AISECT UNIVERSITY, Bhopal, (M.P.)

Scheme of Examination

Department: Computer Science &Engg.

Subject Code	Subject Name	Credits	Maximum marks Allotted						Duration of Exam.	
			Theory			Practical		Total	Theory	Practical
			Major	Minor	Sessional.	End Sem	Lab Work			
TBCS - 701	Compiler Design	6(3+2+1)	50	20	30	25	25	150	3 hr	2 hr

Syllabus

Objective:

- To describe the steps and algorithms used by language translators.
- To discuss the effectiveness of optimization.
- To explain the machine dependent aspects of Compilation

Theory:

UNIT-I

Introduction to compiling & Lexical Analysis

Introduction of Compiler, Major data Structure in compiler, BOOT Strapping & Porting, Compiler structure: analysis-synthesis model of compilation, various phases of a compiler, Lexical analysis: Input buffering, Specification & Recognition of Tokens, LEX.

UNIT-II

Syntax Analysis &Syntax Directed Translation

Syntax analysis: CFGs, Top down parsing, Brute force approach, recursive descent parsing, transformation on the grammars, predictive parsing, bottom up parsing, operator precedence parsing, LR parsers (SLR,LALR, LR),Parser generation. Syntax directed definitions: Construction of Syntax trees, Bottom up evaluation of S-attributed definition, L-attribute definition, Top down translation, Bottom Up evaluation of inherited attributes Recursive Evaluation, Analysis of Syntax directed definition.

UNIT-III

Type Checking & Run Time Environment

Type checking: type system, specification of simple type checker, equivalence of expression, types, type conversion, overloading of functions and operations, polymorphic functions. Run time Environment: storage organization, Storage allocation strategies, parameter passing, dynamic storage allocation, Symbol table

UNIT –IV

Code Generation

Intermediate code generation: Declarations, Assignment statements, Boolean expressions, Case statements, Back patching, Procedure calls Code Generation: Issues in the design of code generator, Basic block and flow graphs, Register allocation and assignment, DAG representation of basic blocks, peephole optimization, generating code from DAG.

UNIT -V

Code Optimization

Introduction to Code optimization: sources of optimization of basic blocks, loops in flow graphs, dead code elimination, loop optimization, Introduction to global data flow analysis, Code Improving transformations ,Data flow analysis of structure flow graph Symbolic debugging of optimized code.

Course Outcomes:

- Ability to understand the design of a compiler given features of the languages.
- Ability to implement practical aspects of automata theory.
- Gain Knowledge of powerful compiler generation tools.

Practical:

1. Write a program to parse using Brute force technique of Top down parsing.
2. Develop LL (1) parser (Construct parse table also).
3. Develop an operator precedence parser (Construct parse table also)
4. Develop a recursive descent parser
5. Write a program for generating for various intermediate code forms
   i) Three address code ii) Polish notation
6. Write a program to simulate Heap storage allocation strategy.
7. Generate Lexical analyzer using LEX
8. Generate YACC specification for a few syntactic categories.
9. Given any intermediate code form implement code optimization techniques.
10. Study of an Object Oriented Compiler.

Reference Books:

1. A. V. Aho, R. Sethi, and J. D. Ullman. Compilers: Principles, Techniques and Tools , Pearson Education
2. Raghavan, Compiler Design, TMH Pub.
3. Louden. Compiler Construction: Principles and Practice, Cengage Learning
4. A. C. Holub. Compiler Design in C , Prentice-Hall Inc., 1993.
5. Mak, writing compiler & Interpreters, Willey Pub.

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TBCS - 702	Distributed System	5(3+2+0)	50	20	30	-	-	100	3 hr	-

Syllabus

Course Objectives:

1.understand foundation of distributed system.

2.Introduce the idea of peer to peer services and file system.

3.understand the detail the system level sand support required for distributed systems.

Theory:

UNIT-I

Introduction to distributed systems

Architecture for Distributed System, Goals of Distributed system, Hardware and Software concepts, Distributed Computing Model, Advantages & Disadvantage distributed system, Issues in designing Distributed System.

UNIT-II

Distributed Share Memory And Distributed File System

Basic Concept of Distributed Share Memory (DSM), DSM Architecture & its Types, Design & Implementations issues In DSM System, Structure of Share Memory Space, Consistency Model, and Thrashing. Desirable features of good Distributed File System, File Model, File Service Architecture, File Accessing Model, File Sharing Semantics, File Catching Scheme, File Application & Fault tolerance. Naming: - Features, System Oriented Names, Object Locating Mechanism, Human Oriented Name.

UNIT-III

Inter Process Communication And Synchronization

API for Internet Protocol, Data Representation & Marshaling, Group Communication, Client Server Communication, RPC- Implementing RPC Mechanism, Stub Generation, RPC Messages. Synchronization: - Clock Synchronization, Mutual Exclusion, Election Algorithms:- Bully & Ring Algorithms.

UNIT-IV

Distributed Scheduling And Deadlock

Distributed Scheduling-Issues in Load Distributing, Components for Load Distributing Algorithms, Different Types of Load Distributing Algorithms, Task Migration and its issues. Deadlock-Issues in deadlock detection & Resolutions, Deadlock Handling Strategy, Distributed Deadlock Algorithms.

UNIT-V

Distributed Multimedia & Database system

Distributed Data Base Management System(DDBMS), Types of Distributed Database, Distributed Multimedia:- Characteristics of multimedia Data, Quality of Service Managements. Case Study of Distributed System:- Amoeba, Mach, Chorus

Course Outcomes:

1.Students able to understand the trends in distributed system.

2.Students able to apply network virtualization

3.students able to apply the remote method invocation and objects.

Reference Books:

1. Sinha, Distributed Operating System Concept & Design, PHI
2. Coulouris & Dollimore, Distributed System Concepts and Design, Pearson Pub
3. Singhal & Shivratari, Advance Concept in Operating System, McGraw Hill
4. Attiya & Welch, Distributed Computing, Wiley Pub.

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TBCS - 703	Cloud Computing	6(3+2+1)	50	20	30	25	25	150	3 hr	2 hr

Syllabus

Course Objective: The course presents a top-down view of cloud computing, from applications and administration to programming and infrastructure. Its main focus is on parallel programming techniques for cloud computing and large scale distributed systems which form the cloud infrastructure. The topics include: overview of cloud computing, cloud systems, parallel processing in the cloud, distributed storage systems, virtualization, security in the cloud, and multicore operating systems. Students will study state-of-the-art solutions for cloud computing developed by Google, Amazon, Microsoft, Yahoo, VMWare, etc. Students will also apply what they learn in one programming assignment and one project executed over Amazon Web Services

Theory:

UNIT-I

Introduction: Historical development ,Vision of Cloud Computing, Characteristics of cloud computing as per NIST , Cloud computing reference model ,Cloud computing environments, Cloud services requirements, Cloud and dynamic infrastructure, Cloud Adoption and rudiments .Overview of cloud applications: ECG Analysis in the cloud, Protein structure prediction, Gene Expression Data Analysis ,Satellite Image Processing ,CRM and ERP ,Social networking .

UNIT-II

Cloud Computing Architecture: Cloud Reference Model, Types of Clouds, Cloud Interoperability & Standards, Scalability and Fault Tolerance.

Cloud Solutions: Cloud Ecosystem, Cloud Business Process Management, Cloud Service Management.

Cloud Offerings: Cloud Analytics, Testing Under Control, Virtual Desktop Infrastructure.

UNIT -III

Cloud Management & Virtualization Technology: Resiliency, Provisioning, Asset Management, Concepts of Map reduce, Cloud Governance, High Availability and Disaster Recovery. Virtualization: Fundamental concepts of compute ,storage, networking, desktop and application virtualization .Virtualization benefits, server virtualization, Block and file level storage virtualization Hypervisor management software, Infrastructure Requirements , Virtual LAN(VLAN) and Virtual SAN(VSAN) and their benefits .

UNIT-IV

Cloud Security: Cloud Information security fundamentals, Cloud security services, Design principles, Secure Cloud Software Requirements, Policy Implementation, Cloud Computing Security Challenges, Virtualization security Management, Cloud Computing Secutity Architecture .

