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**GYAN VIHAR SCHOOL OF ENGINEERING AND TECHNOLOGY**

**DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING**

**Teaching and Examination Scheme for M. Tech. FULL-TIME (Core)**

 **Edition 2015**

**Session 2015-2016**

**Year I Semester – I**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **S. No.** | **Course Code** | **Course Name** | **Credits** | **Contact Hrs/Wk.** | **Exam Hrs.** | **Weightage (in%)** |
| **L** | **T** | **P** | **CIE** | **ESE**  |
|   |   | **University Core** |  |  |  |  |  |  |  |
| 1 | PCA | Proficiency in Co-Curricular Activities | 2 | - | - | - |  |  |  |
|  |  | **Program Core** |  |  |  |  |  |  |  |
| 2 | CP 507 | Advance Data Base Management | 3 | 3 | - | - |  |  |  |
| 3 | CP 515 | High Performance Scientific Computing | 3 | 3 | - | - |  |  |  |
| 4 | CP 519 | Distributed Operating System | 3 | 3 | - | - |  |  |  |
| 5 | CP 556 | ADBMS Lab | 1 | - | - | 2 |  |  |  |
|  |  | **Program Elective** |  |  |  |  |  |  |  |
| 6 | CP 520 | Wireless & Mobile computing | 3 | 3 | - | - |  |  |  |
| 7 | IT 507 | Learning System | 3 | 3 | - | - |  |  |  |
| 8 | CP 513 | Critical System Design | 3 | 3 | - | - |  |  |  |
|  |  | **University / Open Elective** |  |  |  |  |  |  |  |
| 9 | \*\*\*\* | Embedded System | 2 | 2 | - | - |  |  |  |
|   |  |  |  |  |  |  |  |  |  |
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 **Year I Session 2015-2016 Semester – II**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **S. No.** | **Course Code** | **Course Name** | **Credits** | **Contact Hrs/Wk.** | **Exam Hrs.** | **Weightage (in%)** |
| **L** | **T** | **P** | **CIE** | **ESE**  |
|   |   | **University Core** |  |  |  |  |  |  |  |
| 1 |  | Employability Skill VII | 1 | 0 | 2 | 0 |  |  |  |
| 2 | PCA | Proficiency in Co-Curricular Activities | 2 | - | - | - |  |  |  |
|  |  | **Program Core** |  |  |  |  |  |  |  |
| 3 | CP 515 | High Performance Network | 3 | 3 | - | - |  |  |  |
| 4 | \*\*\*\*\* | Digital Multimedia System | 3 | 3 | - | - |  |  |  |
| 5 | \*\*\*\*\* | Object Oriented Software Engineering | 3 | 3 | - | - |  |  |  |
| 6 | CP 659 | MATLAB Lab | 1 | - | - | 2 |  |  |  |
|  |  | **Program Elective** |  |  |  |  |  |  |  |
| 7 | \*\*\*\* | Natural Language Processing | 3 | 3 | - | - |  |  |  |
| 8 | \*\*\*\* | Grid Computing | 3 | 3 | - | - |  |  |  |
|  |  | **University / Open Elective** |  |  |  |  |  |  |  |
| 9 |  | Simulation and Modelling | 2 | 2 | - | - |  |  |  |
|   |  |  |  |  |  |  |  |  |  |
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**Teaching and Examination Scheme for M. Tech. FULL-TIME (Core)**

