Third Year - Sixth Semester

Branch: Computer Science and Engineering

Course Code	**CS 601**
Course Title	**COMPUTER NETWORKS AND SECURITY**
Type of Course	Core
L T P	3 1 0
Credits	4
Course Assessment Methods End Semester Assessment (University Exam.) Continuous Assessment (Sessional, Assignments, Quiz)	 50 50
Course Prerequisites	Data Communication and Networks (CS 501)
Course Objectives (CO)	1. To introduce the data communication components, data flow and network categories and reference models. 2. To introduce the concepts of analog and digital signals, multiplexing, transmission media and switching techniques 3. To introduce different techniques for error detection and correction, media access and flow control protocols. 4. To introduce concepts of logical addressing, routing algorithms and congestion control algorithms. 5. To introduce the techniques for buffering, crash recovery, network security and application protocols.
Course Outcome	1. Understand the fundamental concepts of computer networking and enumerate the functions of Physical layer and Data Link layer. 2. Understand Network layer and Transport Layer functions and protocols. 3. Familiarize with different Application layer functions and protocols. 4. Demonstrate the knowledge of different protocols and security techniques.

SYLLABUS

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SECTION-A

Introduction:

Data Communication: Components, Data Flow; Network Categories: LAN, MAN, WAN (Wireless / Wired); Network Software: Concept of layers, protocols, interfaces and services; Reference Model: OSI, TCP/IP and their comparison. Review of functionality of Physical and Data Link layer.

(7 hours)

Network Layer:

Logical Addressing: IPv4 and IPv6; Packet Formats & their comparison: IPv4 and IPv6;

Routing algorithms: Distance vector, Link State Routing, Hierarchical Routing, Broadcast & Multicast Routing.

Congestion Control: Principles of Congestion Control, Congestion prevention policies, Leaky bucket & Token bucket algorithms.

(10 hours)

Transport Layer:

Addressing, flow control & buffering, multiplexing & de-multiplexing, crash recovery;

Example transport protocols: TCP, SCTP and UDP.

(6 hours)

SECTION-B

Application Layer:

WWW and HTTP; File transfer Protocol: FTP Commands and Replies; Domain Name System; SMTP, SNMP; Electronic Mail

(8 hours)

Web Security:

Security in Computer Networks: Principles of Cryptography-Symmetric key-Public key-authentication protocols; Digital Signatures, Firewalls; Security in different Layers

(7 hours)

Email and IP Security:

Secure E-mail- SSL, IP security, PGP, S/MIME, IP Security Overview and Architecture, Key Management, SSl, TLS, SET

(7 hours)

TEXT BOOKS			
S. No.	**NAME**	**AUTHOR(S)**	**PUBLISHER**
1	Computer Networks	Andrew S. Tanenbaum	5th edition, Pearson Education, 2012.
2	Data Communications and Networking	Behrouz A Forouzan	5th edition, Tata Mcgraw Hill, 2013
RECOMMENDED BOOKS			
1	Data and Computer Communications	William Stallings	8th edition, Pearson Education, 2007.
2	Computer Networks and Internets with Internet Applications	Douglas e. Comer	4th edition, Pearson Education, 2008
3	Computer Networking: A top down approach	James F. Kurose and Keith W. Ross	6th edition, Pearson Education, 2012
4	Network Security Essentials	William Stallings	Pearson Education, 2000

Branch: Computer Science and Engineering

Course Code	**CS 651**
Course Title	**COMPUTER NETWORKS AND SECURITY (Practical)**
Type of Course	Core
L T P	0 0 3
Credits	1
Course Assessment Methods End Semester Assessment Continuous Assessment	 50

SYLLABUS

Practical should be covered based on the following directions:

1. To familiarize with the various basic tools (crimping, krone etc.) used in establishing a LAN.
2. To study various topologies for establishing computer networks.
3. To familiarize with switch , hub, connecters, cables (cabling standards) used in networks
4. To familiarize with routers & bridges
5. To use some basic commands like ping, trace-root, ipconfig for trouble shooting network related problems.
6. To use various utilities for logging in to remote computer and to transfer files from / to remote computer.
7. To develop a program to compute the Hamming Distance between any two code words.
8. To develop a program to compute checksum for an ‘m’ bit frame using a generator polynomial.
9. To develop a program for implementing/simulating the sliding window protocol.
10. To develop a program for implementing/simulating a routing algorithm.
11. To study various IEEE standards (802.3, 802.11, 802.16)
12. Implementation of Firewall in a Network.

Branch: Computer Science and Engineering

Course Code	**CS 602**
Course Title	**LINEAR ALGEBRA AND PROBABILITY THEORY**
Type of Course	Core
L T P	3 1 0
Credits	4
Course Assessment Methods End Semester Assessment (University Exam.) Continuous Assessment (Sessional, Assignments, Quiz)	 50 50
Course Prerequisites	None
Course Objectives (CO)	1. To introduce the concept of Linear equations and vector spaces. 2. To introduces the use of Eigen vectors and Linear transformations. 3. To introduce random variables and probability theory. 4. To introduce the use of 2-d random variables.
Course Outcome	1. Understand the use of linear algebra and linear transformations. 2. Design solutions using matrices and eigen vectors 3. Apply probability theory in different engineering problems. 4. Understand the use of random variables in different applications.