UNIT-V

Market Based Management of Clouds , Federated Clouds/Inter Cloud: Characterization & Definition ,Cloud Federation Stack , Third Party Cloud Services .
Case study : Google App Engine, Microsoft Azure , Hadoop , Amazon , Aneka

Course Outcome: Analyze the trade-offs between deploying applications in the cloud and over the local infrastructure. b. Compare the advantages and disadvantages of various cloud computing platforms. c. Deploy applications over commercial cloud computing infrastructures such as Amazon Web Services, Windows Azure, and Google AppEngine. d. Program data intensive parallel applications in the cloud. e. Analyze the performance, scalability, and availability of the underlying cloud technologies and software. f. Identify security and privacy issues in cloud computing. g. Explain recent research results in cloud computing and identify their pros and cons. h. Solve a real-world problem using cloud computing through group collaboration.

Practical:

1. Installation and configuration of Hadoop/ Euceliptus etc.
2. Service deployment & Usage over cloud.
3. Management of cloud resources.
4. Using existing cloud characteristics & Service models.
5. Cloud Security Management.
6. Performance evaluation of services over cloud.

Reference Books:

1. Buyya, Selvi ,” Mastering Cloud Computing ",TMH Pub
2. Kumar Saurabh, "Cloud Computing” , Wiley Pub
3. Krutz , Vines, "Cloud Security " , Wiley Pub
4. Velte, "Cloud Computing- A Practical Approach” ,TMH Pub
5. Sosinsky, " Cloud Computing” , Wiley Pub

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TBCS - 704	Information Storage & Management	5(3+2+0)	50	20	30	-	-	100	3 hr	-

Course Objectives:

To understand CAS architecture and types of archives and forms of virtualization

To monitor the storage infrastructure and management activities

Syllabus

Theory:

UNIT-I

Introduction to Storage Technology: Data proliferation, evolution of various storage technologies, Overview of storage infrastructure components, Information Lifecycle Management, Data categorization.

UNIT-II

Storage Systems Architecture: Intelligent disk subsystems overview, Contrast of integrated vs. modular arrays, Component architecture of intelligent disk subsystems, Disk physical structure components, properties, performance, and specifications, RAID levels & parity algorithms, hot sparing, Front end to host storage provisioning, mapping and operation.

UNIT-III

Introduction to Networked Storage: JBOD, DAS, NAS, SAN & CAS evolution and comparision. Applications, Elements, connectivity, standards, management, security and limitations of DAS, NAS, CAS & SAN.

UNIT -IV

Hybrid Storage solutions; Virtualization: Memory, network, server, storage & appliances.

Data center concepts & requirements, Backup & Disaster Recovery: Principles Managing & Monitoring: Industry management standards (SNMP, SMI-S, CIM), standard framework

applications, Key management metrics (Thresholds, availability, capacity, security, performance).

UNIT-V

Information storage on cloud :Concept of Cloud, Cloud Computing, storage on Cloud, Cloud Vocabulary, Architectural Framework, Cloud benefits, Cloud computing Evolution, Applications & services on cloud, Cloud service providers and Models, Essential characteristics of cloud computing, Cloud Security and integration.

Course Outcomes:

Ability to identify key challenges in managing information and analyze different storage networking technologies and virtualization

Ability to understand components and the implementation of NAS

To understand CAS architecture and types of archives and forms of virtualization

-To monitor the storage infrastructure and management activities

Reference Books:

1. G. Somasundaram & Alok Shrivastava (EMC Education Services) editors; Information Storage and Management: Storing, Managing, and Protecting Digital Information; Wiley India.
2. Ulf Troppens, Wolfgang Mueller-Friedt, Rainer Erkens, Rainer Wolafka, Nils Haustein; Storage Network explained : Basic and application of fiber channels, SAN, NAS, iSESI, INFINIBAND and FCOE, Wiley India.
3. John W. Rittinghouse and James F. Ransome; Cloud Computing : Implementation , Management and Security, CRC Press, Taylor Frances Pub.
4. Nick Antonopoulos, Lee Gillam; Cloud Computing : Principles, System & Application,Springer.
5. Anthony T. Velete, Toby J.Velk, and Robert Eltenpeter, Cloud Computing : A practical Approach, TMH Pub.
6. Saurabh , Cloud Computing : Insight into New EraI

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TBCS - 705	Network & Web Security	5(3+2+0)	50	20	30	-	-	100	3 hr	-

Syllabus

Course Objective:

This course is designed to cater all student knowledge needs, from elementary networking concepts, to intermediate network monitoring and security techniques.

Theory:

UNIT I

Introduction to Network Security, Computer Security and Cyber Security. Security Terminologies and Principle, Security Threats, Types of attacks (Operating System, application level, Shrink Wrap code, Mis-configuration attacks etc.). Introduction to Intrusion, Terminologies, Intrusion Detection System (IDS), Types of Intrusion Detection Systems, System Integrity Verifiers (SIVS).Indication of Intrusion: System Indications, File System Indications Network Indications. Intrusion Detection Tools, Post attack IDS Measures & Evading IDS Systems. Penetration Testing, Categories of security assessments, Vulnerability Assessment, Types of Penetration Testing. Risk Management.

UNIT II

Cryptography, Classical Cryptographic Techniques, Encryption, Decryption, Code Breaking: Methodologies, Cryptanalysis, Cryptography Attacks, Brute-Force Attack, Use of Cryptography. Public key cryptography, Principles of Public key Cryptosystems, Cryptographic Algorithms RSA, Data Encryption Standard (DES), RC4, RC5, RC6, Blowfish, Key Management, Diffie- Hellman key exchange, elliptic curve cryptography

UNIT III

Hash Functions, One-way Hash Functions,SHA (Secure Hash Algorithm), Authentication Requirements, Authentication Functions, Kerberos. Message Authentication codes ,Message Digest Functions, MD5, SSL (Secure Sockets Layer), SSH (Secure Shell), Algorithms and Security, Disk Encryption, Government Access to Keys (GAK) **Digital Signature:** Analysis, Components, Method, Applications, Standard, Algorithm: Signature Generation/Verification, ECDSA, EIgamal Signature Scheme, Digital Certificates.

UNIT IV

Trojans and Backdoors: Overt and Covert Channels, Working, Types (Remote Access Trojans, Data-Sending Trojans, Destructive Trojans, Trojans, Proxy Trojans, FTP Trojans, Security Software Disablers).

Viruses and Worms: Characteristics, Working, Infection Phase, Attack Phase. Sniffers:

Definition, spoofing, Sniffing, Vulnerable Protocols, Types.
Phishing: Methods, Process, Attacks Types (Man-in-the-Middle Attacks, URL Obfuscation Attacks, Hidden Attacks, Client-side Vulnerabilities, Deceptive Phishing, Malware-Based Phishing, DNS Based Phishing, Content-Injection Phishing, Search Engine Phishing).
Web Application Security- Secured authentication mechanism, secured session management, Cross-site Scripting, SQL Injection and other vulnerabilities

Denial-of Service Attacks: Types of Attacks (Smurf Attack, Buffer Overflow Attack,Ping of Death Attack, Teardrop Attack, SYN Attack, SYN Flooding), DDoS Attack(Distributed DoS Attack.), Session Hijacking, Spoofing v Hijacking, TCP/IP hijacking, CAPTCHA Protection.

UNIT V
IP Security, Web Security, Firewalls: Types, Operation, Design Principles, Trusted Systems. Computer Forensics, Need, Objectives, Stages & Steps of Forensic Investigation in Tracking Cyber Criminals, Incident Handling. Hacking, Classes of Hacker (Black hats, grey hats, white hats, suicide hackers), Foot printing, Scanning (Types-Port, Network, Vulnerability), E-Mail Spiders, Overview of System Hacking Cycle.

Course Outcomes:

At the end of the course, the students will be able to:

1. Understand Network Devices functions and configurations hub, switch, tap and routers

2. Understand Network Security Devices (IDS, Firewall..etc)

3. Understand and analyze network services.

4. Understand and analyze application performance

5. Understand and analyze network traffic and protocols

6. Understand network-troubleshooting concepts.

7. Understand network security concepts.

8. Understand network intrusions and how to identify them such as a. Computer Viruses b. Network worms c. Botnets

Reference Books:

1. William Stallings, "Cryptography and Network Security: Principles and Practice" Pearson
2. Charlie Kaufman, Radia Perlman, Mike Speciner, Michael Speciner, " Network Security - Private communication in a public world" TMH
3. Fourozon, "Cryptography & Network Security" TMH
4. Joseph Migga Kizza, Computer Network Security, , Springer International Edition
5. Atul Kahate,"Cryptography and Network Security" Mc Graw Hill
6. Carl Endorf, Eugene Schultz, Jim MELLANDER **"**INTRUSION DETECTION & PREVENSION**"** TMH Neal, Krawetz, Introduction to Network Security, Cengage

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TBCS - 706	Simulation & Modeling	5(3+2+0)	50	20	30	-	-	100	3 hr	-

Syllabus

Objective:

The aim of this course is to introduce various system modeling and simulation techniques, and highlight their applications in different areas. It includes modeling, design, simulation, planning, verification and validation. After learning the simulation techniques, the students are expected to be able to solve real world problems which cannot be solved strictly by mathematical approaches. This course begins by demonstrating the usefulness of simulation as a tool for problem solving in business, industry, government, and society

Theory:

UNIT-I

Introduction to Modeling and Simulation

Nature of Simulation. Systems , Models and Simulation, Continuous and Discrete Systems, system modeling, concept of simulation, Components of a simulation study, Principles used in modeling Static and Dynamic physical models, Static and Dynamic Mathematical models Introduction to Static and Dynamic System simulation , Advantages disadvantages and pitfalls of Simulation.