**Edition 2015**

**Year II Session 2016-2017 Semester – III**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **S. No.** | **Course Code** | **Course Name** | **Credits** | **Contact Hrs/Wk.** | **Exam Hrs.** | **Weightage (in%)** |
| **L** | **T** | **P** | **CIE** | **ESE**  |
|   |  | **University Core** |  |  |  |  |  |  |  |
| 1 |  | Employability Skills Training VIII | 1 | 0 | 2 | 0 |  |  |  |
| 2 | PCA | Proficiency in Co-Curricular Activities | 2 | - | - | - |  |  |  |
| 3 |  | M.Tech Seminar I | 5 | - | - | 9 |  |  |  |
|  |  | **Program Core** |  |  |  |  |  |  |  |
| 4 | \*\*\*\* | Software Project Management | 3 | 3 | - | - |  |  |  |
| 5 | CP 603 | Knowledge Management & Data Mining | 3 | 3 | - | - |  |  |  |
|  |  | Network Simulator Lab | 1 | - | - | 2 |  |  |  |
|  |  | **Program Elective** |  |  |  |  |  |  |  |
| 6 | CP 615 | E-Secure Transactions | 3 | 3 | - | - |  |  |  |
| 7 | CP 627 | Machine Learning | 3 | 3 | - | - |  |  |  |
| 8 | CP 611 | Neural Network And Fuzzy System | 3 | 3 | - | - |  |  |  |
|  |  | **University / Open Elective** |  |  |  |  |  |  |  |
| 9 |  | Research Methodology  | 2 | 2 | - | - |  |  |  |
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**Year II Session 2106-2017 Semester – IV**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **S. No.** | **Course Code** | **Course Name** | **Credits** | **Contact Hrs/Wk.** | **Exam Hrs.** | **Weightage (in%)** |
| **L** | **T** | **P** | **CIE** | **ESE**  |
|   |   | **University Core** |  |  |  |  |  |  |  |
|  |  | M. Tech. Dissertation / Thesis  | 16 | - | - | - |  |  |  |
|  |  |  |  |  |  |  |  |  |  |

**CP 519 DISTRIBUTED OPERATING SYSTEM C(L,T,P) = 3 (3,0,0)**

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| --- | --- | --- |
| **Units** | **Course Contents** | **Hours** |
| **I** | Introduction: Hardware, Operating systems, distributed operating systems, Network operating systems, Middleware, Client-server model. Communication: Inter-process communication, Protocols, Remote procedure call, Remote object invocation, Message-oriented communication, Stream-oriented communication. | **7** |
| **II** | Synchronization: Semaphores, Monitors, Deadlock, Clock synchronization, Logical clocks, Election Algorithms, Mutual Exclusion, Distributed Transactions. File system management | **8** |
| **III** | Processes: Scheduling algorithms, Threads, Clients, Servers, Code migration, Software agents. Memory management and virtual memory | **7** |
| **IV** | Naming: DNS, X.500, Locating mobile entities, Garbage collection. Consistency and Replication: Data- and Client-centric models, Distribution and Consistency protocols. Fault tolerance: Reliable client-server and group communication, Distributed commit, Recovery. | **8** |
| **V** | Security: Data integrity, message authentication, message replay, message confidentiality, public-key algorithms, digital signatures, key management. | **7** |
|  | Total | **37** |

**Reference Books:**

1. Andrew S.Tanenbaum: Distributed Operating System, Prentice Hall International Inc.1995.
2. Andrew S. Tanenbaum and Maarten van Steen, Distributed Systems: Principles and Paradigms, 2nd edition, Pearson Prentice Hall, Upper Saddle River, NJ, 2007.
3. G. Coulouris, J. Dollimore, and T. Kindberg, Distributed Systems: Concepts and Design, 2nd edition, Addison-Wesley Publishing Company, Menlo Park, CA, 1994.
4. M. Lister and R. D. Eager, Fundamentals of Operating Systems, Fifth Edition, Springer Verlag, New York, NY, 1993.

**CP 513 CRITICAL SYSTEM DESIGN C(L,T,P) = 3 (3,0,0)**

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| --- | --- | --- |
| **Units** | **Course Contents**  | **Hours** |
| I | Introduction to time critical systems, Application, Design Issues, Characterization. | 7 |
| II | classification of time-critical system and tasks, release time, deadlines & timing constraints, reference model,  | 7 |
| III | priority assignment & scheduling, clock driven approach, weighted round robbing approach, priority driven approaches,  | 8 |
| IV | Resources & resource access control, assumption on resources & their uses, protocols.  | 8 |
| V | Scheduling flexible computations and tasks with temporal distance constraints. Introduction to clock synchronization & Case studies. | 7 |
|  | **Total** | **37** |

