics, Multitasking, Low level programming, Fex, Euclid, Run time support.

**Unit IV**: Real time Communication-Communication media, network topologies. Protocols-Contention based, Token based, Stop-and-Go, Polled bus, Hierarchical round robin, deadline based.

**Unit V**: Fault Tolerance Techniques- Fault, fault types, fault detection, fault and error containment, hardware and software redundancy, time redundancy, information redundancy. Reversal checks, Malicious or Byzantine failures, Integrated failure handling.

**References:-**
- C.M Krishna and Kang G. Shin, Real Time Systems, TMH  
- Stuart Bennelt, Real time computer control and introduction, Pearson education, 2003  
- Jane W.S Liu, Real time systems, Mc-Graw Hill
IT832 Image processing

Branch : Information Technology, VIII Semester
Course: Image Processing


Unit II: Image Enhancement: Intensity transformations, histogram processing, Image subtraction, image averaging, Spatial filtering-smoothing and sharpening filters, frequency domain filtering methods-low pass filtering, high pass filtering, median filtering.

Unit III: Image compression: Redundancy and its types. Image compression model, variable length coding, bit plane coding, constant area coding, run length coding, lossless and lossy predictive coding, transform coding.

Unit IV: Image restoration and Segmentation: Degradation model, effect of diagonalisation on degradation, algebraic approach. Detection of discontinuities by point, line and edge detection. Edge linking, graph theoretic techniques, thresholding techniques, region oriented segmentation.

Unit V: Representation & Description: Chain codes, polygonal approximations, signatures, boundary segments, skeleton, boundary descriptors, shape descriptors regional descriptors, image morphology-dilation, erosion, opening, closing, thickening, thinning, skeleton, pruning, hit or miss transform.

References:-
- Anil K Jain, “Fundamentals of Digital image processing”. PHI.
- B Chanda, D. Dutta Majumder, “Digital image Processing and Analysis”, PHI.
**IT 833 Artificial Intelligence**

**Branch**: Information Technology, VIII Semester  
**Course**: Artificial Intelligence

**Unit I**: Meaning and definition of artificial intelligence, Various types of production systems, Characteristics of production systems, Study and comparison of breadth first search and depth first search. Techniques, other Search Techniques like hill Climbing, Best first Search. A* algorithm, AO* algorithms etc, and various types of control strategies.

**Unit II**: Knowledge Representation, Problems in representing knowledge, knowledge representation using propositional and predicate logic, comparison of propositional and predicate logic, Resolution, refutation, deduction, theorem proving, inferencing, monotonic and non-monotonic reasoning.

**Unit III**: Probabilistic reasoning, Baye’s theorem, semantic networks, scripts, schemas, frames, conceptual dependency, fuzzy logic, forward and backward reasoning.

**Unit IV**: Game playing techniques like minimax procedure, alpha-beta cut-offs etc, planning, Study of the block world problem in robotics, Introduction to understanding and natural languages processing.

**Unit V**: Introduction to learning, Various techniques used in learning, introduction to neural networks, applications of neural networks, common sense, reasoning, some example of expert systems.

**References:-**
**IT840-Data Mining & Warehousing**

**Branch**: Information Technology, VIII Semester

**Course**: Data Mining and Warehousing

**Unit I: Data Warehousing**: Need for data warehousing, Basic elements of data warehousing, Data Mart, Data Warehouse Architecture, extract and load Process, Clean and Transform data, Star ,Snowflake and Galaxy Schemas for Multidimensional databases, Fact and dimension data, Partitioning Strategy-Horizontal and Vertical Partitioning.

**Unit II**: Data Warehouse and OLAP technology, Multidimensional data models and different OLAP Operations, OLAP Server: ROLAP, MOLAP, Data Warehouse implementation ,Efficient Computation of Data Cubes, Processing of OLAP queries, Indexing data.

**Unit III: Data Mining**: Data Preprocessing ,Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation , Basics of data mining, Data mining techniques, KDP (Knowledge Discovery Process), Application and Challenges of Data Mining, Introduction of Web Structure Mining, Web Usage Mining, Spatial Mining, Text Mining, Security Issue, Privacy Issue, Ethical Issue.

**Unit IV: Mining Association Rules in Large Databases**: Association Rule Mining, Single-Dimensional Boolean Association Rules, Multi-Level Association Rule, Apriori Algorithm, Fp-Growth Algorithm, Time series mining association rules, latest trends in association rules mining.