UNIT-II

System Simulation and Continuous System Simulation

Types of System Simulation, Monte Carlo Method, Comparision of analytical and Simulation methods, Numerical Computation techniques for Continuous and Discrete Models, Distributed Lag Models, Cobweb Model. Continuous System models, Analog and Hybrid computers, Digital- Analog Simulators, Continuous system simulation languages ,Hybrid simulation ,Real Time simulations.

UNIT -III

System Dynamics & Probability concepts in Simulation

Exponential growth and decay models, logistic curves generalization of growth models , System dynamics diagrams, Multi segment models , Representation of Time Delays. Discrete and Continuous probability functions, Continuous Uniformly Distributed Random Numbers, Generation of a Random numbers, Generating Discrete distributions, Non-Uniform Continuously Distributed Random Numbers, Rejection Method.

UNIT-IV

Simulation of Queueing Systems and Discrete System Simulation

Poisson arrival patterns, Exponential distribution, Service times, Normal Distribution Queuing Disciplines, Simulation of single and two server queue. Application of queuing theory in computer system. Discrete Events ,Generation of arrival patterns, Simulation programming tasks, Gathering statistics, Measuring occupancy and Utilization, Recording Distributions and Transit times .

UNIT-V

Introduction to Simulation languages and Analysis of Simulation output

GPSS: Action times, Succession of events, Choice of paths, Conditional transfers, program control statements . SIMSCRIPT: Organization of SIMSCRIPT Program, Names & Labels, SIMSCRIPT statements . Estimation methods , Relication of Runs, Batch Means , Regenerative techniques , Time Series Analysis , Spectral Analysis and Autoregressive Processes.

Course Outcomes:

Knowledge and understanding

Understand different methods for random number generation
Have a clear understanding of the need for the development process to initiate the real problem.
Have a clear understanding of principle and techniques of simulation methods informed by research direction.

References Books:

1. Gorden G., System simulation, Prentice Hall.
2. Seila, Simulation Modeling, Cengage Learning
3. Law .,Simulation Modeling And Analysis, McGraw Hill
4. Deo, System Simulation with Digital Computer, PHI
5. Harrington, Simulation Modeling methods, McGraw Hill
6. Severance, " System Modeling & Simulation, Willey Pub

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TBCS - 707	Embedded Computer System	5(3+2+0)	50	20	30	-	-	100	3 hr	-

Course Objectives:

- To introduce students to the modern embedded systems and to show how to understand and program such systems using a concrete platform built around
- A modern embedded processor like the Intel ATOM.

Syllabus

Theory:

UNIT - I

Introduction to Embedded systems

Embedded Systems Vs General Computing Systems, Classification of Embedded Systems, Major application areas of Embedded Systems, Purpose of Embedded systems ,Core of the Embedded system, Memory, Sensors and Actuators, Communication Interface, Embedded firmware, PCB and Passive Components, Characteristics and Quality attributes of a Embedded System .

UNIT - II

Design of Embedded Systems with 8bit Microcontrollers-8051

Factors for considering in selecting a Controller ,Designing with 8051 microcontroller Different addressing modes supported by 8051 , Instruction set for 8051 microcontroller. Fundamental issues in Hardware Software Co-Design , Computational models in Embedded Design .

UNIT - III

Embedded Hardware & Firmware Design and Development

Analog &Digital Electronic components, VLSI & Integrated circuit design, Electronic Design Automation tools , PCB layout Design and its fabrication .Embedded firmware design approaches , Embedded firmware Development Languages ,Programming in Embedded C . Integration and testing of Embedded Hardware and Firmware , Safe & robust Design, Reliability, Faults, errors & Failure, Functional Design, Architecture Design, Prototyping.

UNIT -IV

Embedded System Development Environment

Integrated Development Environment (IDE) , Types of files Generated on Cross- Compilation , Disassembler / Decompiler, Simulators, Emulators and Debugging, Boundary Scan.

UNIT - V

Embedded Product Development Lifecycle(EDLC) and Trends in Embedded Industry

What is EDLC ,Objectives of EDLC , Different phases of EDLC , EDLC Approaches-Linear or waterfall model, Iterative Model , Prototyping/Evolutionary Model, Spiral Model . Processor trends in Industry, Embedded OS Trends , Development Language trends Open Standards, Frameworks and Alliances , Bottlenecks.

Course Outcome:

- Students are able to
- Describe the differences between the general computing system and the embedded system, also recognize the classification of embedded systems..
- Become aware of the architecture of the ATOM processor and its programming aspects (assembly Level)
- Become aware of interrupts, hyper threading and software optimization.
- Design real time embedded systems using the concepts of RTOS.
- Analyze various examples of embedded systems based on ATOM processor.

References Books:

1. Shibu, Introduction to Embedded System:, TMH
2. Barrett ,Embedded Systems :Design and Applications ,Pearson Education
3. Rajkamal, Embeded System, TMH
4. Vahid ,Givargis ,Embedded System Design , Wiley
5. Balbno, Embedded Micro Computer System Cengage Learning
6. Siewert, Real Time Embeded System &
7. Peckol, Embeded System, Willey India

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TBCS – 708	Real Time Fault Tolerant Systems	5(3+2+0)	50	20	30	-	-	100	3 hr	-

Course Objective:

Fault tolerance is the ability of a system to continue performing its intended function despite of faults. In a broad sense, fault tolerance is associated with reliability, with successful operation, and with the absence of breakdowns.

The ultimate goal of fault tolerance is the development of a dependable system. As computer systems become relied upon by society more and more, dependability of these systems becomes a critical issue. In airplanes, chemical plants, heart pace-makers or other safety critical applications, a system failure can cost people's lives or environmental disaster.

Syllabus

Theory:

UNIT-I

Structure of Real Time System, Performance Measure for real time system, Task Assignments,Fault Tolerant Scheduling, Real Time Vs General purpose Data Bases, Data Bases for Hard Real Time System, Real Time Communication

UNIT-II

Fault Tolerance, Fault-Error-Failure. Redundancy, Error Detection, Damage Confinement, Error Recovery, Fault Treatment, Fault Prevention, anticipated and unanticipated Faults. Error models: General coding scheme Error detection techniques: Watchdog processors, Heartbeats, consistency and capability checking, Data audits, Assertions, Control-flow checking, Error control coding. Application: DHCP

UNIT-III

Fault tolerance: Coding technique-fault tolerant self checking and fail safe circuits-fault tolerance in combinatorial and sequential circuits- synchronous and asynchronous fail safe circuits. Software fault tolerance: Process pairs, robust data structures, N version programming, Recovery blocks, Replica consistency & reintegration, multithreaded programs Application: VAX. Network fault tolerance: Reliable communication protocols, Agreement protocols, Database commit protocols - Application: Distributed SQL server Check pointing & Recovery - Application: Micro check pointing, IRIX Checkpoints

UNIT-IV

Experimental Evaluation: Modeling and simulation based, Fault injection based - Application: NFTAPE fault injector. Modeling for performance, dependability and perform ability: dependability-specific methods (fault trees, reliability block diagrams), queues, stochastic Petri nets and stochastic activity networks - Application: Ultra SAN

UNIT-V

Practical Systems for Fault Tolerance: - Application: Ad-hoc wireless network - Application: NASA Remote Exploration & Experimentation System Architecture: Fault tolerant computers - general purpose commercial systems-fault tolerant multiprocessor and VLSI based communication architecture. Fault tolerant software: Design-N-version programming recovery block - acceptance tests-fault trees- validation of fault tolerant systems.