**REFERENCE BOOKS:**

1 J.W.S. Liu "Real-Time Systems", Pearson Education Asia.

2. S.T. Lavi, A. K. Agarawal "Real-Time system design", McGraw Hill

3. P.A. Laplante "Real-Time Systems Design and Analysis, An Engineer’s Handbook," IEEE Press.

4. K.Mauch "Real-Time Microcomputer system design, An introduction", McGraw Hill.

**CP 520 Wireless & Mobile Computing C(L,T,P) = 3 (3,0,0)**

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| **Units** | **Contents of the Subject** | **Hours** |
| **I** | **Introduction:** Overview of Computer networks, Multiple Access Technology for Wireless Communication, Mobile Data Communication, Personal Wireless Communication Systems, Digital Cellular Systems and Standards (2G). | **7** |
| **II** | **Overview of Third Generation (3G) in wireless:** Universal Mobile Telecommunication Service (UMTS), UMTS Service and Air interface, 3GPP network architectures, CDMA2000, TD-CDMA and TD-SCDMA Technologies. **Evolution of 2.5G :** Enhancement over 2G, GPRS and EDGE network services and architectures, traffic dimensioning, CDMA2000 (1XRTT), WAP and SMS, migration path from 2G to 2.5G to 3G | **8** |
| **III** | **UMTS:** UMTS basics, WCDMA interface, UTRAN architecture, establishment of UMTS speech cells, UMTS packet data (R99), High speech packet data handover and UMTS core network evolution **CDMA 2000 :** Radio components, Network structure packet data transport flow, Radio network (IS-2000 1XRTT), EVDO | **7** |
| **IV** | **TD-SCDMA:** Architecture and code network, Radio network, Interface Migration Technique RAN Traffic planning. **TD-CDMA:** Generic TD-CDMA architecture, code networks, Radio Network, Interface migration technique RAN traffic planning. | **7** |
| **V** | **VoIP Technology:** Basis of IP transport, VoIP challenges, H-323, session invitation protocol, distributed architecture & media gateway control, VoIP and SS7 VoIP quality of service. **Broadband:** Wifi 802.11, 802.16, bluetooth and cable system **Antenna System Selection:** Base Station antenna, performance criteria, Diversity, cross pole antenna, dual band antenna dBi and dBd | **7** |
|  | **Total** | **36** |

***References:***

1. Raj Pandya, "Mobile and Personal Communication Systems & Services"
2. Yi- Bing Lin and Imrich Chlamtac, "Wireless and Mobile Network Architectures"
3. Rajesh & Balasubramanian "Computer Networks : Fundamentals and Application"
4. Jochen Schiller, "Mobile Communication"
5. C.Y. William Lee, "Mobile Cellular Telecommunications : Analog & Digital Systems"
6. Gilbert Held, "Building A Wireless Network"

**IT 507 LEARNING SYSTEM C(L,T,P) = 3 (3,0,0)**

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| **Units** | **Course Contents**  | **Total Contact Hrs.** |
| 1 | ARTIFICIAL INTELLIGENCE :Particle Swarm Algorithm , PSO Algorithm to Maximize the Function F(X, Y, Z) , M-program for PSO Algorithm , Program Illustration , Genetic Algorithm ,Roulette Wheel Selection Rule, Example, M-program for genetic algorithm , Program illustration , Classification of Genetic Operators , Simple crossover, Heuristic crossover, Arith crossover , Simulated Annealing , Simulated Annealing Algorithm, Examples | 8 |
| 2 |  Back Propagation Neural Network , Single Neuron Architecture, Algorithm,Example, Fuzzy Logic Systems, Union and Intersection of Two Fuzzy ,Fuzzy Logic Systems, Example, Realization of Fuzzy Logic System for the Specifications given in Section , Ant Colony Optimization, Algorithm, Example, Optimal Order using Ant ColonyTechnique | 7 |
| 3 | PROBABILITY AND RANDOM PROCESS: Independent Component Analysis ,ICA for Two Mixed Signals,ICA algorithm,Gaussian Mixture Model ,Expectation-maximization Algorithm, Expectation stage, Maximization stage,K-Means Algorithm for Pattern Recognition, K-means Algorithm, Fuzzy K-Means Algorithm for Pattern Recognition, Fuzzy K-means Algorithm, Example, Fuzzy k-means Algorithm | 7 |
| 4 | Ear Pattern Recognition Using Eigen Ear, Algorithm, Ear Image Data Compression using Eigen Basis ,Adaptive Noise Filtering using Back Propagation Neural Network, Binary Image Rotation Using Transformation Matrix , Binary Image Rotation with 45 Degree ,Anticlockwise Direction, Clustering Texture Images Using K-means Algorithm | 8 |
| 5 | Search Engine Using Interactive Genetic Algorithm, Speech Signal Separation and Denoising Using Independent Component Analysis ,Detecting Photorealistic Images using ICA Basis , Binary Image Watermarking Using Wavelet Domain of the Audio Signal | 7 |

