

Government College of Engineering, Aurangabad
Department of Information Technology

B.E. Information Technology (Under Autonomy)
Proposed Curriculum Structure and Scheme of Evaluation

SEMESTER – I											
Sr No	Course Code	Name of the Subject	Scheme of Teaching (Hrs / week)			Scheme of Evaluation (Marks)					
			L	P	Total Credits	Theory			Term Work	Pract / Viva-voce	Total Marks
						Test	Assign	ESE			
1	IT-401	Data Warehousing & Data Mining	4		4	20	20	60			100
2	IT-402	E-Business Development	4		4	20	20	60			100
3	IT-403	Mobile Computing	4		4	20	20	60			100
4	IT-421 IT-422	Elective-I i) Automata Theory and Compiler Design ii) Soft Computing	4		4	20	20	60			100
5	IT-404	Lab - Knowledge Discovery		2	1				25	25	50
6	IT-405	Lab - Open Source Software		2	2				25	50	75
7	IT-406	Lab - Mobile Computing		2	1				25	25	50
8	IT-423 IT 424	Lab - Elective-I i) Automata Theory and Compiler Design ii) Soft Computing		2	2				25	50	75
9	IT-407	Project Part- I		2	2				25	50	75
	(A) Total of Semester – I		16	10	24	80	80	240	125	200	725
SEMESTER – II											
1	IT-411	Cryptography and Network Security	4		4	20	20	60			100
2	IT-412	Image Processing	4		4	20	20	60			100
3	IT-413	Computer Ethics and Cyber Security	4		4	20	20	60			100
4	IT-431 IT-432	Elective-II i) Advanced Java ii) Business Processes	4		4	20	20	60			100
5	IT-414	Lab - Cryptography and Network Security		2	1				25	50	75
6	IT-415	Lab - Image Processing		2	2				25	50	75
7	IT-433 IT-434	Lab - Elective-II i)Advanced Java ii) Business Processes		2	2				25	50	75
8	IT-416	Project Part- II		6	3				50	100	150
	(B) Total of Semester- II		16	12	24	80	80	240	125	250	775
	Grand Total = (A) +(B)		32	22	48	160	160	480	250	450	1500

(Note: L: Lecture, P: Practical, ESE: End Semester Examination, Assign.: Assignment)

(Codes Range – IT 401 to 420 – **Compulsory**, Range - IT 421 to 440 **Electives**)

SEMESTER - I

IT- 401: Data Warehousing and Data Mining

Teaching Scheme:

Theory: 4 Hrs/week

Examination Scheme:

ESE – 60 marks, Test – 20 marks

Assignment – 20 marks

Credits: 4

Objectives:

- To familiarize with the fundamental concepts of Data warehousing and OLAP
- To develop the concepts of data mining methods in database management skills
- To be able to efficiently design and manage data storages using data warehousing, OLAP, and data mining techniques,
- To use the concepts in Text mining, web mining and Knowledge Discovery

Unit 1- Introduction to Data Warehousing: (8 hrs)

Introduction to Decision Support System: DSS Defined, History of DSS, Ingredients of DSS, Data and Model Management, DSS Knowledge base, User Interfaces, The DSS Users, Categories and Classes of DSSs Need for data warehousing, Operational & informational data, Data Warehouse definition and characteristics, Operational Data Stores.

Unit 2- Data warehouse Components (8 hrs)

Architectural components, Data Preprocessing: Why Preprocess Data? Data Cleaning Techniques, Data Integration and Transformation, Data Reduction Techniques, Discretization and Concept Hierarchy Generation for numeric and categorical data, Significant role of metadata , Building a Data warehouse, Benefits of Data Warehousing.

Unit 3- OLAP in the Data Warehouse (8 hrs)

A Multidimensional Data Model, Schemas for Multidimensional Databases: Stars, Snowflakes, Star join and Fact Constellations Measures, Concept Hierarchies, OLAP Operations in the Multidimensional Data Model, Need for OLAP, OLAP tools , Mining Multimedia Databases, Mining Text Databases, Mining the World Wide Web.

Unit 4- Data Mining Algorithms (8 hrs)

Concept Description: What is Concept Description? Data Generalization and Summarization-Based Characterization, Mining Descriptive Statistical Measures in Large Databases. Mining Association Rules: Association Rule Mining, Market Basket Analysis, Association Rule classification, The Apriori Algorithm, Mining Multilevel Association Rules, Constraint-Based Association Mining, Sequential mining.

Classification and Prediction: What is Classification and Prediction? Data Classification Process, Issues Regarding Classification and Prediction, Classification by Decision Tree Induction, Bayesian Classification,

Unit 5- Classification, Knowledge Discovery (8 hrs)

Classification Based on Association Rule Mining, Other Classification Methods Cluster Analysis: What is Cluster Analysis? Types of Data in Cluster Analysis, A Categorization of Clustering Methods.

Introduction to **Knowledge Discovery**, innovative techniques for knowledge discovery, application of those techniques to practical tasks in areas such as fraud detection, scientific data analysis, and web mining, Introduction to huge data sets such as Web, telecommunications networks, relational databases, object-oriented databases, and other sources of structured and semi-structured data, Problem of Large Data sets

Text Books –

1. Paul Punnian, “Data Warehousing Fundamentals”, John Wiley Pub
2. Han, Kamber, "Data Mining Concepts and Techniques", Morgan Kaufmann .
3. Alex Berson, S.J. Smith, “Data Warehousing, Data Mining and OLAP”, Tata McGraw Hill
4. Margaret Dunham, “Data Mining: Concepts and Techniques”, Morgan Kaufmann Pub.