SYLLABUS

Note for Examiner- *Examiner will set 7 questions of equal marks. First question will cover whole syllabus, having 10 conceptual questions of 1 mark each or 5 questions of 2 mark each and is compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt at least two questions from each part.*

SECTION-A

Systems of Linear equations:
Introduction, Linear equations, solutions, Linear equations in two unknowns, Systems of linear equations, equivalent systems, Elementary operations, Systems in Triangular and echelon form, Reduction Algorithm, Matrices, Row equivalence and elementary row operations, Systems of Linear equations and matrices, Homogeneous systems of Linear equations. (Scope as in Chapter 1, Sections 1.1-1.10 of Reference 1).
(5 hours)

Vector Spaces:
Introduction, Vector spaces, examples of vector spaces, subspaces, Linear combinations, Linear spans, Linear dependence and Independence, Basis and Dimension, Linear equations and vector spaces. (Scope as in Chapter 5, Sections 5.1-5.8 of Reference 1).

(5 hours)

Eigenvalues and Eigenvectors, Diagonalization:
Introduction, Polynomials in matrices, Characteristic polynomial, Cayley-Hamilton theorem, Eigen-values and Eigen-vectors, computing Eigen-values and Eigen-vectors, Diagonalizing matrices.(Scope as in Chapter 8, Sections 8.1-8.5 of Reference 1).

(4 hours)

Linear Transformations:
Introduction, Mappings, Linear mappings, Kernel and image of a linear mapping, Rank- Nullity theorem (without proof), singular and non-singular linear mappings, isomorphisms.(Scope as in Chapter 9, Sections 9.1-9.5 of Reference 1).

(5 hours)

Matrices and Linear transformations:
Introduction, Matrix representation of a linear operator, Change of basis and Linear operators.(Scope as in Chapter 10, Sections 10.1-10.3 of Reference 1).

(5 hours)

SECTION-B

Probability
Sample Space and Events, the Axioms of probability, some elementary theorems, Conditional probability, Baye's Theorem, Random Variables-Discrete and Continuous, Independent random variables, Expectation, Variance and Covariance, Means and variances of linear combinations of random variables, Chebyshev's inequality

(7 hours)

Probability Distributions
Joint Probability distributions, Marginal and Conditional distributions, Binomial, Poisson, Uniform and Normal distributions, Normal and Poisson approximations to Binomial, Moments, Moment generating function.

(7 hours)

Two Dimensional Random Variables
Joint distributions – Marginal and conditional distributions – Covariance – Correlation and Regression – function of a random variable-Transformation of random variables - Central limit theorem.

(7 hours)

TEXT BOOKS			
S. No.	**NAME**	**AUTHOR(S)**	**PUBLISHER**
1	Shaum's Outline of Theory and Problems of Linear Algebra	Seymour Lipschutz	2nd edition, McGraw-Hill, 1991.
2	Linear Algebra	VivekSahai, VikasBist	Narosa Publishing House, 2002
3	Introduction to Probability and Statistics	J. S. Milton and J.C. Arnold	4th edition, McGraw Hill, 2007
4	Probability and Statistics for Engineers	R.A. Johnson and C.B. Gupta	7th edition, Pearson Education, 2007
5	Fundamentals of Mathematical Statistics	S. C. Gupta and V.K. Kapoor	Sultan Chand and Sons

Branch: Computer Science and Engineering

Course Code	**CS 603**
Course Title	**MODELING AND SIMULATION**
Type of Course	Core
L T P	3 1 0
Credits	4
Course Assessment Methods End Semester Assessment (University Exam.) Continuous Assessment (Sessional, Assignments, Quiz)	 50 50
Course Prerequisites	None
Course Objectives (CO)	1. To introduce the simulation techniques to solve real time problems where experimentation on the actual system is very risky. 2. To introduce different discrete event and continuous simulation methods. 3. To introduce different techniques for generating random numbers and random variates following various distributions. 4. To introduce different queuing techniques for single server and multi server systems. 5. To introduce the different simulation languages like MATLAB and GPSS.
Course Outcome	1. Understand the continuous and discrete event simulation techniques and apply them suitably to real time problems where experimentation on actual system is risky. 2. Analysing different procedures to generate random numbers and apply them for implementation of different simulation systems. 3. Understand different simulation languages like MATLAB and GPSS and apply them to simulate different systems.

SYLLABUS

Note for Examiner- *Examiner will set 7 questions of equal marks. First question will cover whole syllabus, having 10 conceptual questions of 1 mark each or 5 questions of 2 mark each and is compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt at least two questions from each part.*

SECTION-A

Introduction:
What is modeling and simulation, application areas, definition and types of system, model and simulation, introduction to discrete-event and continuous simulation.
(5 hours)

Simulation Methods:
Discrete-event Simulation, Time advance Mechanisms, Components and organization of Discrete-event simulation, Flowchart of next-event time advance approach, Continuous Simulation, Monte Carlo Simulation.

(10 hours)

Queuing Models:
Single server queuing system, introduction to arrival and departure time, flowcharts for arrival and departure routine. Event graphs of queuing model. Determining the events and variables, Event graphs for inventory model.