**Reference Books:**

1 Algorithm Collections for Digital Signal Processing Applications Using Matlab, E.S. Gopi, Springer.

2. Neural networks by Simons Hykins , PHI

 **CP 659 MATLAB C(L,T,P) = 2 (0,0,3)**

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| **List of Experiments**1. Matlab Interactive Sessions, Menus and the toolbar, Computing with Matlab, Script files and the Editor Debugger, Matlab Help System, Programming in Matlab.
2. Arrays, Multidimensional Arrays, Element by Element Operations, Polynomial Operations Using Arrays , Cell Arrays , Structure Arrays
3. Elementary Mathematical Functions , User Defined Functions, Advanced Function Programming , Working with Data Files
4. Program Design and Development , Relational Operators and Logical Variables , Logical Operators and Functions , Conditional statements , Loops , The Switch Structure , Debugging Mat Lab Programs
5. XY- plotting functions , Subplots and Overlay plots , Special Plot types , Interactive plotting , Function Discovery , Regression , 3-D plots
 |

**CP 507 ADVANCED DATABASE MANAGEMENT SYSTEM C(L,T,P) = 3 (3,0,0)**

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| --- | --- | --- |
| **Unit** | **Course Contents** | **Hours** |
| I | **Database Security -** Introduction; Discretionary Access Control; Mandatory Access Control; Statistical Databases; Data Encryption.  | **6** |
| II | **Optimization -** Introduction; Query Processing; Expression Transformation; Databases Statistics; Divide and conquer strategy.  | **6** |
| III | **Type Inheritance -** Introduction; Type Hierarchies; Polymorphism and Substitutability; Variables and Assignments; Specialization by Constraint.  | **7** |
| IV | **Distributed Databases -** Introduction; the twelve objectives; Problems of distributed systems; client/ server systems; DBMS independence.  | **6** |
| V | **Decision Support -** Introduction; Aspects of Decision Support; Database Design for Decision Support; Data preparation. **Data Warehouses and Data Mining -** Online Analytical processing; Data Mining. **Logic Based Databases -** Introduction; Propositional Calculus; Predicate Calculus; A Proof Theoretic View of Databases; Deductive database systems; recursive query processing .  | **8** |
|  | **Total** | **33** |

**Text Book:**

C.J. Date, An introduction to Database Systems, 7th Ed. Pearson Education, New Delhi, 2004.

**Reference Texts:**

1. H. Korth et al. Database Management System concepts, 3rd Ed. TMH, New Delhi 2002

2. B.Desai, Database Management Systems Galgotia Publications, New Delhi, 1998

**CP 515 HIGH PERFORMANCE SCIENTIFIC COMPUTING C(L,T,P) = 3 (3,0,0)**

|  |  |  |
| --- | --- | --- |
| **Units** | **Course Contents**  | **Hours** |
| I | Overview of Scientific Computing, Tools-Elements of Mat Lab, Elements of IDL, Elements of AVS, | 7 |
| II | Scientific Visualization Architecture- Computer Performance. Vector Computing.  | 7 |
| III | Distributed-memory MIMD Computing. SIMD Computing.  | 8 |
| IV | Applications-Advection. Computerized Tomography.  | 8 |
| V | A review of selected topic from Numerical Analysis. | 7 |
|  | Total | 37 |