Course Outcomes:

The aims of this course are:

- to create understanding of the fundamental concepts of fault-tolerance
- to learn basic techniques for achieving fault-tolerance in electronic, communication and software systems
- to develop skills in modeling and evaluating fault-tolerant architectures in terms of reliability, availability and safety
- to gain knowledge in sources of faults and means for their prevention and forecasting

to understand merits and limitations of fault-tolerant design

References Books:

1. K.K.Pradhan, "Fault Tolerant computing theory and techniques" volume III.

   Prentice Hall,1989.
2. Krishna, Real Time System, TMH
3. Anderson and Lee, "Fault Tolerant principles and practice" ,PHI 1989.
4. Siewert, Real Time Embeded System, Cengage Learning.
5. Rajiv Mall, Real Time System, Pearson Edu.
6. Parag K. Lala, "Fault Tolerant and Fault Testable, Hardware design" PHI 1985.
7. Shem , toy Levei , Ashok K.Agarwala , "Fault Tolerant System design", Tata McGraw Hill

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TBCS - 709	INDUSTRIAL TRAINING	1(0-0-1)	-	-	-	-	50	50	-	2 hrs

Syllabus

Theory:

SCHEME OF STUDIES

Duration: 6 weeks after the VI semester in the summer break, Assessment in VII semester.

SCHEME OF EXAMINATION

For the assessment of industrial training undertaken by the students, following components are considered with their weightage.

(a) Term work In Industry Marks allotted

1. Attendance and General Discipline 10
2. Daily diary Maintenance 10
3. Initiative and participative attitude during training 10
4. Assessment of training by Industrial Supervisor 20

TOTAL **50**

(b) Practical/Oral Examination (Viva-Voce) In Institution Marks allotted

1. Training Report 25
2. Seminar and cross questioning (defense) 25

TOTAL **50**

Marks of various components in industry should be awarded to the students, in consultations with the

Training and Placement Officer/Faculty of Institute and I/c of training from Industry. During training students will prepare a first draft of training report in consultation with section in-charge. After training they will prepare final draft with the help of T.P.O./Faculty of the institute. Then they will present a seminar on their training and they will face viva-voce on training in the institute.

1.1 OBJECTIVE OF INDUSTRIAL TRAINING

The objective of undertaking industrial training is to provide work experience so that student's engineering knowledge is enhanced and employment prospects are improved. The student should take this course as a window to the real World of Work and should try to learn as much as possible from real life experiences by involving and interacting with industry staff. Industrial training also provides an opportunity to students to select an engineering problem and possibly an industry guide for their Major Project in final semester.

Industrial training of the students is essential to bridge the wide gap between the classroom and industrial environment. This will enrich their practical learning and they will be better equipped to integrate the practical experiences with the classroom learning process.

1.2LEARNING THROUGH INDUSTRIAL TRAINING

During industrial training students must observe following to enrich their learning:

- Industrial environment and work culture.
- Organisational structure and inter personal communication.
- Machines/ equipment/ instruments - their working and specifications.
- Product development procedures and phases.
- Project planning, monitoring and control.
- Quality control and assurance.
- Maintenance system.
- Costing system.
- Stores and purchase systems.
- Layout of Computer/ EDP/MIS centres.
- Roles and responsibilities of different categories of personnel.
- Customer services.
- Problems related to various areas of Work etc.

Faculty and TPO are supposed to plan industrial training in such a manner that students get exposure on most of the above arena in the field (world of work). Students are supposed to acquire the knowledge on above by -

1. Observation,
2. Interaction with officials at the workplace
3. Study of Literature at the workplace (e.g. User Manual, standards, maintenance schedules, etc.)
4. "Hand's on" experience
5. Undertaking / assisting project work.
6. Solving problems at the work place.
7. Presenting a seminar.
8. Participating in-group meeting/ discussion.
9. Gathering primary and secondary data/ information through various sources, Storage,retrieval and analysis of the gathered data.
10. Assisting officials and managers in their working.
11. Undertaking a short action research work.
12. Consulting current technical journals and periodicals in the library.
13. Discussions with peers.

1.2 GUIDANCE TO THE FACULTY/TPO FOR PLANNING AND IMPLEMENTING THE INDUSTRIAL TRAINING

The industrial training programme, which is spread to 6 weeks' duration, has to be designed

in consultation with the authorities of the work place, keeping in view the need of the contents. Following are some of the salient points:

- Spelling out the objectives of the industrial training in behavioral terms and same is informed in advance to the 1) students, 2) authorities of the work place and 3) supervising faculty members.
- Discussing and preparing students for the training for which meetings with the students has to be planned.
- Meeting with industrial personnel and orienting them regarding the objective of the training and the expectations of the programme.
- Correspondence with the authorities of the work place.
- Orientation classes for students on how to make the training most beneficial - monitoring daily diary, writing weekly reports, how to interact with various categories of industrial personnel, how to behave and undertake responsibilities, how to gather information from the workplace, ethics etc.
- Guiding students to make individual plans (week wise/ day wise) to undertake industrial training
- Developing a system of maintaining training records, by teachers for every batch of students for convenient retrieval.
- Inviting industrial personnel to deliver lectures on some aspects of training.

1.4 ACTION PLAN FOR PLANNING STAGES AT THE INSTITUTION LEVEL

S.No.	Activity Commencing Week Finishing week Remarks
1.	Meeting with Principal
2.	Meeting with Colleagues
3.	Correspondence with work place (Industries concerned)
4.	Meeting with authorities of work place
5.	Orientation of students for industrial training
6.	Scrutinizing individual training plan of students
7.	Commencement of industrial training
8.	First monitoring of industrial training
9.	Second monitoring of industrial training
10.	Finalization of Training report
11.	Evaluation of performance at Industry level
12.	Evaluation of industrial programme in the institution.

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Department: Computer science & Egg.

Subject Code	Subject Name	Credits	Maximum marks Allotted						Duration of Exam.	
			Theory			Practical		Total	Theory	Practical
			Major	Minor	Sessional.	End Sem	term Work			
TBCS - 711	Seminar	1(0-0-1)					50	50		2 hr

OBJECTIVE OF GD AND SEMINAR :
is to improve the MASS COMMUNICATION and CONVINCING/ understanding skills of students and it is to give student an opportunity to exercise their rights to express themselves.

EVALUATION:
Will be done by assigned faculty based on group discussion and power point presentation.

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Scheme of Examination

Department: Computer Science &Engg.

Subject Code	Subject Name	Credits	Maximum marks Allotted						Duration of Exam.	
			Theory			Practical		Total	Theory	Practical
			Major	Minor	Sessional.	End Sem	Lab Work			
TBCS - 801	Soft Computing	6(3+2+1)	50	20	30	25	25	150	3 hr	2 hr

Course Objective:

To give knowledge of soft computing theories fundamentals, i.e. of fundamentals of non-traditional technologies and approaches to solving hard real-world problems, namely of fundamentals of artificial neural networks, fuzzy sets and fuzzy logic and genetic algorithms.

Syllabus

Theory:

UNIT - I

Soft Computing Introduction of soft computing, soft computing vs. hard computing, various types of soft computing techniques, applications of soft computing.

Artificial Intelligence : Introduction, Various types of production systems, characteristics of production systems, breadth first search, depth first search techniques, other Search Techniques like hill Climbing, Best first Search, A* algorithm, AO* Algorithms and various types of control strategies.Knowledge representation issues, Prepositional and predicate logic, monotonic and non monotonic reasoning, forward Reasoning, backward reasoning, Weak & Strong Slot & filler structures, NLP.

UNIT - II

Neural Network : Structure and Function of a single neuron: Biological neuron, artificial neuron, definition of ANN, Taxonomy of neural net, Difference between ANN and human brain, characteristics and applications of ANN, single layer network, Perceptron training algorithm, Linear separability, Widrow & Hebbs learning rule/Delta rule, ADALINE, MADALINE, AI v/s ANN. Introduction of MLP, different activation functions, Error back propagation algorithm, derivation of BBPA, momentum, limitation, characteristics and application of EBPA,

UNIT - III

Counter propagation network, architecture, functioning & characteristics of counter Propagation network, Hopfield/ Recurrent network, configuration, stability constraints, associative memory, and characteristics, limitations and applications. Hopfield v/s Boltzman machine . Adaptive Resonance Theory: Architecture, classifications, Implementation and training. Associative Memory.

UNIT - IV

Fuzzy Logic ,Fuzzy set theory, Fuzzy set versus crisp set, Crisp relation & fuzzy relations, Fuzzy systems: crisp logic, fuzzy logic, introduction & features of membership functions, Fuzzy rule base system : fuzzy propositions, formation, decomposition & aggregation of fuzzy rules, fuzzy reasoning, fuzzy inference systems, fuzzy decision making & Applications of fuzzy logic.