Reference Books -

1. Ralph Kimball, "The Data Warehouse Lifecycle toolkit", John Wiley.
2. Jiawei Han, Micheline Kamber, "Data Mining : Concepts and Techniques", 2nd edition, Morgan Kaufmann, ISBN 1558609016, 2006.
3. A B M Shaukat Ali, Saleh A Wasimi, "Data Mining: Methods and Techniques", Cengage Learning Pub.
4. Ian Witten and Eibe Frank, Data Mining, "Practical Machine Learning Tools and Techniques with Java Implementations", Morgan Kaufman, ISBN 1558605525, 1999,

IT - 402 - E-Business Development

Teaching Scheme:

Theory: 4 Hrs/week

Examination Scheme:

ESE – 60 marks, Test – 20 marks

Assignment – 20 marks

Credits: 4

Objectives:

- To study basics of e-business development
- To create a background for supporting e-business components
- To be able to transform e-business strategy into action
- To learn the legal issues in online business

CONTENTS

Unit-1

(8 hrs)

Introduction: Introduction to e-business, being on-line, defining e-business, harvesting the partnerships, creating new Techno-enterprise

E-business Trends:

Trends driving business process, Customer oriented trends, Organizational trends, Employee Trends, General Technology Trends.

E-Business Models: B2C, B2B, B2G, C2C, C2B

Unit -2:

(8 hrs)

Defining E-Business Idea: Factors affecting, Exploiting advantages

Creating E-Business Plan: Organization- Market Analysis, Operational plan, Functional Plan, Management Plan, Critical Risks, Exit strategies, Legal forms of Organization,

E-business Design: Self-diagnosis, Reverse the value chain, Choose a focus, Execute flawlessly.

E-business Architecture: Enterprise Applications, Trends driving E-business Architecture, problems caused by lack of integration, Cross-functional integrated applications, Integrated application frameworks

Unit -3:

(8 hrs)

Operating E-Business: Commercial space, Electronic payment methods,, Front-end and Back-end technologies,, outsourcing operations,

Marketing E-Business: Building brand, marketing Tools, other promotional schemes

Website Development, Design and Content: Commercial web presence, Website development, Design and Content, Design tips for increasing web sales, on-line sales promotions.

Unit -4:

(8 hrs)

E-business Strategy and Action: Roadmap for moving your company into e-business, Case study for e-business design in action: E*TRADE,

E-blueprint Formulation: Basic phases of e-blueprint planning, communication, The serious business of e-blueprint planning

On-line Shopping: Shopping solutions, Auctioning on Internet, Operational Resources Management (ORM), Joining shopping and ORM

On-line Legal Issues: Email marketing and database management, Email marketing and Spamming, Electronic Contract Formation and Validation, Electronic Authentication, Electronic information and confidentiality, Electronic information and security, Data Protection

Unit -5:

(8 hrs)

Securing E-Business: Risk management, Security Audits and penetration Testing

E-payment systems: postpaid, instant-paid, prepaid payment systems, Problems involved.

Supporting e-business components:

- i) **Customer Relationship management (CRM)**- Basic architecture, Integration Requirements, A roadmap for managers
- ii) **Content Management Systems (CMS)**- Basics, Architecture
- iii) **Knowledge Management Systems (KMS)**- Evolution of KM applications, elements of Business Intelligence (BI) applications
- iv) **Supply Chain Management (SCM) and e-fulfilment**- Basics of SCM, e-supply chain fusion, its management issues

Text/ Reference Books:

1. Ravi Kalakota, Marcia Robinson, “*e-Business 2.0- Roadmap for Success*”, Pearson Education, Print 2005.
2. Richard Gray, Alan Charlesworth, Rita Esen, “*On-line Marketing - A customer-led approach*”, Oxford University Press, Print 2007
3. H. Albert Napier, JB Napier, Ollie N Rivers, Stuart W. Wagner, “*Creating a Winning E-Business*”, Cengage Learning Pun.

IT 403 – Mobile Computing

Teaching Scheme:

Theory: 4 Hrs/week

Examination Scheme:

ESE – 60 marks, Test – 20 mark

Assignment – 20 marks

Credits: 4

Objectives:

1. To make students familiarize with Wireless Networking.
2. To know the basics of WAP and WML
3. To familiarize students with open source tools for Mobile Applications

CONTENTS:

Unit-1 Wireless and Mobile Network Architecture

(8 Hrs)

Principle of Cellular Communication, Overview 1G, 2G, 2.5G and 3G and 4G technologies. GSM Architecture and Mobility management hand off management, Network signalling. Mobile Devices – PDA and mobile OS, PalmOs, Win CE and Symbian.

Unit-2 Mobile IP Protocol Architecture

(8 Hrs)

Mobile IP and IP v 6 and its application in mobile computing. Cellular Digital Packet Data CDPD, VOIP, GPRS Services, Wireless Local Loop-WLL system.

Unit- 3 Wireless Application Protocol (WAP)

(8 Hrs)

The Wireless Application Protocol application environment, wireless application protocol Client software, hardware and websites, wireless application protocol gateways, Implementing enterprise wireless application protocol strategy.

Unit-4 Wireless Markup Language

(8 Hrs)

An Introduction to Wireless Technologies, Markup Languages, An Introduction to XML, Fundamentals of WML. Writing and Formatting Text, Navigating Between Cards and Decks, Displaying Images, Tables, Using Variables, Acquiring User Input

Unit-5 Wireless Markup Language Script

(8 Hrs)

An Introduction to WMLScript, WMLScript Control Structures, Events, Phone.com Extensions, Usability, Application of Mobile computing: ASP and Dynamic WAP Sites, Developing WAP Applications using Emulators.