(10 hours)

SECTION-B

Random Numbers:
Introduction to Random Numbers, Importance of Random Numbers in Simulation, Mid-Square random number generator, Residue method, Arithmetic Congruential generator, Testing Numbers for Randomness, Chi-Square Test.

(5 hours)

Distribution Functions:
Stochastic activities, Discrete probability functions, Cumulative distribution function, Continuous probability functions. Generation of random numbers following binomial distribution, Poisson distribution, continuous distribution, normal distribution, exponential distribution, uniform distribution.

(10 hours)

Simulation Languages:
Basic Introduction to Special Simulation Languages:-GPSS/ MATLAB/ Network Simulators. (5 hours)

TEXT BOOKS			
S. No.	**NAME**	**AUTHOR(S)**	**PUBLISHER**
1	Simulation Modeling and Analysis	Averill M. Law	4th edition, Tata Mcgraw Hill, 2007.
2	System Simulation	Geoffery Gordon	2nd edition, Prentice-Hall of India, 2001
3	System Simulation	D.S. Hira	1st edition, S. Chand Publication, 2001
4	MATLAB Programming for Engineers	Stephen J. Chapman	3rd edition, Thomson Learning, 2005
5	Discrete-Event System Simulation	Jerry Banks, John S. Carson, Barry L. Nelson and David M. Nicol	5th edition, Prentice-Hall of India, 2009
6	Getting Started with MATLAB: A Quick Introduction for Scientists and Engineers	RudraPratap	8th edition, Oxford University Press, 2009

Branch: Computer Science and Engineering

Course Code	**CS 653**
Course Title	**MODELING AND SIMULATION (Practical)**
Type of Course	Core
L T P	0 0 3
Credits	1
Course Assessment Methods End Semester Assessment Continuous Assessment	 50

SYLLABUS

Practical should be covered based on the following directions:

1. Programming in MATLAB: Introduction, Branching statements, loops, functions, additional data types, plots, arrays, inputs/outputs etc.
2. Introduction regarding usage of any Network Simulator.
3. Practical Implementation of Queuing Models using C/C++.

Branch: Computer Science and Engineering

Course Code	**CS 604**
Course Title	**COMPILER DESIGN**
Type of Course	Core
L T P	3 1 0
Credits	4
Course Assessment Methods End Semester Assessment (University Exam.) Continuous Assessment (Sessional, Assignments, Quiz)	 50 50
Course Prerequisites	Theory of Computation (CS 505)
Course Objectives (CO)	1. This course will provide the in-depth knowledge of different concepts involved while designing a compiler.
Course Outcome	1. Understand the functioning of different phases of a compiler. 2. Understand the implementation details and concepts behind each phase of the compiler by stressing more on the syntax analysis and further on different parsing techniques. 3. Understand need of intermediate code generation, code optimization and actual machine code generation techniques.

SYLLABUS

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SECTION-A

Introduction:
Compilers and Translators; The phases of the compiler – Lexical Analysis, Syntax Analysis, Intermediate Code Generation, Optimization, Code generation, Bookkeeping, Error handling.
(5 hours)

Lexical Analysis:
The role of the lexical analyzer, Tokens, Patterns, Lexemes, Input buffering, Specifications of a token, Recognition of a tokens, design of a lexical analyzer generator.

(5 hours)

Syntax Analysis:
The role of a parser, Context free grammars, Writing a grammar, Top down Parsing: Recursive decent parser, Predictive parser, Bottom up Parsing: Handles, Viable prefixes, Operator precedence parsing, LR parsers: SLR, LALR, CLR. Parser generator (YACC).Error Recovery techniques for different parsers

(12 hours)

SECTION-B

Syntax directed translation:
Syntax directed definitions, Synthesized and inherited attributes, Construction of syntax trees.

(4 hours)

Run time environments:
Source language issues (Activation trees, Control stack, scope of declaration, Binding of names), Storage organization (Subdivision of run-time memory, Activation records), Storage allocation strategies, Symbol tables: storage, data structures used

(6 hours)

Intermediate code generation:
Intermediate languages, Graphical representation, Three-address code, Implementation of three address statements (Quadruples, Triples, Indirect triples)

(3 hours)

Code optimization and code generation:
Introduction, Basic blocks & flow graphs, DAG, principle sources of optimization: loop optimization, eliminating induction variable, eliminating common sub-expression, loop unrolling, loop jamming etc. Peephole optimization, Issues in the design of code generator, a simple code generator, Register allocation & assignment.

(10 hours)

TEXT BOOKS			
S. No.	**NAME**	**AUTHOR(S)**	**PUBLISHER**
1	Compilers: Principles, techniques and tools	A. V. Aho, J D. Ullman, M. S. Lam, R. Sethi	2nd edition, Pearson Education, 2014.
2	Compiler Construction: Principle and Practice	K C Louden	1st edition, Cengage Learning
3	Compiler Design in C	Holub	Latest edition, PHI

Branch: Computer Science and Engineering

Course Code	**CS 654**
Course Title	**COMPILER DESIGN (PRACTICAL)**
Type of Course	Core
L T P	0 0 3
Credits	1
Course Assessment Methods End Semester Assessment Continuous Assessment	 50

SYLLABUS

Practical should be covered based on the following directions:

1. Implementation of lexical analyzer for a hypothetical language.
2. Implementation of LL parser.
3. Implementation of SLR parser.
4. Implementation of CLR parser.
5. Implementation of LALR parser.