UNIT - V

Genetic algorithm, Fundamentals, basic concepts, working principle, encoding, fitness function, reproduction, Genetic modeling: Inheritance operator, cross over, inversion & deletion, mutation operator, Bitwise operator, Generational Cycle, Convergence of GA, Applications & advances in GA, Differences & similarities between GA & other traditional methods.

Course Outcomes:

Students acquire knowledge of soft computing theories fundamentals and so they will be able to design program systems using approaches of these theories for solving various real-world problems.

Students awake the importance of tolerance of imprecision and uncertainty for design of robust and low-cost intelligent machines.

Practical:

1. WAP to perform Union, Intersection and Complement operations.
2. WAP to implement De-Morgan's Law.
3. WAP to plot various membership functions.
4. WAP to implement FIS Editor. Use Fuzzy toolbox to model tip value that is given after a dinner based on quality and service.
5. WAP to implement FIS Editor.
6. WAP to Generate ANDNOT function using McCulloch-Pitts neural net.
7. WAP to Generate XOR function using McCulloch-Pitts neural net.
8. WAP for Hebb Net to classify two dimensional input patterns in bipolar with given targets.
9. WAP to implement Perceptron net for an AND function with bipolar inputs and targets.
10. WAP to calculate the weights for given patterns using hetero associative neural net.
11. WAP to store vector in an auto-associative net. Find weight matrix & test the net with input
12. WAP to store the vector ,find the weight matrix with no self.

Reference Books :

1. S, Rajasekaran & G.A. Vijayalakshmi Pai, Neural Networks, Fuzzy Logic & Genetic Algorithms, Synthesis & applications, PHI Publication.
2. S.N. Sivanandam & S.N. Deepa, Principles of Soft Computing, Wiley Publications
3. Rich E and Knight K, Artificial Intelligence, TMH, New Delhi.
4. Bose, Neural Network fundamental with Graph , Algo.& Appl, TMH
5. Kosko: Neural Network & Fuzzy System, PHI Publication
6. Klir & Yuan ,Fuzzy sets & Fuzzy Logic: Theory & Appli.,PHI Pub.
7. Hagen, Neural Network Design, Cengage Learning

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Department: Computer Science &Engg.

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			Theory			Practical		Total	Theory	Practical
			Major	Minor	Sessional.	End Sem	Lab Work			
TBCS - 802	Web Engineering	6(3+2+1)	50	20	30	25	25	150	3 hr	2 hr

Syllabus

Course Objectives:

The Objective of the course are as follows:

1. To be able to analyze and design comprehensive systems for the creation, dissemination, storage, retrieval, and use of electronic records and documents
2. To learn and use some of the client-side and server-side languages used to manipulate information on the World Wide Web – i.e. ASP.NET, and Javascript.
3. To learn techniques and evaluation metrics for ensuring the proper operability, maintenance and security of a web application.

Theory:

UNIT-I

Web Engineering:

Introduction, History, Evolution and Need, Time line, Motivation, Categories & Characteristics of Web Applications, Web Engineering Models, Software Engineering v/s Web Engineering. World Wide Web: Introduction to TCP/IP and WAP, DNS, Email, TelNet, HTTP and FTP. Browser and search engines: Introduction, Search fundamentals, Search strategies, Directories search engines and Meta search engines, Working of the search engines.Web Servers: Introduction, Features, caching, case study-IIS, Apache.

UNIT- II

Information Architecture:

Role, Collaboration and Communication, Organizing Information, Organizational Challenges, Organizing Web sites parameters and Intranets Website Design: Development, Development phases, Design issues, Conceptual Design, High-Level Design, Indexing the Right Stuff, Grouping Content. Architectural Page Mockups, Design Sketches, Navigation Systems. Searching Systems, Good & bad web design, Process of Web Publishing. Web-site enhancement, submission of website to search engines. Web security: issues, security audit. Web effort estimation, Productivity Measurement,

Quality usability and reliability. Requirements Engineering for Web Applications: Introduction, Fundamentals, Requirement Source, Type, ,Notations Tools. Principles Requirements Engineering Activities, Adapting RE Methods to Web Application.

UNIT- III

Technologies for Web Applications: HTML and DHTML: Introduction, Structure of documents, Elements, Linking, Anchor Attributes, Image Maps, Meta Information, Image Preliminaries, Layouts, Backgrounds, Colors and Text, Fonts, Tables, Frames and layers, Audio and Video Support with HTML Database integration, CSS, Positioning with Style sheets, Forms Control, Form Elements. Introduction to CGI, PERL, JAVA SCRIPT, JSP, PHP, ASP & AJAX. Cookies: Creating and Reading

UNIT-IV

Technologies for Web Applications II:

XML: Introduction, HTML Vs XML, Validation of documents, DTD, Ways to use, XML for data files, Embedding XML into HTML documents, Converting XML to HTML for Display, Displaying XML using CSS and XSL, Rewriting HTML as XML, Relationship between HTML, SGML and XML, web personalization , Semantic web, Semantic Web Services, Ontology.

UNIT- V

E- Commerce: Business Models, Infrastructure, Creating an E-commerce Web Site, Environment and Opportunities. Modes & Approaches, Marketing & Advertising Concepts. Electronic Publishing issues, approaches, legalities and technologies, Secure Web document, Digital Signatures and Firewalls, Cyber crime and laws, IT Act. Electronic Cash, Electronic Payment Systems: RTGS, NEFT, Internet Banking, Credit/Debit Card. Security: Digital Certificates & Signatures, SSL, SET, 3D Secure Protocol.

Course Outcome:

On successful completion of the course students will be able to:

1. Develop a web application using server side programming languages and components.
2. Apply the web engineering methodologies for Web application development
3. Develop a component based web solution and use UML diagrams to describe such a solution.
4. Identify and discuss the security risk of a Web application

Practical:

1. To Study Web servers and web Browsers
2. Write the introduction of ASP, PHP and XML
3. Create a web page purely in HTML code
4. Create a web page to show application of CSS file
5. Study of JavaScript and applying java script to validate form
6. Create a web page using HTML, java script, CSS file
7. Create a web page to show application of form controls
8. a) Write a code in ASP to format the text with HTML tags.

b) Write a code to reverse the string.

9. Create an XML document template to describe the result of student in an examination.
10. a) Write the code in PHP by using Loop statements any

    b Write the code in PHP using Mathematical operations, String functions (any one).

Reference Books:

1. Roger S.Pressman, David Lowe, "Web Engineering", Tata Mc Graw Hill Publication, 2007
2. Achyut S Godbole and Atul Kahate, "Web Technologies", Tata McGraw Hill
3. Gopalan N P , Akilandeswari, "Web Technology: A Developer s Perspective" , PHI
4. Neil Gray, "Web server Programming" Wiley
5. Chris Bates, "Web Programming: Building Internet applications" Wiley
6. Moller, "An Introduction to XML and Web Technologies", Pearson Education New Delhi, 2009
7. "Web Technologies: Black Book", Kogent, Dreamtech
8. Internet & World Wide Web How to Program, Pearson education, 3rd edition, by: H.M. Deitel, P.J. Deitel, A.B. Goldberg.
9. C. Xavier, "Web Technology & Design ", Tata McGraw Hill.
10. Ivan Bay Ross, "HTML,DHTML, Java script, Perl CGI" , BPB

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TBCS – 803	Network Management	5(3+2+0)	50	20	30	-	-	100	3 hr	-

Syllabus

Course Objectives:

1. In-depth understanding of specialist bodies of knowledge within the engineering discipline.
2. Application of established engineering methods to complex engineering problem solving.
3. Fluent application of engineering techniques, tools and resources

Theory:

UNIT-I

Introduction to Network Managements, Network Management Framework, Network Based Managements, Evolution of Network Management: SGMP, CMIP, SNMP. Network Implementation and Management Strategies, Network Management Categories: Performance Management, Fault Management, Configuration Management, Security Managements, Accounting Managements. Network Management Configuration: Centralized Configuration, Distributed Configuration. Selected Management Strategy.

UNIT -II

Management Information Base (MIB) , Structure of Management Information, NMS Presentation of the SMI, NMS Meter-ware Network View. Remote Monitoring (RMON), RMON Group. Desktop Management: Desktop Management Interface (DMI), DMI Architecture, DMI Browser, DMI/SNMP Mapping, Desktop SNMP Extension Agents. Setting up LAN Access, SNMP Configuration.