**REFERENCE BOOKS:**

1 G.H. Golub,J.M. Ortega"Scientific computing -An introduction With parallel computing" Academic Press,

2. Lloyd D. Fosdick,Elizabeth R. Jessup,Carolyn"an introduction to High Performance Scientific computing" PHI

**EMBEDDED SYSTEM C(L,T,P)=(3,0,0)**

Embedded Computing Requirements: Characteristics and applications of embedded systems; Components of Embedded Systems; challenges in Embedded System Design and design process; Formalism for system design.

Embedded Processors: RISC vs. CISC architectures; ARM processor – processor architecture and memory organization, instruction set, data operations and flow control; SHARC processor – memory organization, data operations and flow control, parallelism within instructions; Input and output devices, supervisor mode, exception and traps; Memory system, pipelining and superscalar execution.

Embedded Computing Platform: CPU Bus – Bus protocols, DMA, system bus configurations, ARM bus; Timers and counters, A/D and D/A converters, Keyboards, LEDs, displays and touch screens; Design examples.

Embedded Software Analysis and Design: Software design pattern for Embedded Systems; Model programs – data flow graphs and control/data flow graphs; Assembly and linking; Compilation techniques; Analysis and optimization of execution time, energy, power and program size.

Embedded System Accelerators: Processor accelerators, accelerated system design

**Recommended Book:**

1. Computer as Components by Wayne Wolf published by Elsevier Inc

2. ARM System Developer’s Guide by Andrew S. Loss published by Elsevier Inc

3. Embedded System Design by Steve Heath published by Elsevier Inc

4. Embedded System design: A unified hardware/software Introduction by Frank Vahid & Tony

Givagi published by John Wiley & Sons Inc.

**DIGITIAL M ULTIMEDIA PROCESSING C(L,T,P)=(3,0,0)**

**Fundamentals:** Introduction, Origin, Areas of Image Processing, steps in Digital Image Processing, types of image and video with compression technique Components of Image Processing System, Image Sensing , Sampling and Quantisation, Neighbouring of Pixels

**Image Enhancement and Restoration: Enhancement:** Spatial Filtering, Introduction to Fourier Transformation, Restoration: A model of the Image Degradation/ Restoration Process. Cosine tranform

**Color Image Processing:** Color fundamentals, models, transformation and segmentation. Noise in color images.

**Wavelets:** Wavelet functions, Wavelet transformations in one and two dimensions, short time Fourier transform, fast wavelet transform.

**Image Compression:** Image compression models, Error free compression, Lossy compression.

**Image segmentation:** Line detection, edge detection, Edge linking and boundary detection, region based

segmentation.

**Representation and Description:** Representation, Boundry and Regional Descriptors, Relational Descriptors.

**Object Recognition:** Pattern and pattern classes, recognition based on Decision Theoretic Methods, Structural Methods.

**References:**

**Digital Image Processing** by Rafael C. Gonzalez, Richard E. Woods

**OBJECT ORIENTED SOFTWARE ENGINEERING C(L,T,P)=(3,0,0)**

**Unit 1: Introduction to OOSE** - Software Engineering Development, Traditional Software life cycle models, object oriented techniques in software life cycle models, Requirement Elicitation: Concepts, Activities. Managing requirement Elicitation.

**Unit 2: Object Analysis** : Essence of object oriented analysis, object oriented analysis versus structure analysis, Reference model of analysis and design, Analysis activities shortcomings of OO analysis.

**Unit 3: System Modeling Design** : System Design Concepts, object modeling, dynamic modeling, Functional modeling. Design Goals, Design Activities, Managing System Design, overview of object design, Reuse concepts and Managing Reuse.

**UNIT 4: Modeling with UML** : Overview of UML : use case diagram, class diagram, interaction diagram, statechart chart diagram, Activity diagram. Modeling concepts and UML diagrams.