Text Books:

1. Yi Bing Lin, “*Wireless and Mobile Networks Architecture*”, John Wiley.
2. Wrox, “*The Beginning WML and WML Script*”, Wrox Publication
3. Tomasz Imielinski et.al, “*Mobile Computing*”, Kluwer Academic Press 1996.
4. Jochen Burkhardt, et.al. “*Pervasive Computing, Technology and Architecture of Mobile Internet Applications*”, Addison Wesley, 2002

Reference Books -

1. Gary J.Mullet “introduction to Wireless Telecommunication Systems and Networks”, DELMAR CENGAGE Learning 2007

IT - 421 – Elective-I (i) Automata Theory and Compiler Design

Teaching Scheme:

Theory: 4 Hrs/week

Examination Scheme:

ESE – 60 marks, Test – 20 marks

Assignment – 20 marks

Credits: 4

Objectives:

- To study abstract models of computations
- To create a background for design of compilers
- To be able to apply these models in practice for solving problems in diverse areas such as string searching, pattern matching and language design
- To study and design Lexical Analyzer and Parser
- To study and understand techniques of Code Optimization

CONTENTS

Unit-1 (8 hrs)

Finite Automata: Definition of Finite Automata, Deterministic Finite Automata, Nondeterministic Finite Automata, Application of FA: Text Search

Regular Expressions and Languages: Regular Expressions, Finite Automata and Regular Expressions, Applications of Regular Expressions and Languages, Algebraic Laws for Regular Expressions and Language, Closure Properties of Regular Expressions, Decision Properties of Regular Expressions, Equivalence and Minimization of Automata.

Unit- 2: (8 hrs)

Context Free Grammar: Parse Trees, Application of CFG, Ambiguity in Grammars and Languages, Normal Forms for Context Free Grammars, Pumping Lemma for CFL, Closure and Decision Properties of Context Free Languages.

Pushdown Automata: Definition of PDA, Languages of Pushdown Automata, Equivalence and Context Free Grammars of Pushdown Automata, Deterministic PDA

Unit -3: (8 hrs)

Turing Machine: Introduction to Turing Machine, Programming Techniques of Turing Machine, Extension to Basic Turing Machines, Turing Machines and Computers, Undecidable Problems about Turing Machines

Unit -4: (8 hrs)

Lexical Analysis: Role of Lexical Analyzer (scanner), Finite Automata as a Recognized Regular Expression, scanner generator- **lex**, programs using **lex**

Parsers: What is a Parser? Constructing Parse Tree, Top-Down Parsing, LR Parser, LR Grammars, Parser Generator- **yacc**, programs using **yacc**

Code Optimization: Introduction, Principle Sources of Optimization, Loop Optimization, Basic Blocks.

Unit -5: (8 hrs)

Syntax Directed Translation: SDT Schemes, SDT Scheme for Desk Calculator, Parse Tree with Translation, Intermediate Code, Postfix Notation, Three Address Code, Quadruples, Triples, Translation Scheduler for Assignment Statements, Translation Schemes for Boolean Expressions

Run-Time Storage Administration: Implementation of Simple Stack allocation Schemes, Implementation of Block Structured Languages. **Code Generation Phase-**

Text Books:

1. John E. Hopcroft , Rajeev Motwani , Jeffrey D. Ullman, "*Introduction to Automata Theory, Languages, and Computation*" 3rd ed. , Pearson Education, ISBN: 81-317-1429-2
2. Alfred V. Aho and Jeffrey D. Ullman, "*Principles of Compiler Design*", NAROSA Pub
3. K.L.P. Mishra, N. Chandrasekaran, "*Theory of Computer Science: Automata, Languages and Computation*" 3rd ed. , PHI , ISBN : 978-81-203-2968-3
4. John C Martin, "*Introduction to Languages and The Theory of Computation*", 3rd ed., Tata McGraw Hill , ISBN : 0-07-066048-4

Reference Books -

1. D. M. Dhamdhere, "*Compiler construction Principles and Practices*",
2. Santanu Chattopadhyay, "*Compiler Design*", PHI Learning Pvt. Ltd.

IT-422: Elective - I (ii) Soft Computing

Teaching Scheme:

Theory: 4 Hrs/week

Examination Scheme:

ESE – 60 marks, Test – 20 marks

Assignment – 20 marks

Credits: 4

Objectives:

- To study models of ANN and Fuzzy Logic
- To be able to apply these models in practice for solving problems in diverse areas such as pattern recognition, pattern matching
- To study and understand techniques of Feed forward and feedback neural networks

Unit 1 -

(8 hrs)

Basics of Artificial Neural Network

Characteristics of Neural Networks, Structure and working of a biological neural network, artificial neural network: terminology, models of neurons: Mc-Culloch - Pitts model, Perceptron model, Adaline model, topology, Basic learning laws.

Functional Units for ANN for Pattern Recognition Task: Pattern Recognition Problem, Basic Functional units, PR by functional units.

Unit 2

(8 hrs)

Feedforward Neural Networks

Supervised Learning I: Perceptrons – Learning and Memory, Learning Algorithms, Error Correction and Gradient Decent Rules, Perceptron Learning Algorithms, Supervised Learning II: Backpropagation- Multilayered Network Architectures, Back propagation Learning Algorithm, example Applications of feed forward neural networks.

Unit 3

(8 hrs)

Feedback Neural Networks & Self Organizing Feature Map

Introduction, Associative Learning, Hopfield network, Error Performance in Hopfield networks, simulated annealing, Boltzmann machine and Boltzmann learning,

State transition diagram and false minima problem, stochastic update, simulated annealing, Boltzmann machine, Bidirectional Associative Memory, BAM Stability Analysis.

Self Organization, Generalized Learning Laws, Competitive Learning, Vector Quantization, self organizing feature map, Applications of self organizing feature map.