UNIT-III

Introduction, layering, OSI Layering, TCP/IP Layering, Protocols & Standards, Internet standards, Internet administration, Internet Addresses, Internet protocol: introduction, IP header, IP routing, subnet addressing, subnet mask, special case of IP addresses, Comparative Study of IPV4 & IPV6, port numbers Address Resolution Protocol, ARP packet format, Proxy ARP, ARP command, ARP Example, Reverse Address Resolution Protocol (RARP): Introduction, RARP Packet format, RARP Examples, RARP server design

UNIT-IV

Delivery and Routing of IP Packets, Routing Methods, Static versus Dynamic Routing, Routing table and Routing Module, Classless Addressing: CIDR. Internet Protocol (IP), Datagram, Fragmentation, Options, IP Package. Interior and Exterior Routing, Routing information protocol (RIP), Open shortest path first protocol (OSPF), BGP, GGP. Private Networks. Virtual Private Network (VPN), Network Address Translation (NAT).

UNIT -V

Internet Control Message Protocols (ICMP):- Types of message, message format, error reporting, query, checksum, ICMP Package. IGMP, IGMP Message and its Operation, IGMP Package. Transmission control protocol, Process-to-Process Communication, TCP Services Flow Control, TCP Timers. TCP Operation, TCP Package.. Application layers protocol, Telnet Protocol, File Transfer Protocol (FTP), Simple Mail Transfer Protocol (SMTP), X-Window system protocol, Remote procedure call, and Network file system.

Course Outcomes-

On completion of this course you should be able to:

Describe the need for and issues associated with dealing with scale, complexity, reliability, extensibility, efficiency and sustainability of network management systems.
Analyse a specific network management problem and apply concepts and issues learnt to design one or more aspects of a network management solution.
Explain and use software defined network principles for the design of new generation of networks.
Design and implement software defined network application on SDN-based networking devices.

Reference Books:

- Forouzan, TCP/IP Protocol Suite 4th edition, TMH
- J.Richard Burkey, Network Management Concept and Practice, PHI
- Stevens, TCP/IP Illustrated Volume-I, Pearson
- Tittel: TCP/IP, Cenage Learning
- Uyless Black, TCP/IP and related protocols, McGraw Hill.
- Doughals E. Comer, Internetworking with TCP/IP Vol. I, Principles, Protocols, and Architecture, Prentice Hall, India.

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Department: Computer Science &Engg.

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			Theory			Practical		Total	Theory	Practical
			Major	Minor	Sessional.	End Sem	Lab Work			
TBCS - 804	Cyber Security	5(3+2+0)	50	20	30	-	-	100	3 hr	-

Syllabus

Course Objective:

Cyber security is the body of technologies, processes and practices designed to protect networks, computers, programs and data from attack, damage or unauthorized access. In a computing context, security includes both cyber security and physical security.

Theory:

UNIT-I

Introduction of Cyber Crime, Challenges of cyber crime, Classifications of Cybercrimes: E-Mail Spoofing, Spamming, Internet Time Theft, Salami attack/Salami Technique, Data Diddling, Web jacking, Online Frauds, Software Piracy, Computer Network Intrusions, Password Sniffing, Identity Theft, cyber terrorism, Virtual Crime , Perception of cyber criminals: hackers, insurgents and extremist group etc. Web servers hacking, session hijacking.

UNIT-II

Cybercrime on Mobile and Wireless Device: Proliferation of Mobile and Wireless Devices, trends in Mobility Credit Card Frauds in Wireless Computing, Types and techniques of Credit Card Frauds, Attacks on Mobiles: Mobile Viruses, Mishing, Vishing, Smishing & Hacking Bluetooth. Web servers hacking, session hijacking.

UNIT-III

Tools and Methods in Cybercrime: Proxy Servers and Anonymizers, Password Cracking, Keyloggers and Spyware, virus and worms, Trojan Horses, Backdoors, DoS and DDoS Attacks , Buffer and Overflow, Attack on Wireless Networks, Phishing : Method of Phishing, Phishing Techniques.

UNIT-IV

Cyber Crime and Criminal justice: Concept of Cyber Crime and the IT Act, 2000, Hacking, Teenage Web Vandals, Cyber Fraud and Cheating, Defamation, Harassment and E-mail Abuse, Other IT Act Offences, Monetary Penalties, jurisdiction and Cyber Crimes, Nature of Criminality, Strategies to tackle Cyber Crime and Trends.
The Indian Evidence Act of 1872 v. Information Technology Act, 2000: Status of Electronic Records as Evidence, Proof and Management of Electronic Records; Relevancy, Admissibility and Probative

Value of E-Evidence, Proving Digital Signatures, Proof of Electronic Agreements, Proving Electronic Messages.

UNIT-V

Introduction to Cyber Forensics: Information Security Investigations, Corporate Cyber Forensics, Scientific Method in Forensic analysis, investigating large scale Data breach cases. Analyzing Malicious software. Types of Computer Forensics Technology, Types of Business Computer Forensic Technology, Specialized Forensics Techniques.

Course Outcomes:
Upon completion of their Cyber security Program will student will able to:

- Identify infrastructure components and the roles they serve, and design infrastructure including devices, topologies, protocols, systems software, management and security. Analyze performance of enterprise network systems.
- Effectively communicate technical information verbally, in writing, and in presentations.
- Use appropriate resources to stay abreast of the latest industry tools and techniques analyzing the impact on existing systems and applying to future situations.
- Explain the concepts of confidentiality, availability and integrity in Information Assurance, including physical, software, devices, policies and people. Analyze these factors in an existing system and design implementations.
- Cite and comply with relevant industry and organizational codes of conduct and ethics.

References:

1. Principles of Cyber crime, Jonathan Clough Cambridge University Press
2. John R. Vacca, Computer Forensics:Computer Crime Scene Investigation, 2nd Edition, CharlesRiver Media, 2005
3. Cyber Law Simplified, Vivek Sood, Pub: TMH.
4. Cyber Security by Nina Godbole, Sunit Belapure Pub: Willey-India
5. Information Warfare : Corporate attack and defense in digital world, William Hutchinson, Mathew Warren, Elsevier.
6. Cyber Laws and IT Protection, Harish Chander, Pub:PHI.

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Department: Computer Science &Engg.

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			Theory			Practical		Total	Theory	Practical
			Major	Minor	Sessional.	End Sem	Lab Work			
TBCS - 805	Data Mining And Knowledge Discovery	5(3+2+0)	50	20	30	-	-	100	3 hr	-

Syllabus

Course Objective:

The Objective of data mining is to discover structure inside unstructured data, extract meaning from noisy data, discover patterns in apparently random data, and use all this information to better understand trends, patterns, correlations, and ultimately predict customer behavior, market and competition trends, so that the company uses its own data more meaningfully to better position itself on the new waves.

Theory:

UNIT-I

Introduction, to Data warehousing, needs for developing data Warehouse, Data warehouse systems and its Components, Design of Data Warehouse, Dimension and Measures, Data Marts:-Dependent Data Marts, Independents Data Marts & Distributed Data Marts, Conceptual Modeling of Data Warehouses:-Star Schema, Snowflake Schema, Fact Constellations. Multidimensional Data Model & Aggregates.

UNIT-II

OLAP, Characteristics of OLAP System, Motivation for using OLAP, Multidimensional View and Data Cube, Data Cube Implementations, Data Cube Operations, Guidelines for OLAP Implementation, Difference between OLAP & OLTP, OLAP Servers:-ROLAP, MOLAP, HOLAP Queries.

UNIT-III

Introduction to Data Mining, Knowledge Discovery, Data Mining Functionalities, Data Mining System categorization and its Issues. Data Processing :- Data Cleaning, Data Integration and Transformation. Data Reduction, Data Mining Statistics. Guidelines for Successful Data Mining.

UNIT-IV

Association Rule Mining:-Introduction, Basic, The Task and a Naive Algorithm, Apriori Algorithms, Improving the efficiency of the Apriori Algorithm, Apriori-Tid, Direct Hasing and Pruning(DHP),Dynamic Itemset Counting (DIC), Mining Frequent Patterns without Candidate Generation(FP-Growth),Performance Evaluation of Algorithms,.

UNIT-V

Classification:-Introduction, Decision Tree, The Tree Induction Algorithm, Split Algorithms Based on Information Theory, Split Algorithm Based on the Gini Index, Over fitting and Pruning, Decision Trees Rules, Naive Bayes Method.