Branch: Computer Science and Engineering

Course Code	**CS 605A**
Course Title	**SOFTWARE TESTING AND QUALITY ASSURANCE**
Type of Course	Elective
L T P	3 1 0
Credits	4
Course Assessment Methods End Semester Assessment (University Exam.) Continuous Assessment (Sessional, Assignments, Quiz)	 50 50
Course Prerequisites	Software Engineering (CS 404)
Course Objectives (CO)	1. To study the concept of quality control and quality assurance. 2. To study risk management and technique to manage changing requirement of software. 3. To study change control management process to tackle changing requirement of system 4. To study various software testing strategies for testing different type of system under test. 5. To enable the student to extend their testing concept to real scenarios and specialized systems**.** 6. To study the concepts of quality metrics and reporting formats**.**
Course Outcome	1. Understand the concept of Software Testing and Quality Assurance to develop cost effective software system. 2. Understand the essence of risk management and control management and ability to develop RMMM plan to mitigate risk and manage the artifacts of software system.. 3. Ability to tests the system at various levels and dimensions to control error generation and propagation which ultimately makes debugging successful and cost effective. 4. Ability to extend the testing concept to real scenarios and specialized systems like multiplatform, Real Time system, Client-Server system**.**

SYLLABUS

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compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt at least two questions from each part.

SECTION-A

Introduction:
Overview of Software Engineering, Software Process, Characteristics of a Software Process, Process Models, Project Management Process and its Phases, Software Measurements, Metrics, Scheduling, Estimation.
(7 hours)

Software Quality Assurance Concepts and Standards :
Quality Concepts, Quality Control, Quality Assurance, SQA Activities, Software Reviews, Formal Technical Reviews, Review Guidelines, Software Reliability, Software Safety, Quality Assurance Standards, ISO 9000, ISO 9001:2000, ISO 9126 Quality Factors, CMM, TQM, Six Sigma, SPICE, Software Quality Assurance Metrics.
(8 hours)

Risk Management and Change Management:
Software Risks, Risk Identification, Risk Projection, Risk Refinement, The RMMM Plan, Software Configuration Management, Baselines, Software Configuration Items, SCM Process: Version Control, Change Control, Configuration Audit, Configuration Management for Web Engineering.
(7 hours)

SECTION-B

Software Testing:
Testing, Verification and Validation, Test Strategies for Conventional and Object Oriented Software, Unit Testing, Integration Testing, Validation Testing, Alpha and Beta Testing, System Testing, Recovery Testing, Security Testing, Stress Testing, Performance Testing, Metrics for Source Code, Metrics for Testing, Debugging Process, Debugging Strategies.
(7 hours)

Testing Techniques: Software Testing Fundamentals, Black Box and White Box Testing, Basis Path Testing, Flow Graph Notation, Independent Program Paths, Graph Matrices, Control Structure Testing, Condition Testing, Data Flow Testing, Loop Testing, Graph Based Testing Methods, Equivalence Partitioning, Boundary Value Analysis, Object Oriented Testing Methods: Applicability of Conventional Test Case Design Methods, Fault-Based Testing, Scenario-Based Testing, Random Testing and Partition Testing for Classes, Interclass Test Case Design.
(8 hours)

Testing Process and Specialized Systems Testing:
Test Plan Development, Requirement Phase, Design Phase and Program Phase Testing, Testing Client/Server Systems, Testing Web based Systems, Testing Off-the-Shelf Software, Testing in Multiplatform Environment, Testing for Real Time Systems, Testing Security
(8 hours)

TEXT BOOKS			
S. No.	**NAME**	**AUTHOR(S)**	**PUBLISHER**
1	Software Engineering	Ian Somerville	7th edition, Pearson Education.
2	Software Engineering: A Practitioner's Approach	Pressman	6th edition, TataMcGraw- Hill.
3	Effective Methods for Software Testing	William E. Perry	2nd edition, John Wiley
RECOMMENDED BOOKS			
1	Software Engineering: Theory and Practice	Pfleeger	2nd edition, Pearson Education

2	Software Engineering	K..Aggarwal, Yogesh Singh.	2nd edition, New.Age International
3	An Integrated Approach to Software Engineering	Pankaj Jalote	2nd edition, Narosa
4	Software Quality Assurance – Principles and Practice,	.Nina S Godbole :Narosa.	2nd edition, Narosa
5	Software Testing Techniques	Boris Beizer	2nd edition

Branch: Computer Science and Engineering

Course Code	**CS 655A**
Course Title	**SOFTWARE TESTING AND QUALITY ASSURANCE (Practical)**
Type of Course	Elective
L T P	0 0 3
Credits	1
Course Assessment Methods End Semester Assessment Continuous Assessment	 50

SYLLABUS

Practical should be covered based on the following directions:

1. Study of different quality assurance and software testing tools.
2. Use of black box testing techniques to test programs.
3. Use of white box testing techniques to test programs.
4. Use of Object Oriented Testing Techniques to test programs.
5. Use of a software testing tool.
6. Use of a quality assurance tool.
7. Testing a web based system.
8. Design and Implementation of a quality assurance / software testing tool.