Unit 4 - Fuzzy Logic

(8 hrs)

Fuzzy set theory, crisp sets, operations on crisp set, fuzzy sets, fuzzy versus crisp, operations, fuzzy relations, crisp relations, properties Fuzzy logic

Application: Fuzzy Control of Blood Pressure

Unit 5

(8 hrs)

Fuzzy Logic in database and Information systems- Fuzzy Information, Fuzzy Logic in database Systems, Fuzzy Relational data Models, operations in Fuzzy Relational data Models, Design theory for Fuzzy Relational databases, Fuzzy information Retrieval and Web search, Fuzzy Object Oriented databases.

Introduction to Genetic Algorithms, Evolutionary Algorithms.

Text Books:

- 1) B. Yegnanarayana , “*Artificial Neural Networks*”, PHI publications
- 2) Satish Kumar, “*Neural Networks- A classroom Approach*”, TMH Publication
- 3) John Yen, Reza Langari, “*Fuzzy Logic*”, Pearson Education

Reference Books :

- 1) S. Rajasekaran, Vijaylakshmi Pari, “Neural networks, Fuzzy Logic and Genetic Algorithms- Synthesis and Applications”, PHI publication.
- 2) Lotfi A. Zadeh, “Soft computing and Fuzzy Logic”, World Scientific Publishing Co., Inc. River Edge, NJ, USA.

IT- 404 : Lab - Knowledge Discovery

Teaching Scheme:

Practical: 2 Hrs/week

Examination Scheme:

Term work: 25

Practical/Viva: 25

Credits: 1

TERM Work:

The term work shall consist of a journal record of at least 10 experiments/ assignments based on the syllabus of the subject – Data Warehousing and Data mining.

Assessment of term work should be done based on the points mentioned below:

- Continuous lab assessment
- Actually performing practical in the laboratory
- Oral Examination conducted (internally) at the time of submission

Practical Examination:

The Practical Examination shall consist of writing and performing an experiment / assignment and oral based on the syllabus as per the journal record. Duration of examination is three hours.

Suggestive List of experiments:

1. Evolution of data management technologies, introduction to data warehousing concepts
2. Develop an application to implement defining subject areas, design of fact and dimension tables, data marts.
3. Develop an application to implement OLAP, roll-up, drill-down, slice, and dice operations.
4. Develop an application to construct a multidimensional data
5. Develop an application to implement data generalization and summarization techniques
6. Develop an application to extract association mining rules.
7. Develop an application for classification of data.
8. Develop an application for implementing one of the clustering technique
9. Develop an application for implementing Naïve Bayes classifier
10. Develop an application for Decision tree classifier

Reference books:

- Lilian Hobbs , Susan Hillson , Shilpa Lawande , Pete Smith , “ Oracle 10g Data Warehousing”
- A B M Shaukat Ali, Saleh A Wasimi, “Data Mining: Methods and Techniques”, Cengage Learning Pub.
- Ralph Kimball, “The Data Warehouse Lifecycle Toolkit”, John Wiley Pub.
- Witten and E. Frank, Data Mining: Practical Machine Learning Tools and Techniques with Java Implementations, Morgan Kaufman Pub.

IT 405 – Lab – Open Source Software (PHP and MYSQL)

Teaching Scheme:

Practical: 2 Hrs/week

Examination Scheme:

Term work: 25

Practical/Viva: 50

Credits: 2

Contents:

Installation of APACHE, PHP and MYSQL, PHP- variables, loops, in-else, arrays, functions, forms, Create a new database , Create tables , Insert data, Get the data , Update & Delete data, Exception handling, Setting connection with database, GET and POST functions, Web database, developing Interactive applications using this software

TERM Work:

The term work shall consist of at least 10 experiments/ assignments based on the contents mentioned above.

Assessment of term work should be done based on the points mentioned below:

- Continuous lab assessment
- Actually performing practical in the laboratory
- Oral Examination conducted (internally) at the time of submission

Practical Examination:

The Practical Examination shall consist of writing and performing an experiment / assignment and oral based on the syllabus as per the journal record. Duration of examination is three hours.

Suggestive List of Experiments:

1. Introduction to PHP, MYSQL and APACHE server
2. Storing and retrieving data in PHP
3. Reusing code and writing functions in PHP
4. PHP GET and POST functions.
5. PHP advanced functions
6. Interacting with the File System and the Server
7. Session control in PHP
8. Exception handling in PHP
9. Introduction to designing web database structure in MYSQL
10. Develop web application that can insert, delete and modify information of database

IT 406 - Lab: Mobile Computing

Teaching Scheme:

Practical: 2 Hrs/week

Examination Scheme:

Term work: 25

Practical/Viva: 25

Credits: 1

TERM Work:

The term work shall consist of at least 10 experiments/ assignments based on the syllabus of the subject “Mobile Computing”.

Assessment of term work should be done based on the points mentioned below:

- Continuous lab assessment
- Actually performing practical in the laboratory
- Oral Examination conducted (internally) at the time of submission

Practical Examination:

The Practical Examination shall consist of writing and performing an experiment / assignment and oral based on the syllabus as per the journal record. Duration of examination is three hours.

Suggestive List of Experiments –

1. WAP and WML
2. Programs Wireless Markup Language
3. Writing and formatting of text in WML
4. Navigation between cards and deck
5. Displaying of Image using WML
6. Table properties of WML
7. Methods of acquiring user inputs in WML
8. WML scripts basics
9. If – else structure of WML script
10. Assignment on latest Open Source Operating Systems for Mobile

IT 423 - LAB: (i) Automata Theory and Compiler Design

Teaching Scheme:

Practical: 2 Hrs/week

Examination Scheme:

Term work: 25

Practical/Viva: 50

Credits: 2

TERM Work:

The term work shall consist of at least 10 experiments/ assignments based on the syllabus of the subject “Mobile Computing”.