**Unit V**: Classification and Clustering Distance Measures, Types of Clustering, K-Means Algorithm, Decision Tree Induction, Bayesian Classification, Association Rule Based, Other Classification Methods, Prediction, Classifier Accuracy, Categorization of methods, Partitioning methods, Outlier Analysis.

**Reference:-**
- M.H.Dunham, “Data Mining Introductory & Advanced Topics”, Pearson Education.
- M.Berry , G.Linoff, “Master in Data Mining”, John Wiley.
- W.H.Inmon, “Building the Data Ware houses”, Wiely Dreamtech.
IT841-Cyber law & Forensic

Branch: Information Technology, VIII Semester
Course: Cyber Law & Forensic

Unit I: Cyber world: an overview, internet and online resources, security of information, digital signature, intellectual property (IP), historical background of IP, IPR governance, National patent offices, the world intellectual property organization (WIPO).

Unit II: Introduction about the cyber space, cyber law, regulation of cyber space, scope of cyber laws: ecommerce; online contracts; IPRs (copyright, trademarks and software patenting), e-taxation; e-governance and cyber crimes, cyber law in India with special reference to Information Technology Act, 2000.

Unit III: Introduction to computer and cyber crimes. Cyber crimes and related concepts, distinction between cyber crimes and conventional crimes, Cyber criminals and their objectives. Kinds of cyber crimes cyber stalking; cyber pornography, forgery and fraud, crime related to IPRs, cyber terrorism; computer vandalism etc. Cyber forensics, computer forensics and the law, forensic evidence, computer forensic tools.

Unit IV: Regulation of cyber crimes, Issues relating to investigation, issues relating to jurisdiction, issues relating to evidence, relevant provisions under Information Technology Act 2000, Indian penal code, pornography Act and evidence Act etc.

Unit V: Copyright issues in cyberspace: linking, framing, protection of content on web site, international treaties, trademark issues in cyberspace: domain name dispute, cyber squatting, uniform dispute resolution policy, computer software and related IPR issues.

References:
- NIIT, Understanding Forensics in IT, PHI Learning.
- IT Act 2000 Details www.mit.gov.in
- Simpson, “Ethical Hacking and Network Defense”, Cengage Learning India
IT842- Adhoc Network

Branch : Information Technology, VIII Semester
Course: Ad Hoc Networks


References Books:-
- Charles E. Perkins, Ad Hoc Networking, Pearson Education.
IT843 - Operation Research

Branch: Information Technology, VIII Semester
Course: Operational Research

Unit I: Introduction to Linear Programming, Solution by Graphical and Simplex Method, Concept of Degeneracy and Duality, Artificial Variable Techniques: Big-M Method, Two Phase Method, Solution of Transportation Problems by North-West Corner Method, Lowest Cost Entry Method, Vogel’s Method, Non-Degenerate Basic Feasible Solution, Assignment Model

Unit II: Integer Programming: Relationship to Linear Programming, Branch and Bound, Cutting Plane Techniques: General Cutting Planes, Dynamic Programming: Introduction, Bellman’s Principle of optimality, Applications of dynamic programming, Critical Path Method, PERT

Unit III: Replacement, Introduction, Replacement of items that deteriorate with time when money value is not counted and counted, Replacement of items that fail completely, group replacement. Games Theory: Introduction, Minimax (maximin), Criterion and optimal strategy, Solution of games with saddle points, Rectangular games without saddle points, 2 X 2 games, dominance principle—m X 2 & 2 X n games.

Unit IV: Inventory: Introduction, Single item – Deterministic models, Purchase inventory models with one price break and multiple price breaks shortages are not allowed, Stochastic models demand may be discrete variable or continuous variable, Instantaneous production. Instantaneous demand and continuous demand and no set up cost.

Unit V: Waiting Lines: Introduction, Single Channel, Poisson arrivals, exponential service times with infinite population and finite population models, Multi channel, Poisson arrivals, exponential service times with infinite population single channel Poisson arrivals: (M/M/1 : /FCFS), (M/M/1 : N/FCFS), (M/Ek/1 : /FCFS), (M/M/S : /FCFS)

References:-
- Taha, “Introduction to O.R”, PHI.