Branch: Computer Science and Engineering

Course Code	**CS 605B**
Course Title	**SOFT COMPUTING**
Type of Course	Elective
L T P	3 1 0
Credits	4
Course Assessment Methods End Semester Assessment (University Exam.) Continuous Assessment (Sessional, Assignments, Quiz)	 50 50
Course Prerequisites	Artificial Intelligence (CS 503)
Course Objectives (CO)	1. To understand the basic soft computing techniques available and to apply these concepts as applicable to different problems in real life. 2. Describe, argue for and critique Soft Computing discipline. Students will be able to use at least two of the Soft Computing techniques
Course Outcome	1. Illustrate different soft computing techniques and their relation to artificial intelligence 2. Apply fuzzy logic and reasoning to handle uncertainty and solve engineering problems 3. Apply genetic algorithms to combinatorial optimization problems 4. Apply neural networks to pattern classification and regression problems 5. Analyze and study the problem in question conceptually and mathematically and solve the problem using any of soft computing techniques

SYLLABUS

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SECTION-A

Intelligent Agents:

Agents Behavior and Environments, Structure of Agents, Planning Problem, Planning with state Space Search, Partial order Planning, GRAPHPLAN, Planning in logic, Planning in non-deterministic domains, hierarchical task planning, Multi agent planning, execution.

(9 hours)

Probabilistic Reasoning Fuzzy Logic:

Knowledge representation under uncertainty, Bayesian theorem, Bayesian Networks, Dempster Shafer theory, Representing vagueness, Fuzzy sets, operation on fuzzy sets, reasoning with fuzzy logic, Fuzzy

Automata, Fuzzy Control methods, Fuzzy decision making, inference in temporal models, Hidden Markov Models, Kalman Filters

(12 hours)

SECTION-B

Neural Networks:

Basic concepts, Single layer perception, Multilayer Perception, Supervised and Unsupervised learning - Backpropagation networks - Kohnen'sself organizing networks - Hopfield network.

Introduction to Artificial Neural Systems - Perceptron - Representation - Linear separability - Learning – Training algorithm -Adaptive networks based Fuzzy interface systems - Classification and Regression Trees - Data clustering algorithms - Rule based structure identification - Neuro-Fuzzy controls - Simulated annealing

(16 hours)

Genetic Algorithms:

Evolutionary computation.Survival of the Fittest - Fitness Computations - Cross over – Mutation, Reproduction - Rank method - Rank space method.

(8 hours)

TEXT BOOKS			
S. No.	**NAME**	**AUTHOR(S)**	**PUBLISHER**
1	AI: A Modern Approach	Stuart J.Russel, Norvig	Latest edition, Pearson Publication
2	Artificial Intelligence: A Guide to Intelligent Systems	Michael Negnevitsky	2nd edition, Addison Wesley, 2005
3	Neural Networks - Algorithms, Applications & Programming Techniques	James Freeman A. and David Skapura M	Addison Wesley, 1992
4	Artificial Neural Networks	Yegnanarayana B	Prentice Hall of India Private Ltd, 1999
5	Genetic algorithms in search, optimization and machine learning	Goldberg, David E	Latest edition, Addison Wesley

Branch: Computer Science and Engineering

Course Code	**CS 655B**
Course Title	**SOFT COMPUTING (Practical)**
Type of Course	Elective
L T P	0 0 3
Credits	1
Course Assessment Methods End Semester Assessment Continuous Assessment	 50

SYLLABUS

Practical should be covered based on the following directions:

1. Write a Matlab program to calculate union, intersection, complement of two fuzzy sets.
2. Write a Matlab program to implement the Demorgan's Law.
3. Write a Matlab program to plot Triangular, Trapezoidal and Bell-shaped membership functions.
4. Use Matlab's Fuzzy Logic Toolbox to model the tip given after a dinner for two, where the food can be not good, satisfying, good and delightful, and the service can be poor, average, or good.
5. Consider the water tank with following rules
   1. IF (level is okay) THEN (valve is no_change)
   2. IF (level is low) THEN (valve is open_fast)
   3. IF (level is high) THEN (valve is close_fast)

   Using Mamdani method and max–min method for fuzzification and method of centroid for defuzzification method construct a FIS. Before editing that rules, membership functions must be defined with membership function editor.
6. Write a Matlab Program to generate logical AND, NOT, XOR functions using McCulloch-Pitts neural net.
7. Write a Matlab program for Perceptron net for an AND function with bipolar inputs and targets.
8. Write a Matlab program to store vector[-1 -1 -1 -1] and [-1 -1 1 1] in an auto-associative net.Find weight matrix.Test the net with [1 1 1 1] as input.
9. Write a program in Matlab to implement Roulette wheel and ranking selection method.
10. Write a program in Matlab to maximize a function f(x,y)=xsin(4□x) + ysin(20□x) subject to -3.0 ≤ x ≤ 12.1 and 4.1≤ y ≤ 5.8

Branch: Computer Science and Engineering

Course Code	**CS 605C**
Course Title	**DATA MINING AND ANALYSIS**
Type of Course	Elective
L T P	3 1 0
Credits	4
Course Assessment Methods End Semester Assessment (University Exam.) Continuous Assessment (Sessional, Assignments, Quiz)	 50 50
Course Prerequisites	Database Systems (CS 302)
Course Objectives (CO)	1. To learn various data mining techniques and different ways to analyze different data sets.
Course Outcome	1. Understand different ways to manage the large data set using data warehousing techniques. 2. Analyze various multi dimensional techniques to represent data for effective retrieval. 3. Identify different data analysis techniques like frequent pattern analysis, classification and clustering 4. Demonstrate the use of various data mining techniques on different datasets.