Assessment of term work should be done based on the points mentioned below:

- Continuous lab assessment
- Actually performing practical in the laboratory
- Oral Examination conducted (internally) at the time of submission

Practical Examination:

The Practical Examination shall consist of writing and performing an experiment / assignment and oral based on the syllabus as per the journal record. Duration of examination is three hours.

Suggested List of Experiments-

1. Construction of Finite Automata equivalent to Regular Expressions
2. Convert Regular Expression To NFA
3. Construct Transition Diagram for DFA from Given Regular Expression.
4. Construction of Parse Tree for Context Free Grammar
5. Lexical Analyzer
6. Application of Pumping Lemma
7. Construction of Pushdown Automata for Given Context Free Grammar
8. Construction of Context Free Grammar equivalent to given Pushdown Automata
9. Construction of Turing Machine for Recognizing Context Free Language
10. Construct a DFA from Three Address Code
11. Find Type of Grammar

IT-424: Lab - Elective - I (ii) Soft Computing

Teaching Scheme:

Practical: 2 Hrs/Week

Examination Scheme:

Term Work : 25 Marks

Pract/viva Exam: 50 Marks

Credit: 2

Term Work:

Term work shall consist of journal record of at least 10 experiments/programs based on syllabus.

Assessment of term work should be done based on following points:

- Continuous lab assessment
- Performance of Practical in Laboratory
- Oral Examination conducted (internally) at the time of submission.

Practical Examination:

The practical examination shall consist of writing and performing an experiment/assignment and oral based on the syllabus as per journal record Duration of examination is three hours.

Suggestive List of Programs –

- 1) Implementation of McCulloh-Pitts model.
- 2) Implementation of perceptron model.
- 3) Implementation of Hopfield model.
- 4) Implement Delta rule.
- 5) Implement back propagation rule.
- 6) Implement model for multilayer perceptron.
- 7) Study of pattern classification and pattern clustering
- 8) Study of ART networks

Implementation of the programs is to be done using MATLAB platform.

IT- 407: Project Part - I

Teaching Scheme:

Practical: 2 Hrs/week

Examination Scheme:

Term work: 25

Practical/Viva: 50

Credits: 2

The project group should deliver a seminar based on the work they have completed during the first term. It is expected that the group should start the phase of system development completing the initial two phases of Introduction and Literature Survey. The submission will consist of a typewritten report covering the project work.

Guidelines for Project:

- **Minimum 2 to maximum 4** students per project group
- Decide the topic in **first 15 days** from the start of the semester.
- Follow Software Development Life Cycle Phase for project development.

The **suggestive format** of the report and other details will be available in the Department.

→ Semester –II

IT - 411: Cryptography and Network Security

Teaching Scheme:

Theory: 4 Hrs/week

Examination Scheme:

ESE – 60 marks, Test – 20 marks

Assignment – 20 marks

Credits: 4

Objectives:

- To make students familiar with the fundamental concepts of Network Security
- To learn the cryptography techniques
- To realize the importance of network security and the places where it needs to be employed
- To give emphasis on how Network security is implemented

Unit- 1

(8Hrs)

Introduction to Network security: Passive and active attacks, access control, integrity, the model of internetwork security

Internet standards: the internet society and RFC publications (Request for comments.)

Symmetric Ciphers: Symmetric Cipher Model, Substitution Techniques, Transposition Techniques, Block cipher modes of Operation, Characteristics of Advanced Symmetric Block Cipher, Euclid's Algorithm, triple DES

Unit- 2

(8Hrs) Cryptography: Encryption

Principles, the RSA Algorithm, Key Management, Diffie- Hellman Key Exchange, Authentication Requirements, Authentication Functions, Digital Signatures, Authentication Protocols, Digital Signature Standards.

Unit- 3

(8Hrs)

Network security Applications: Kerberos, X.509 directory Authentication Services, e-mail PGP security (Pretty Good Privacy) operational description, SMIME (Security/Multipurpose Internet Mail Extensions) functionality.

Unit- 4

(8 Hrs)

IP Security: Overview , IP security architecture, Authentication header,

Web Security: Web security requirements,

Secure Socket Layer (SSL): Functionality, Certificates, Risks, HTTPS

SSH and Security: SSH use, Limitations, Risks

Transport layer security TLS, secure electronic Transactions TES.

Unit-5

(8Hrs)

Firewall: Characteristics, types of firewall configuration, Trusted Systems, data access control,

Virtual Private Networks (VPN) – Basics and Architecture,

TCP: TCP Hijacking, ICMP attacks, LAND attack, Stateful Packet Inspection (SPI), Intrusion Detection System (IDS), Intrusion Prevention System (IPS),

Text Books –

1. William Stallings, “*Cryptography and Network Security*”, (Pearson Edu. Asia Pub.)
2. Mark Rhodes , “*The Complete Reference Book of Network Security*”, Ousley
3. Neal Krawetz, “*Introduction to Network Security*”, Cengage Learning Pub.

Reference Books –

1. Alfred Basta, Wolf Halton, “*Computer Security, Concepts, Issues and Implementation*”, Cengage Learning Pub.

IT - 412 Image Processing

Teaching Scheme:

Theory: 4 Hrs/week

Examination Scheme:

ESE – 60 marks, Test – 20 marks

Assignment – 20 marks

Credits : 4

Unit 1:

(8 Hrs)

Fundamentals of Image Processing: Image Acquisition, Image Model, Sampling, Quantization, Relationship between pixels and distance measurement, connectivity, Image Geometry, Photographic film. Histogram: Definition, Decision of Contrast biasing on histogram, Operations basing on histograms like image stretching, image sliding, Image classification. Definition and Algorithm of Histogram equalization

Image Enhancement (by Spatial Domain Methods) Arithmetic and Logical operations, pixel or point operations, size operations) Smoothing filters – Mean, Median, Mode filters. Low pass filters, high pass filters, sharpening filters.