**UNIT 5: Testing object oriented Systems** : Introduction, Testing Concepts and activities. Managing Testing. Testing standard: External Standards, Internal standards, Building test data and Test cases, characterists of good test case, How to write good test case, user case studies.

**TEXT BOOK** :

1. Bernd Bruegge, Allen H. Dutoit , Object oriented Software Engineering, using UML, Pattern and **Java (2nd Edition), Pearson, 2008.**
2. George Wilkie, Object oriented Software Engineering, Addison-Wesley, 1994

**Reference Book(s):**

1. Ivar Jacobson “Object Oriented Software Engineering: A Use Case Driven Approach”, Addison-Wesley, 2002
2. Grady Booch “Object-Oriented Analysis and Design with Applications”, 2/E, Addison-Wesley Professional, 2005
3. Stephen R. Scach, “Object Oriented and Classical Software Engineering” 7/E Tata McGraw Hill, 1999
4. Booch, Rumbaugh & Jacobson “The Unified Modeling Language User Guide”, Addison-Wesley 2005
5. Bernd Bruegge, Allen H. Dutoit “Object Oriented Software Engineering: Using UML, Patterns and Java” 2/E Pearson Education.
6. Timothy C. Lethbridge, Robert Laganiere “Object oriented Software Engineering: Practical Software development using UML and Java” McGraw Hill
7. Edwards Yourdon, Carl Argila “Case Studies in Object Oriented Analysis and Design” Prentice Hall.

**NATURAL LANGUAGE PROCESSING C(L,T,P)=(3,0,0)**

Context Free grammars, Lexical analysis. Introduction to parsing, context Sensitive grammars

Linguistics of English: Review of English Grammar, Morphology, syntax, semantics, structure of discourse. Words and the lexicon: word classes.

Semantic Grammars, TN, ATN, Case grammars, paninian Grammars, parser of NL statements, Determiners and quantifiers, noun-noun modification, pronoun resolution relative clauses.

Deep Structure, shallow structure, Differences between English and Hindi Application

(a) MT

(b) ASR

(c) IR

(d) Q & A

**References:**

1.Manning C.D..Selauze H.” Foundation of statical natural language processing”.MIT Press

2.Juratsby D.Martin J.H.”Speech and language processing”,PHI

3.Allen.J.”Natural language understanding.”Benjamin/Cummins Publishing

4.Wall Let W.”Programming PERL”.O Reilly

**GRID COMPUTING C(L,T,P)=(3,0,0)**

Computational grids; A discussion of the need, potential users and techniques for use of grids. Grid requirements of end users, application developers, tool developers, grid developers, and system managers.

Grid Architecture, Networking Infrastructure, Protocols and Quality of Service, Computing Platforms. Operating Systems and Network Interfaces, Compilers, Languages and Libraries for the Grid, Grid Scheduling, Resource Management, Resource Brokers, Resource Reservations, Instrumentation and Measurement, Performance Analysis and Visualization,

Security, Accounting and Assurance, The Globus Toolkit: Core systems and related tools such as the Message Passing Interface communication library, the Remote I/O (RIO) library, and the Nimrod parameter study library, Legion and related software, Condor and the Grid, Open Grid Service Architecture and Data Grids, Grid Portal Development.

**Suggested reference materials:**

1. Peter Pacheco "Parallel Programming with MPI". Morgan Kaufmann.

2. Ian Foster and Carl Kesselman."The Grid: Blueprintf for a New Computing Infrastructure", Morgan Kaufmann.

3. Fran Berman, Geoffrey Fox, and Anthony G. Hey."Grid Computing: Making the Global Infrastructure a

Reality".Wiley Series in Communications, Networking, and Distributed Systems.