SYLLABUS

Note for Examiner- *Examiner will set 7 questions of equal marks. First question will cover whole syllabus, having 10 conceptual questions of 1 mark each or 5 questions of 2 mark each and is compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt at least two questions from each part.*

SECTION-A

Introduction: Introduction to RDBMS, Data Warehouse, Transactional Databases, Data Mining Functionalities, Interestingness of pattern, classification of data mining system, major issues
(6 hours)

Data Warehouse and OLAP: Difference from traditional databases, Multidimensional data model, Schema for Multi dimensional model, measures, concept hierarchies, OLAP operations, starnet query model, Data Warehouse architecture, ROLAP, MOLAP, HOLAP, Data Warehouse Implementation, Data Cube, Metadata Repositories, OLAM

(6 hours)

Data Processing: Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and concept hierarchy generation

(2 hours)

Data Mining Architecture: Data Mining primitives, Task relevant data, interestingness measures, presentation and visualization of patterns, Data Mining Architecture, Concept Description, Data Generalization and Summarization, Attributed oriented induction, Analytical characterization, Mining class comparisons

(6 hours)

SECTION-B

Association Rules: Association rules mining, Mining Association rules from single level, multilevel transaction databases, multi dimensional relational databases and data warehouses, Correlational analysis, Constraint based association mining

(6 hours)

Classification and Clustering: Classification and prediction, Decision tree induction, Bayesian classification, k-nearest neighbor classification, Cluster analysis, Types of data in clustering, categorization of clustering methods

(6 hours)

Introduction of Mining Complex Data: Complex data objects, Mining spatial databases, Multimedia databases, Time Series and sequence databases, Text databases and World Wide Web

(7 hours)

TEXT BOOKS			
S. No.	**NAME**	**AUTHOR(S)**	**PUBLISHER**
1	Data Mining: Concepts and Techniques	J.Han and M. Kamber	Latest edition, Morgan Kaufman publishers, Harcourt India pvt. Ltd
2	Data Mining Introductory and Advance Topics	Dunham	Latest edition, Pearson Education

Branch: Computer Science and Engineering

Course Code	**CS 655C**
Course Title	**DATA MINING AND ANALYSIS (Practical)**
Type of Course	Elective
L T P	0 0 3
Credits	1
Course Assessment Methods End Semester Assessment Continuous Assessment	 50

SYLLABUS

Practical should be covered based on the following directions:

Students are required to perform practicals in Oracle/MS SQL Server and STATISTICA Data Miner.

1. Building a Database Design using ER Modeling and Normalization Techniques
2. Implementation of functions, Procedures, Triggers and Cursors
3. Load Data from heterogeneous sources including text files into a predefined warehouse schema.
4. Design a data mart for a bank to store the credit history of customers in a bank .Use this credit profiling to process future loan applications.
5. Feature Selection and Variable Filtering (for very large data sets)
6. Association Mining in large data sets
7. Interactive Drill-Down, Roll up, Slice and Dice operations
8. Generalized EM & k-Means Cluster Analysis
9. Generalized Additive Models (GAM)
10. General Classification and Regression Trees (G Trees)
11. General CHAID (Chi-square Automatic Interaction Detection) Models
12. Interactive Classification and Regression Trees
13. Goodness of Fit Computations

Branch: Computer Science and Engineering

Course Code	**CS 605D**
Course Title	**MOBILE APPLICATION DEVELOPMENT**
Type of Course	Elective
L T P	3 1 0
Credits	4
Course Assessment Methods End Semester Assessment (University Exam.) Continuous Assessment (Sessional, Assignments, Quiz)	 50 50
Course Prerequisites	Programming Fundamentals (CS 101), Object-Oriented Programming (CS 202)
Course Objectives (CO)	1. To learn the basics of mobile application development using Android and their testing and deployment in different user environments.
Course Outcome	1. Understand basic requirements to develop mobile applications. 2. Design and develop different mobile applications using Android platform 3. Test their application in different conditions. 4. Deploy the mobile applications in different environments.

SYLLABUS

Note for Examiner- *Examiner will set 7 questions of equal marks. First question will cover whole syllabus, having 10 conceptual questions of 1 mark each or 5 questions of 2 mark each and is compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt at least two questions from each part.*

SECTION-A

Introduction to Java and Android

Basic programming introduction to Java, Java Foundation Classes, Developing applications in Java, Overview of Android platform

(9 hours)

Getting started with Mobility

Mobility landscape, Mobile platforms, Mobile apps development, , setting up the mobile app development environment along with an emulator, a case study on Mobile app development

(6 hours)

Building blocks of mobile apps

App user interface designing – mobile UI resources (Layout, UI elements, Drawable, Menu), Activity-states and life cycle, interaction amongst activities.