Unit 2: Image Restoration

(8 Hrs)

A model of the Image degradation/ Restoration

Noise models :Spatial and frequency properties of noise , noise probability density function, periodic noise, Estimation of noise parameters, Restoration in the presence of noise only - Statistical filtering:- Mean filtering, order statistical filters, adaptive filters

Periodic Noise reduction by frequency domain sampling –Band reject filters band pass filters, notch filters, Optimum notch filtering, linear positional Invariant degradation

Estimation of Degradation function- Estimation by image observation, Estimation by Experimentation, Estimation by image modeling.

Unit 3: Image compression

(8 Hrs)

Fundamentals- Coding redundancy, interpixel redundancy, Psychovisual redundancy, fidelity criteria, Image compression models- The source encoder and decoder, The channel Encoder and decoder, Elements of information theory- Measuring information, The information channel, Fundamental coding theorems, Using Information theory

Error free Compression-Variable length coding, LZW Coding Bit plane coding, Loss less predictive coding, Lossy Compression- Lossy predictive coding, transform coding, wavelet coding

Unit 4:

(8Hrs) **Morphological Image**

Processing: Dilation and erosion, Opening and closing, The Hit or Miss transformation, Basic Morphological algorithms: Boundary extraction, region filling, Applications of Gray-scale morphology.

Color Image Processing: Color fundamentals, color models (RGB, CMY, HIS, YcbCr), Color transformations: formulation, color complements, color slicing, tone and color corrections.

Unit 5: Image segmentation

(8 Hrs)

Detection of discontinuities- Point detection, line detection edge detection, combined

Detection, Edge linking and boundary detection-local processing, global processing via Hough Transform, Global processing via Graph Theoretic Technique,

Thresholding: - Foundation, the Role of illumination, Basic Adoptive Thresholding Optimal Global and Adoptive thresholding, Use of boundary characteristics, for histogram improvement and local thresholding, thresholding based on several variables

Region Based segmentation- Basic formulation, region growing by pixel Aggregation, region splitting and merging, The use of Motion in segmentation – Spatial techniques, frequency domain techniques, Segmentation using watershed transform:- Basic Concept , Dam construction Watershed segmentation Algorithm the use of Markers.

Text Books:

1. Rafael C. Gonzalez and Richard E. Woods, "*Fundamentals of Digital Image Processing*", Pearson Education, Second Edition
2. Rafael C. Gonzalez and Richard E. Woods and Eddins, "*Fundamentals of Digital Image Processing using MATLAB*", Pearson Education, Second Edition

Reference Books:

1. Sonka, Hlavac, Boyle, "*Digital Image Processing and Computer Vision*", Cengage Learning
2. Anil K Jain, "*Digital Image Processing*", PHI
3. Pratt, "*Digital Image processing*", (Third Edition)

IT 413 – Computer Ethics and Cyber Security

Teaching Scheme:

Theory: 4 Hrs/week

Examination Scheme:

ESE – 60 marks, Test – 20 marks

Assignment – 20 marks

Credits: 4

Objectives:

- To make students familiar with the fundamental concepts of computer ethics
- To know the linkage between computer, professional, philosophical ethics and decision making
- To develop the concepts in computer forensics
- To give emphasis on how cyber security operations are carried out
- To introduce the linkage between technology, law and ethics

CONTENTS

Unit 1- Computer ethics and philosophical ethics: (08 Hrs)

Vacuum of policies, conceptual muddles, social context, moral and legal issues, uniqueness of ethical issues, role of analogy, descriptive and normative claims, ethical relativism, utilitarianism, other theories

Professional Ethics:

Characteristics, the system of professions, computing as a profession, professional relationships, responsibilities, code of ethics and professional conduct

Privacy: Computers and privacy issue, reframing this issue, legislative background, better privacy protection

Unit- 2 (08 Hrs)

Intellectual property issues in cyberspace:

Introduction to intellectual property Protections via Copyright, Trade Secrets, Trademarks, Patents, Contracting to protect intellectual property, Protection options – Encryption, copyright on web-content, copyright on software

Ethical Decision Making: (08 Hrs)

Types of ethical choices, Making defensible decisions, Ethical dilemmas, law and ethics, Guidelines for dilemma (Informal and Formal), Four-step analysis process of solving dilemma

Case studies: i) A stolen password ii) Recovery of data leads to Discovery of confidential files iii) Do copyright ethics change overseas?

Unit 3- Crime incident Handling Basics: (08 Hrs)

Hacking, cyber activism, Tracking hackers, clues to cyber crime, privacy act, search warrants, common terms, organizational roles, procedure for responding to incidents, reporting procedures, legal considerations

Information Technology Act 2000

Scope, jurisdiction, offense and contraventions, powers of police, adjudication

Unit 4- Cyber Forensics: (08 Hrs)

Cyber forensics, cyber crime examples, forensics casework, investigative incident-response actions, computer forensics tools, Threats in cyberspaces, Blended attacks

Sample Policy Documents: i) Antivirus Guidelines Policy ii) Internal Lab Security Policy iii) Server Security Policy iv) Wireless Communications Policy

Unit 5- (08 Hrs)

Information Security Certifications, CISSP and SSCP, CISA and CISM, SCP, GIAC, certification weaknesses, Role of these certified professionals, Windows Server 2003 Security Fundamentals

Text Books:

1. Deborah G Johnson, “ *Computer Ethics*”, Pearson Education Pub., ISBN : 81-7758-593-2.
2. Earnest A. Kallman, J.P Grillo, “*Ethical Decision making and IT: An Introduction with Cases*”, McGraw Hill Pub.
3. John W. Rittinghouse, William M. Hancock, “*Cyber security Operations Handbook*”, Elsevier Pub.
4. Michael E. Whitman, Herbert J. Mattord, “*Principles of Information Security*”, 2nd Edition,, CengageLearning Pub.