4. Fran Berman , Geoffrey Fox, Anthony J.G. Hey "Grid Computing: Making The Global Infrastructure a Reality".

**CP 512 HIGH PERFORMANCE NETWORKS C(L,T,P) = 3 (3,0,0)**

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| **Units** | **Course Contents**  | **Hours** |
| I | **ISDN and Frame Relay:** Introduction to High Speed networks - Basics: OSI/ISO reference model - ISDN: Conceptual view – Standards – Transmission structure – BISDN - Frame Relay: Frame mode protocol architecture – Call control – LAPF – Congestion – Traffic rate management – Explicit congestion avoidance – Implicit congestion control.  | 7 |
| II | **Asynchronous Transfer Mode**: Asynchronous transfer mode - ATM Protocol Architecture, ATM logical Connection, ATM Cell - ATM Service Categories – AAL - Traffic and Congestion control in ATM - Requirements - Attributes - Traffic Management Frame work, Traffic Control – ABR traffic Management - ABR rate control, RM cell formats, ABR Capacity allocations - GFR traffic management. | 7 |
| III | **Congestion Control and QoS in IP Networks:** Congestion Control in Packet Switching Networks: – The Need for Flow and Error Control – Link Control Mechanisms – ARQ Performance – TCP Flow Control – TCP Congestion Control – Performance of TCP Over ATM – Integrated Services Architecture – Queuing Discipline – Random Early Detection – Differentiated Services – Resource Reservation : RSVP – Multi protocol Label Switching – Real Time Transport Protocol. | 7 |
| IV | **WDM Optical Networks:** Introduction to Optical Networks – Wave length Division Multiplexing(WDM) – Introduction to broadcast and select networks – switch architectures – channel accessing – Wavelength routed networks – switch architectures – Routing and wavelength assignment – Virtual topology design – IP over ATM over WDM – IP over WDM. SQL, User Defined ADT in SQL, Routines, ADT Subtypes and Inheritance, Tables, Procedural Facilities, Other Type Constructions,  | 8 |
| V | **SONET and SDH:** High Speed LAN’s: Fast Ethernet – Switched fast Ethernet - Gigabit Ethernet – FDDI: Network configuration – Physical Interface – Frame transmission and reception –SONET: Introduction – Layers – Frames – STS multiplexing – SONET networks – Virtualtributaries - Payload mappings – Packet over SONET – Generic Framing Procedure – Transport services – SONET over WDM – Traffic Grooming. | 6 |
|  | **Total** | 35 |

**REFERENCE BOOKS:**

1 William Stallings, “ISDN and Broadband ISDN with Frame Relay and ATM”, Prentice-Hall of India, Fourth edition, 2004.

2. William Stallings, “High Speed Networks and Internets”, Pearson Education, Second edition, 2002.

3. C. Siva Ram Murthy and Mohan Gurusamy, “WDM Optical Networks: Concepts, Design and Algorithms”, Prentice-Hall of India, 2002.

4. Fred Halsall, “Multimedia Communications – Applications, Networks, Protocols”, Pearson Edition, 2001.

**Intellectual Property Right C(L,T,P) = 3 (3,0,0)**

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| **Unit** | **Contents of the Course** | **Total Contact Hrs** |
| I | **Introductory Aspects:** Overview of the concept of property; Industrial property and non-industrial property; Historical background of IPR; Importance of human creativity in present scenario; Different forms of IP and its conceptual analysis.  | 6 |
| II | **Patents:** Introduction and overview of patent protection; History of Patent protections; What is patent and definition of patent; Object of patent; Scope and salient features of patent; How to obtain patent; Product patent and Process patent; Specification – Provisional and complete specification; Procedure for patent applications; Register of patents and Patent Office; Rights and obligations of patentee; Transfer of Patent Rights; Government use of inventions; Biotech patents and patentability of life forms; Infringement of Patents; Offences and Penalties. | 7 |
| III | **Trade Marks:** Introduction and overview of trade mark; Evolution of trade mark law; Object of trade mark; Features of good trade mark; Different forms of trade mark; Trade mark registry and register of trade marks; Property in a trade mark; Registrable and non-registrable marks; Basic principles of registration of trade mark; Deceptive similarity; Assignment and transmission; Rectification of register; Infringement of trade mark; Passing off; Domain name protection and registration; Offences and penalties. | 7 |
| IV | Introduction and overview of Cyber Intellectual Property; Intellectual property and cyberspace; Emergence of cyber crime ; Grant in software patent and Copyright in software; Software piracy; Trade marks issues related to Internet (Domain name); Data protection in cyberspace; E-commerce and E-contract; Salient features of Information Technology Act; IPR provisions in IT Act; Internet policy of Government of India. | 6 |
| V | International Convention and Treaties: Paris Convention: Background; Salient features of Paris Convention; Governing rules of Paris Convention; Patent Cooperation Treaty: Background; Objectives of PCT; Salient features of PCT; Madrid Convention: Salient features; International registration of marks; World Intellectual Property Organisation: Background; Salient features WIPO; Organisation of WIPO. | 6 |
|  Total | 32 |