(6 hours)

SECTION-B

Sprucing up mobile apps

App functionality beyond user interface - Threads, Async task, Services – states and life cycle, Notifications, Broadcast receivers, Telephony and SMS APIs

Native data handling – on-device file I/O, shared preferences, mobile databases such as SQLite, and enterprise data access (via Internet/Intranet)
Graphics and animation – custom views, canvas, animation APIs, multimedia – audio/video playback and record, location awareness, and native hardware access (sensors such as accelerometer and gyroscope)

(16 hours)

Testing mobile apps

Debugging mobile apps, White box testing, Black box testing, and test automation of mobile apps, JUnit for Android, Robotium, MonkeyTalk

(5 hours)

Deployment of apps

Versioning, signing and packaging mobile apps, distributing apps on mobile market place

(3 hours)

TEXT BOOKS			
S. No.	**NAME**	**AUTHOR(S)**	**PUBLISHER**
1	Android Application Development All in one for Dummies	Barry Burd	1st edition
2	Android Application Development	Rick Rogers, John Lombardo , Meike Blake	1st edition, O'Reilly, 2010
3	Professional Android 2 Application Development	Reto Meier	1st edition,Wrox, 2010
4	Teach Yourself Android Application Development In 24 Hours		1st edition, SAMS

Branch: Computer Science and Engineering

Course Code	**CS 655D**
Course Title	**MOBILE APPLICATION DEVELOPMENT (Practical)**
Type of Course	Elective
L T P	0 0 3
Credits	1
Course Assessment Methods End Semester Assessment Continuous Assessment	 50

SYLLABUS

Practical should be covered based on the following directions:

Students should implement (and learn to use the tools to accomplish this task) the following during Practical hours: (illustrative only)

1. Understand the app idea and design user interface/wireframes of mobile app
2. Set up the mobile app development environment
3. Develop and debug mobile app components – User interface, services, notifications, broadcast receivers, data components
4. Using emulator to deploy and run mobile apps
5. Testing mobile app - unit testing, black box testing and test automation

Branch: Computer Science and Engineering

Course Code	**CS 605E**
Course Title	**DATA ACQUISITION AND INTERFACING**
Type of Course	Elective
L T P	3 1 0
Credits	4
Course Assessment Methods End Semester Assessment (University Exam.) Continuous Assessment (Sessional, Assignments, Quiz)	 50 50
Course Prerequisites	None
Course Objectives (CO)	1. This course will introduce various data acquisition systems and techniques and their application using different hardware interfacing mechanisms.
Course Outcome	1. Understand the principles of operation and limitations of the data acquisition system (single and Multiple channels). 2. Use Labview for analysing and generating reports of various acquired signals. 3. Use different interface mechanism of devices for communication

SYLLABUS

Note for Examiner- *Examiner will set 7 questions of equal marks. First question will cover whole syllabus, having 10 conceptual questions of 1 mark each or 5 questions of 2 mark each and is compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt at least two questions from each part.*

SECTION-A

Signal conditioning and data acquisition: Analog-to-digital and digital-to-analog converters; sampling rate, multiplexing, resolution, range, and code width; grounding, isolation and noise; single-ended and differential measurements; attenuation, amplification, and filtering; excitation and linearization; impedance mismatch and loading; digital signal conditioning; signal transmission (voltage vs. current loop); and hardware architecture of a modern multi-function data acquisition card. Various DAS Configurations, Single Channel DAS, Multi-Channel DAS, IC Based DAS, Data Acquisition, Data Acquisition in PLC

(9 hours)

Fundamentals of programming logic: Labview: Virtual instruments; indicators and controls; front panel and block diagram; data types and data flow programming; case and sequence structures; arrays, loops, and clusters; graphs and charts; sub VIs; and file I/O.

(12 hours)

SECTION-B

Instrument control: Components of an instrument control system (GPIB and RS-232); detecting and configuring instruments; and instrument drivers.

(6 hours)

Instrumentation system design: Design specifications; functional block representation; design, debugging, and testing; interpretation and presentation of data; user interface; temperature control system

design; motor speed control system design; and instrumentation project incorporating multiple sensors, signal interfacing electronics, data-acquisition hardware, instrument control

(6 hours)

Buses – Industry standard architecture (ISA), peripheral component Interconnect (PCI) – Instrumentation Buses: Serial (RS232C, USB) and Parallel (GPIB) Accelerated Graphics port (AGP) – plug-and-play devices – SCSI concepts – USB architecture.

(4 hours)

Project Work: Using Labview: Generation of signal (different function generators) on PC and acquiring the signal from sensor at PC again with different sampling rate and quantization level. Representations of different characteristics of acquired signals and their analysis and reporting.