Reference Books:

1. Randy Weaver, Dawn Weaver, “*Network Infrastructure Security*”, Cengage Learning Pub.

IT 431 - Elective II (i) Advanced Java

Teaching Scheme:

Theory: 4 Hrs/week

Examination Scheme:

ESE – 60 marks, Test – 20 marks

Assignment – 20 marks

Credits: 4

Objectives:

- To study advanced concepts of Java Language
- To enable students to develop Network based and Advanced Online Applications in Java

Unit-1 (8 hrs)

Introduction to Java 2 Enterprise Edition: Need for J2EE, Advantages of J2EE, Types of Enterprise Architecture, Architecture of J2EE, J2EE Components, J2EE Containers, J2EE Technologies

JDBC and Database Programming: Introduction to JDBC, JDBC Drivers, The java.sql package, PreparedStatement class, CallableStatement object, Scrollable Resultset, Updatable Resultset, Connection Pooling

Unit- 2: (8 hrs)

Java Coding Standards

Socket Programming: Introduction to Networking, Client Sockets and Server Sockets

Introduction to RMI: Architecture of RMI, Working with RMI, Creating Distributed Applications, Using RMI, RMI over IIOP, RMI-IIOP and J2EE, Sample Application with RMI-IIOP

Unit -3: (8 hrs)

Servlet Programming: Overview of Servlet, What's new in Servlet, Features of Java Servlet, Servlet Life cycle, Servlet Configuration, Understanding Request and Response Object, Reading Form Data from Servlet

Understanding Servlet Sessions: What is Session? Introduction to Session Tracking, Mechanism of Session Tracking, Session Tracking and Java Servlet API

Unit -4: (8 hrs)

Enterprise Java Beans: EJB Fundamentals, EJB Architecture, EJB Interfaces, EJB Roles, Benefits and Limitations of EJB, Session Bean, Stateless versus Stateful Session Beans, Developing Session Beans, Introduction of Entity Beans, BMT Entity Beans, CMP Beans, ejbLoad(), ejbStore() ejbRemove and Finder methods, Sample Application, Deploying EJBs.

Unit -5: (8 hrs)

Understanding Struts: What is Struts? Why Struts, MVC Framework, Building Model Components, Building View Components, Building Controller Components, Installing Struts, Developing Sample Application

Understanding Hibernate: Features of Hibernate, Architecture of Hibernate, Understanding Hibernate O/R mapping, Hibernate Query Language, Configuring Hibernate.

Text Books:

1. “Java Server Programming, Black Book”, Dreamtech Press, Edition 2007.
2. “J2EE – Complete Reference”, McGraw Hill, Edition 2007

Reference Books:

1. Bruce Eckel, “Thinking in Java”, Prentice - Hall
2. Herbert Schildt, Patrick Naughton, “JAVA 2 – Complete Reference”, McGraw Hill

Website:

IT 432 – Elective-II (ii) Business Processes

Teaching Scheme:

Theory: 4 Hrs/week

Examination Scheme:

ESE – 60 marks, Test – 20 marks

Assignment – 20 marks

Credits: 4

Objectives:

- To study concepts of Business Process
- To enable students to understand various types of processes involved in Business
- To know the linkage between the technology and the actual processes used in Business

Unit-1 (8 hrs)

Business Process: Overview, History – Adam Smith and Other definitions. Supporting Theories and Concepts - Division of Labor, Span of Control, Departmentalization by Process and Purpose, Information Management Concepts

Business Architecture: Overview, Business Architecture Topics – Different view of an organization, Disciplined Approach, Business Strategy. Frameworks for Business Architecture – Zachman Framework, The Object Management Group, The Open Group, eXtended Business Modeling Language, Industry Reference Models

Unit- 2: (8 hrs)

Business Process Management: Overview, BPM Life-cycle - Design, Modeling, Execution, Monitoring, Optimization. Practice - BPM Technology. Use of Software

Business Process Automation: Delivery – Extension of Existing IT Systems, Purchase of a Specialist BPA tool, Purchase of a Business Process Management Solution with BPA Extensions, Purchase of a Middleware Solution. BPA vs BPM, The Role of Service-Oriented Architecture (SOA) with respect to BPA

Unit -3: (8 hrs)

Business Process Reengineering: Basic Concepts, Need for BPR, Principles of BPR, Role of IT, BPR and restructuring the organization

Business Process Mapping: Early History, Recent Developments

Unit -4: (8 hrs)

Business Process Execution: Overview, History, Business Process Execution Language Topics – BPEL Design Goals, The BPEL Languages, Relationship of BPEL to BPMN, Adding 'Programming in the Small' Support to BPEL, WS- BPEL

Business Process Outsourcing (BPO): Benefits and limitations of outsourcing the processes, offshore and nearshore outsourcing, industry size, risks involved

Unit -5: (8 hrs)

Business Management Strategy- Six Sigma: Historical Overview, Origin and Meaning of the Term "Six Sigma Process", Role of the 1.5 Sigma Shift, Sigma Levels. Methods- DMAIC, DMADV. Implementation Roles, Quality Management Tools and Methodologies used in Six Sigma, Software used for Six Sigma, List of Six Sigma Companies, Reception – Lack of Originality, Role of Consultants, Potential Negative Effects, Based on Arbitrary Standards, Criticism of the 1.5 Sigma Shift.