Cluster Analysis:- Introduction, Desired Features of Cluster Analysis, Types of Cluster Analysis Methods:- Partition Methods, Hierarchical Methods, Density- Based Methods, Dealing with Large Databases. Quality and Validity of Cluster Analysis Methods.

Course Outcome:

After the completion of course students able to discover the new patterns from raw data.

Able to understand different analysis algorithms.

References:

1. Berson: Data Warehousing & Data Mining &OLAP , TMH
2. Jiawei Han and Micheline Kamber, Data Mining Concepts & Techniques, Elsevier Pub.
3. Arun.K.Pujari, Data Mining Techniques, University Press.
4. N.P Gopalan: Data Mining Technique & Trend, PHI
5. Hand, Mannila & Smith: Principle of Data Mining, PHI
6. Tan, Introduction to Data Mining, Pearson Pub.

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			Theory			Practical		Total	Theory	Practical
			Major	Minor	Sessional.	End Sem	Lab Work			
TBCS - 806	Semantic Web & Ontologies	5(3+2+0)	50	20	30	-	-	100	3 hr	-

Syllabus

Course Objective:

The Objective of Conceptual structures that define an underlying ontology are germane to the idea of machine process- able data on the Semantic Web. Ontologies are (meta)data schemas, providing a controlled vocabulary of concepts, each with an explicitly defined and machine process semantics. By defining shared and common domain theories, ontologies help both people and machines to communicate concisely, supporting the exchange of semantics and not only syntax. Hence, the cheap and fast construction of domain-specific ontologies is crucial for the success and the proliferation of the Semantic Web.

Theory:

UNIT-I

Semantic Web: Building Models , Calculating with knowledge, Exchanging Information, Semantic Web Technologies ,Types of Web :Smart Web & Dumb Web, Applications ,Semantic Data ,Search Engine for Semantic Web

UNIT-II

Semantic Modeling: Modeling for human communication, Explanation and prediction, Mediating Variability: Variation & Classes, Variation & Layers, Expressivity in Modeling.

UNIT-III

Resource Description Language RDF : Introduction , Advanced features , simple ontologies in RDF Schema , encoding of special data structures, RDF formal semantics ,syntactic reasoning with deduction rules ,Distributing data across web , Managing data from multiple sources.

UNIT-IV

Web Ontology Language OWL : OWL syntax and Intuitive semantics , OWL species , Owl formal semantics : Description Logics , Model-Theoretic Semantics of OWL, Automated reasoning with OWL ,Ontology Matching and Distributed Information.

UNIT-V

Semantic Web Application Architecture: RDF Parser/Serializer, RDF store: RDF data standards and Interoperability of RDF stores , RDF query engines , SPARQL: Query language for RDF , conjunctive Queries for OWL DL ,RDF backed web portals , Data federation .
Ontology Engineering: Constructing Ontologies manually, Reusing Existing Ontologies, Semiautomatic Ontology Acquisition, Ontology Mapping.

Course Outcome:
Knowledge and Understanding, Having successfully completed this module, you will be able to demonstrate knowledge and understanding of:

- The technical architecture of the Semantic Web, and its integration with the World Wide Web
- The underlying knowledge representation formalisms in use on the Semantic Web
- Common ontology design patterns
- Common application vocabularies in use on the Semantic Web
- The Linked Web of Data

Reference Books:

1. Hitzler, Markus, Rudolph , " Foundations of Semantic Web Technologies" , Chapman & Hall/CRC,2009,ISBN 9781420090505
2. Allemang , Hendler , " Semantic Web for the working Ontologist" 2nd ed. Elsevier Pub
3. Liang Yu , " Introduction to the Semantic Web and Semantic Web Services", Chapman & Hall/CRC
4. Antoniou , Harmelen , "A semantic Web Primer", PHI Pub.
5. Rajendra Akerkar ," Foundations of Semantic Web" , Narosa Publishing ,NewDelhi

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			Theory			Practical		Total	Theory	Practical
			Major	Minor	Sessional.	End Sem	Lab Work			
TBCS – 807	Bioinformatics	5(3+2+0)	50	20	30	-	-	100	3 hr	-

Syllabus

Course Objective:

The course is designed to introduce the most important and basic concepts, methods, and tools used in Bioinformatics Topics include (but not limited to) bioinformatics databases, sequence and structure alignment,protein structure prediction,protein folding, protein-protein interaction,Monte Carlo simulation, and molecular dynamics. Emphasis will be put on the Understanding and utilization of these concepts and algorithms. The objective is to help the students to reach rapidly the frontier of bioinformatics and be able to use the bioinformatics tools to solve the problems on their own research.

Theory:

UNIT-I

Introduction

Introduction to bioinformatics, objectives of bioinformatics, Basic chemistry of nucleic acids, structure of DNA & RNA, Genes, structure of bacterial chromosome, cloning methodology, Data maintenance and Integrity Tasks.

UNIT-II

Bioinformatics Databases & Image Processing

Types of databases, Nucleotide sequence databases, Protein sequence databases, Protein structure databases, Normalization, Data cleaning and transformation, Protein folding, protein function, protein purification and characterization, Introduction to Java clients, CORBA, Using MYSQL, Feature Extraction.

UNIT-III

Sequence Alignment and database searching

Introduction to sequence analysis, Models for sequence analysis, Methods of optimal alignment, Tools for sequence alignment, Dynamics Programming, Heuristic Methods, Multiple sequence Alignment

UNIT-IV

Gene Finding and Expression

Cracking the Genome, Biological decoder ring, finding genes through mathematics & learning, Genes prediction tools, Gene Mapping, Application of Mapping, Modes of Gene Expression data, Mining the Gene Expression Data

UNIT-V

Proteomics & Problem solving in Bioinformatics

Proteome analysis, tools for proteome analysis, Genetic networks, Network properties and analysis, complete pathway simulation: E-cell, Genomic analysis for DNA & Protein sequences , Strategies and options for similarity search , flowcharts for protein structure prediction .

Course Outcome:

- knowledge and awareness of the basic principles and concepts of biology, computer science and mathematics
- existing software effectively to extract information from large databases and to use this information in computer modeling
- problem-solving skills, including the ability to develop new algorithms and analysis methods

Reference Books:

1. Gopal & Jones, BIOINFORMATICS with fundamentals of Genomics & Proteomics ,TMH Pub
2. Rastogi , Bioinformatics -Concepts , skills & Applications , CBS Pub
3. Bergeron , Bioinformatics computing , PHI
4. Claverie , Bioinformatics , Wiley pub
5. Baxevanis , Bioinformatics , Wiley Pub 6.Stekel , Micrarray BioInformatics , Cambridge

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Department: Computer Science &Engg.

Subject Code	Subject Name	Credits	Maximum marks Allotted						Duration of Exam.	
			Theory			Practical		Total	Theory	Practical
			Major	Minor	Sessional.	End Sem	Lab Work			
TBCS - 808	Digital Image Processing	5(3+2+0)	50	20	30	-	-	100	3 hr	-

Syllabus

Course Objectives:

- Develop a theoretical foundation of fundamental Dig
- ital Image Processing concepts.
- Provide mathematical foundations for digital manipulation of images; image acquisition;
- preprocessing; segmentation; Fourier domain processing; and compression.
- Gain experience and practical techniques to write programs using MATLAB language for digital manipulation of images; image acquisition; preprocessing; segmentation; Fourier domain processing; and compression.

Theory:

UNIT-I

Digital Image fundamentals, A simple image model, Sampling and Quantization. Relationship between pixels. Imaging geometry , Image acquisition systems, Different types of digital images

UNIT-II

Image transformations, Introduction to Fourier transforms, Discrete Fourier transforms, Fast Fourier transform, Walsh transformation, Hadmord transformation, Discrete Cosine Transformation.

UNIT-III

Image enhancement, Filters in spatial and frequency domains, Histogram based processing. Image subtraction, Averaging, Image smoothing, Nedion filtering, Low pass filtering, Image sharpening by High pass filtering.