(8 hours)

TEXT BOOKS			
S. No.	**NAME**	**AUTHOR(S)**	**PUBLISHER**
1	Instrumentation Devices And Systems	Rangan C. S., Sarma G. R. and Mani V. S. V.	Tata McGraw-Hill
2	Modern Electronic Instrumentation and Measurement Techniques	Helfrick Albert D. and Cooper W. D.	Prentice Hall India
RECOMMENDED BOOKS			
1	Digital Instrumentation	A. J. Bouvens	McGraw-Hill
2	Process Control Instrumentation Technology	Johnson Curtis D.	Prentice Hall
3	A Course In Electrical And Electronics Measurements And Instrumentation	Shawhney A. K.	Dhanpat Rai & Sons
4	Data acquisition technique using personal computers	Howard Austurlitz	

Branch: Computer Science and Engineering

Course Code	**CS 655E**
Course Title	**DATA ACQUISITION AND INTERFACING (Practical)**
Type of Course	Elective
L T P	0 0 3
Credits	1
Course Assessment Methods End Semester Assessment Continuous Assessment	 50

SYLLABUS

Practical should be covered based on the following directions:

1. Embedded Programming.
2. RF Experiments.
3. Experiments in interfacing with UbiSense.
4. Experiments in interfacing with Ubi-DAQ.
5. WSN Applications.

Branch: Computer Science and Engineering

Course Code	**CS 605F**
Course Title	**MULTIMEDIA COMPUTING**
Type of Course	Elective
L T P	3 1 0
Credits	4
Course Assessment Methods End Semester Assessment (University Exam.) Continuous Assessment (Sessional, Assignments, Quiz)	 50 50
Course Prerequisites	None
Course Objectives (CO)	1. To provide an in-depth understanding of Multimedia system design Enabling technologies and standards.
Course Outcome	1. Demonstrate Knowledge of Multimedia Tools and Standards 2. Understand Compression standards 3. Understand current technologies in multimedia 4. Familiarize with issues in multimedia communication systems

SYLLABUS

Note for Examiner- *Examiner will set 7 questions of equal marks. First question will cover whole syllabus, having 10 conceptual questions of 1 mark each or 5 questions of 2 mark each and is compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt at least two questions from each part.*

SECTION-A

Introduction:
Multimedia and its types, Introduction to Hypermedia, Hyper Text, Multimedia Systems and their Characteristics, Challenges, Desirable Features, Components and Applications, Trends in Multimedia
(4 hours)

Multimedia Technology:
Multimedia Systems Technology , Multimedia Hardware devices, Multimedia software development tools, Multimedia Authoring Tools, Multimedia Standards for Document Architecture, SGML, ODA, Multimedia Standards for Document interchange, MHEG, Multimedia Software for different media.
(6 hours)

Storage Media :
Magnetic and Optical Media, RAID and its levels, Compact Disc and its standards, DVD and its standards, Multimedia Servers
(4 hours)

Audio:
Basics of Digital Audio, Application of Digital Audio, Digitization of Sound, Sample Rates and Bit Size, Nyquist's Sampling Theorem Typical Audio Formats Delivering Audio over a Network , Introduction to MIDI (Musical Instrument Digital Interface), Components of a MIDI System Hardware Aspects of MIDI ,MIDI Messages. Audio Compression, Simple Audio Compression Methods, Psychoacoustics ,MPEG Audio Compression
(8 hours)

SECTION-B

Basics of Compression:

Classifying Compression Algorithms, Lossless Compression Algorithms, Entropy Encoding, Run-length Encoding, Pattern Substitution, Basics of Information theory, Huffman Coding, Adaptive Huffman Coding, Arithmetic Coding, Lempel-Ziv-Welch (LZW) Algorithm, Source Coding Techniques: Transform Coding, Frequency Domain Methods, Differential Encoding.

(6 hours)

Image and Graphics Compression:

Color in Images, Types of Color Models, Graphic/Image File Formats: TIFF, RIFF, BMP, PNG, PDF, Graphic/Image Data, and JPEG Compression, GIF Compression.

(6 hours)

Video Compression:

Basics of Video, Video Signals, Analog Video, Digital Video, TV standards, H. 261 Compression, Intra Frame Coding, Inter-frame (P-frame) Coding, MPEG Compression, MPEG Video, The MPEG Video Bit stream, Decoding MPEG Video in Software.

(6 hours)

Multimedia Communication:

Building Communication network, Application Subsystem, Transport Subsystem, QOS, Resource Management, and Distributed Multimedia Systems.

(5 hours)

TEXT BOOKS			
S. No.	**NAME**	**AUTHOR(S)**	**PUBLISHER**
1	Multimedia Computing Communications and Applications	Ralf Steinmetz and Klara Nahrstedt	Pearson Educations
2	Multimedia Systems	Parag Havaldar, Gerard Medioni	Cengage Learning publication
3	Multimedia System Design	Prabhat K. Andleigh, Kran Thakkar	Latest edition, PHI
4	Multimedia Communications	Fred Halsall	Pearson Education

Branch: Computer Science and Engineering

Course Code	**CS 655F**
Course Title	**MULTIMEDIA COMPUTING (Practical)**
Type of Course	Elective
L T P	0 0 3
Credits	1
Course Assessment Methods End Semester Assessment Continuous Assessment	 50

SYLLABUS

Practical should be covered based on the following directions:

1. Introduction to Windows Movie Maker.
2. Create a movie file using windows movie maker.
3. Introduction to Adobe Photoshop.
4. Study of Image Editing using Adobe Photoshop.
5. Introduction to Macromedia Flash.
6. Creating animated e-card using macromedia Flash.
7. Study of Corel Draw.
8. Working and designing in Corel Draw.
9. Study of Audio-Video mixing software like Audacity.