Text/ Reference Books:

1. R. Radhakrishnan and S. Balasubramanian, “*Business Process Reengineering: Text cases*”, PHI Pub.
2. Vikram Sethi, William R King, “*Organizational Transformation Through Business Process Reengineering*”, Pearson Education Pub.

Website: www.wikipedia.org (Wikipedia, The Free Encyclopedia)

IT - 414 Lab: Cryptography and Network Security

Teaching Scheme:
Practical: 2 Hrs/week

Examination Scheme:
Term Work - 25 marks,
Practical /viva – 50 marks
Credits: 1

TERM Work:

The term work shall consist of a journal record of at least 10 experiments/ assignments based on the syllabus of the subject – **Cryptography and Network Security**.

Assessment of term work should be done based on the points mentioned below:

- Continuous lab assessment
- Actually performing practical in the laboratory
- Oral Examination conducted (internally) at the time of submission

Practical Examination:

The Practical Examination shall consist of writing and performing an experiment / assignment and oral based on the syllabus as per the journal record. Duration of examination is three hours.

Suggestive list of experiments:

1. Study & establish Local Area Network (LAN)
2. Implementing Euclid's Algorithm
3. Gathering hardware information using utility like NAT (Network Asset Tracker)
4. Exploring Windows Password Policy Settings
5. Analysing Captured Packets using software like "Ethereal".
6. Examining Digital Certificates
7. Configuring an IPSec Policy for Windows
8. Securing Green Globe's Web Server
9. Write a C program that prints the environment string in UNIX.
10. Write a program for file Transfer using TCP Sockets.
11. Implementing secret key algorithm
12. Implementing RSA Algorithm
13. Study of Cryptography Algorithm
14. Study and use of digital signature
15. Implementing Web Security
16. Study of System Security

IT - 415 Lab: Image Processing

Teaching Scheme:

Practical: 2 Hrs/week

Examination Scheme:

Term Work -25 marks,
Practical Oral/viva – 50 marks
Credits: 2

TERM Work:

The term work shall consist of a journal record of at least 10 experiments/ assignments based on the syllabus of the subject – Image Processing.

Assessment of term work should be done based on the points mentioned below:

- Continuous lab assessment
- Actually performing practical in the laboratory
- Oral Examination conducted (internally) at the time of submission

Practical Examination:

The Practical Examination shall consist of writing and performing an experiment / assignment and oral based on the syllabus as per the journal record. Duration of examination is three hours.

Suggestive list of experiments:

It should consist of programs/ assignments on above topics using software like MATLAB/ Octave/ DIPUM toolbox.

1. Program to filter an image using averaging filter in spatial domain
2. Program to sharpen an image using high pass filter in spatial domain
3. Program for compressing an image using Huffman coding
4. Program for morphological operations- erosion, dilation, opening and closing
5. Program for Reconstructing image using morphological operations
6. Program to segment an image using Watershed technique
7. Program for segmentation using region growing method
8. Program for detecting edges in an image
9. Program for compression of image using wavelet transform
10. Program for enhancement of color image
11. Program for illustrating color image processing
12. Program for creation of watermarking

IT 433 – LAB – Elective II (i) Advanced Java

Teaching Scheme:

Practical: 2 Hrs/week

Examination Scheme:

Term Work: 25

Practical/Viva: 25

Credits: 2

Term Work:

Term work shall consist of journal record of at least 10 experiments/programs based on syllabus of Advanced Java. Assessment of term work should be done based on following points:

- Continuous lab assessment
- Performance of Practical in Laboratory
- Oral Examination conducted (internally) at the time of submission.

Practical Examination:

The practical examination shall consist of writing and performing an experiment/assignment and oral based on the syllabus as per journal record Duration of examination is three hours.

Suggested List of Experiments-

1. Displaying values in a table record by record and show next and previous buttons.
2. Display all values in a table in tabular format
3. Create a program to demonstrate simple chat application using Networking
4. Create a program to develop RMI application for basic arithmetic calculations.
5. Create a Servlet to read data from a HTML Form and display it on Servlet page.
6. Create a Cookie using Servlet API.
7. Create a Simple EJB to demonstrate Java EJB API
8. Deploy Bean created in Previous Experiment
9. Create a Sample Application using Struts.
10. Create a sample application to demonstrate configuration of Hibernate
11. Mini Project

IT –434 Lab - Elective-II (ii) Business Processes

Teaching Scheme:

Practical: 2 Hrs/week

Examination Scheme:

Term Work: 25

Practical/Viva: 25

Credits: 2

Term Work:

Term work shall consist of journal record of at least 5 experiments/ case studies based on syllabus. Assessment of term work should be done based on following points:

- Continuous lab assessment
- Performance of Practical in Laboratory
- Oral Examination conducted (internally) at the time of submission.

Practical Examination:

The practical examination shall consist of an **oral** based on the syllabus as per journal record.

Suggestive List of Experiments:

- Lab work will consist of BPR study, design and discussion on various types of businesses.
- Some lab work will be based on case studies of different organizational problems and possible solutions.

IT –416 Lab – Project Part-II

Teaching Scheme:

Practical: 6 Hrs/week

Examination Scheme:

Term Work: 50

Practical/Viva: 100

Credits: 3

The project group should complete the project work taken in Part-I. It should complete the rest of the work from stage III onwards till the conclusion. The performance Analysis chapter should consist of various testing methods used along with sample test cases. It should also include how better the system is performing as compared to other similar systems.

The final examination will consist of the demonstration of work which will be judged by two examiners (one internal and one external) and the marks will be given accordingly.

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