UNIT-IV

Image encoding and segmentation, Encoding: Mapping, Quantizer, Coder. Error free compression, Lossy Compression schemes, JPEG Compression standard, Detection of discontinuation by point detection, Line detection, edge detection, Edge linking and boundary detection, Local analysis, Global processing via Hough transforms and graph theoretic techniques

UNIT-V

Mathematical morphology- Binary, Dilation, crosses, Opening and closing, Simple methods of representation, Signatures, Boundary segments, Skeleton of a region, Polynomial approximation

Course Outcomes:

1.Have a clear understanding of the principals the Digital Image Processing terminology used to describe features of images.
2. Have a good understanding of the mathematical found actions for digital manipulation of images; image acquisition; preprocessing; segmentation; Fourier domain processing, compression and analysis.
3. Able to write programs using Matlab language for digital manipulation of images; image acquisition; preprocessing; segmentation; Fourier domain processing; and compression.
4.Have knowledge of the Digital Image Processing Systems.
5. Able to understand the documentation for, and make use of, the MATLAB library and MATLABDigital Image Processing Toolbox (IPT).
6.Learn and understand the Image Enhancement in the Spatial Domain.
7.Learn and understand the Image Enhancement in the Frequency Domain.
8.Understand the Image Restoration, Compression, Segmentation, Recognition, Representation and Description.

References Books:

1. Rafael C Gonzalez, Richard E Woods 3rd Edition, Digital Image Processing Pearson.
2. Rafael C Gonzalez, Richard E Woods 3rd Edition, Digital Image Processing using Matlab - TMH.
3. Sonka, Digital Image Processing & Computer Vision , Cengage Learning 4 Jayaraman, Digital Image Processing, TMH.
4. Pratt, Digital Image Processing, Wiley India
5. Annadurai, Fundamentals of Digital Image Processing ,Pearson Education .

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AISECT UNIVERSITY, Bhopal, (M.P.)

Scheme of Examination

Department: Computer Science &Engg.

Subject Code	Subject Name	Credits	Maximum marks Allotted						Duration of Exam.	
			Theory			Practical		Total	Theory	Practical
			Major	Minor	Sessional.	End Sem	Lab Work			
TBCS - 809	Wireless Network	5(3+2+0)	50	20	30	-	-	100	3 hr	-

Syllabus

Course Objective:

The aim of the module is to introduce the students to advanced network concepts, with emphasis on wireless technologies. The students will be reminded of the OSI and the TCP/IP models. This subject will be introduced to various wireless and mobile network- technologies and protocols with an emphasis on impact to various layers of the OSI stack at the Application Layer, multimedia and gaming applications will be discussed in the context of real-time content delivery. Adaptive and non-adaptive content delivery solutions will be presented along with significant issues such as end-user perceived quality, application-level error and congestion control.

Theory:

UNIT I

Introduction of Wireless Networks, Different Generations of Wireless Networks . Characteristics of the Wireless Medium: Radio Propagation Mechanisms, Path Loss Modeling and Signal Coverage, Effect of Multipath and Doppler, Channel Measurement and Modeling Techniques.

UNIT II

Network Planning: Introduction, Wireless Network Topologies, Cellular Topology, Cell Fundamentals, Signal to Interferences Radio Calculations, Network Planning for CDMA Systems.

Wireless Network Operations: Mobility Management, Radio Resources and Power Management

UNIT III

Multiple Division Techniques: FDMA, TDMA, CDMA, OFDM, SDMA. Comparison of Multiple Division Techniques, Modulation Techniques - AM, FM, FSK, PSK, QPSK, QAM, 16QAM Mobile Data Networks: Introduction, Data Oriented CDPD Network, GPRS, EDGE and High Data Rates, SMS in GSM, Mobile Application Protocols.

UNIT IV

Introduction to Wireless LAN, Evolution of WLAN, Wireless Home Networking, Technologies for Home Area Network (HAN), Overview of IEEE 802.11, Reference Architecture, PHY and MAC Layer, Wireless ATM, HIPERLAN.

UNIT V

IEEE 802.15 WPAN, Home RF, Bluetooth, Interference between Bluetooth and 802.11, Adhoc Networks, Introduction to 2.5 G and 3 G Networks.

Outcome:
Having successfully completed this course, the students will:

- Able to demonstrate advanced knowledge of networking and wireless networking in particular
- Able to compare different solutions for communications at each network layer
- Able to demonstrate knowledge of protocols used in wireless communications
- Able to demonstrate knowledge of programming for wireless network communications
- Able to perform simulations of wireless networking

Reference Books:

1. Kaveh Pahlavan, Prashant Krishnamurthy "principles of Wireless Networks", PHI.
2. Qing- An Zeng, Dharma Prakash Agrawal "Introduction to Wireless and Mobile Systems" CENGAGE Learning
3. Sumit Kasera, Nishit Narang, A P Priyanka "2.5 G Mobile Networks: GPRS and EDGE", TMH
4. Dr. KAMILO FEHER "Wireless Digital Communications" , PHI
5. Jochen Schiller " Mobile Communications", PEARSON

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AISECT UNIVERSITY, Bhopal, (M.P.)

Scheme of Examination

Department: Computer Science &Engg.

Subject Code	Subject Name	Credits	Maximum marks Allotted						Duration of Exam.	
			Theory			Practical		Total	Theory	Practical
			Major	Minor	Sessional.	End Sem	Lab Work			
TBCS - 810	Quantum Computing	5(3+2+0)	50	20	30	-	-	100	3 hr	-

Syllabus

Course Objective:

1. The prehistory of quantum computing;
2. The specific properties of quantum computing in comparison with randomized computing;
3. The basic experiments and principles of quantum physics;
4. The basics of Hilbert space theory;
5. The elements of classical reversible computing.

Theory:

UNIT I

Introduction to quantum mechanics :
Postulates of quantum mechanics, Qubit and quantum states, Vector Spaces, Single Qubit Gates, multiple Qubit Gates, Controlled Gates, Composite Gates, Matrices and operators.

UNIT II

Density operators :
Density Operator for a Pure State, Density Operator for a Mixed State,Properties of a Density Operator, Characterizing Mixed States, Completely Mixed States, Partial Trace and Reduced Density Operator.
Quantum measurement theory:
Distinguishing Quantum States and Measurement,Projective Measurements, Measurements on Composite Systems, Generalized Measurements, Positive Operator Valued Measures.

UNIT III

Entanglement:
Quantum state entanglement ,Bell's Theorem, The Pauli Representation, Using Bell States For Density Operator Representation, Quantum gates and circuits: Single Qubit Gates, The Z Y Decomposition ,Basic Quantum Circuit Diagrams, Controlled Gates, Application of Entanglement in teleportation and supper dense coding., Distributed quantum communication
Quantum Computer :

Guiding Principles, Conditions for Quantum Computation, Harmonic Oscillator Quantum Computer, Optical Photon Quantum Computer – Optical cavity Quantum electrodynamics, Ion traps, Nuclear Magnetic resonance.

UNIT IV

Quantum Algorithm:
Hadamard Gates, The Phase Gate, Matrix Representation of Serial and Parallel Operations, Quantum Interference, Quantum Parallelism and Function Evaluation, Deutsch –Jozsa Algorithm, Quantum Fourier Transform, Phase Estimation, Shor's Algorithm ,Quantum Searching and Grover's Algorithm.

UNIT V

Quantum Error Correction:
Introduction, Shor code, Theory of Quantum Error Correction, Constructing Quantum Codes, Stabilizer codes, Fault Tolerant Quantum Computation, Entropy and information –Shannon Entropy, Basic properties of Entropy,Von Neumann, Strong Sub Additivity, Data Compression, Entanglement as a physical resource.

Course Outcomes:

1. Students able to understand the basic concepts of quantum information theory;
2. Students able to understand the basic concepts of quantum transmission;
3. Students able to understand the basic techniques of quantum data compression;
4. Students able to understand the basic techniques of communication through a noisy channel;
5. Students able to understand the basic modes and measures of entanglement;
6. Students able to understand the basic quantum entanglement concentration and purification techniques.

Reference Books:

1. Quantum Computing Explained: David McMahon, Wiley Interscience (IEEE Computer Science).
2. Quantum Computing without Magic Devices : Zdzislaw Meglicki; PHI .
3. Quantum Computation and Quantum Information: M.A. Nielsen & Isaac L. Chuang, Cambridge University Press .
4. Quantum Computing and communications: An Engineering Approach: Sandor Imre and Ferenc Balazs, Wiley.

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Scheme of Examination

Department: Computer science & Egg.

Subject Code	Subject Name	Credits	Maximum marks Allotted						Duration of Exam.	
			Theory			Practical		Total	Theory	Practical
			Major	Minor	Sessional.	End Sem	Term Work			
TBCS - 812	Seminar	1(0+0+1)	-	-	-	-	50	50	-	2 hr

OBJECTIVE OF GD AND SEMINAR :
Is to improve the MASS COMMUNICATION and CONVINCING/ understanding skills of students and it are to give student an opportunity to exercise their rights to express themselves.

EVALUATION:
Will be done by assigned faculty based on group discussion and power point presentation.

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