**Prescribed Books:**

1. P. Narayanan – Intellectual Property Law.

2. Cornish William – Intellectual Property.

**Reference Books:**

1. Ganguli – Intellectual Property Rights: Unleashed the knowledge economy.

2. Copinger & Skine James – Copyright.

3. Pal P. – Intellectual Property Rights in India.

4. Unni – Trade Mark, Design and Cyber Property Rights.

MACHINE LEARNING AND NEURAL NETWORKS

**CP 623 ARTIFICIAL NEURAL NETWORKS C(L,T,P) = 3 (3,0,0)**

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| **Unit** | **Contents** | **Hours** |
| 1 | **INTRODUCTION TO ARTIFICIAL NEURAL NETWORKS :** Introduction, Artificial Neural Networks, Historical Development of Neural Networks, Biological Neural Networks, Comparison Between Brain and the Computer, Comparison Between Artificial and Biological Neural Networks, Network Architecture, Setting the Weights, Activation Functions, Learning Methods. | 7 |
| 2 | **FUNDAMENTAL MODELS OF ARTIFICIAL NEURAL NETWORKS:** Introduction, McCulloch – Pitts Neuron Model, Architecture, Learning Rules, Hebbian Learning Rule, Perceptron Learning Rule, Delta Learning Rule (Windrow-Hoff Rule or Leastmean Squre (LMS) rule, Competitive Learning Rule, Memory Based Learning. | 7 |
| 3 | **FEED FORWARD NETWORKS:** Single Layer Perceptron Architecture, Algorithm, Perception Algorithm for Several Output Classes, Perceptron Convergence Theorem, Back Propagation Network (BPN), Generalized Delta Learning Rule, Back Propagation rule, Architecture, Training Algorithm, Selection of Parameters, Learning in Back Propagation, Application Algorithm, Local Minima and Global Minima, Radial Basis Function Network (RBFN). | 7 |
| 4 | **ADALINE AND MADALINE NETWORKS:** Adaline Architecture, Algorithm, Applications, Madaline, Architecture, MRI Algorithm, MRII Algorithm. | 7 |
| 5 | **COUNTER PROPAGATION NETWORKS :** Winner Take – all learning, out star learning, Kohonen Self organizing network, Grossberg layer Network, Full Counter Propagation Network (Full CPN), Architecture, Training Phases of Full CPN, Training Algorithm, Application Procedure, Forward Only counter Propagation Network, Architecture, Training Algorithm, Applications, Learning Vector Quantizer (LVQ). | 7 |
|  | **Total** | **35** |

**Reference Books**:

1. Introduction to Artificial Neural Systems - J.M.Zurada, Jaico Publishers, 3rd Edition.

2. Introduction to Neural Networks Using MATLAB 6.0 - S.N. Shivanandam, S. Sumati, S. N. Deepa, TMH.

4. Artificial Neural Network – Simon Haykin, Pearson Education, 2nd Ed.

5. Fundamental of Neural Networks – Laurene Fausett, Pearson, 1st Ed.

6. Artificial Neural Networks - B. Yegnanarayana, PHI.

**CP 627 MACHINE LEARNING C(L,T,P) = 3 (3,0,0)**

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| --- | --- | --- |
| **Units** | **Contents** | **Hours** |
| 1 | Review Basic Tasks, Machine Learning Overview, Concept Learning, Version Space Learning, Learning Theory, Decision Tree Learning, Neural Network Learning. | 7 |
| 2 | Methods and underlying problems of Machine Learning, Learning methods such as role, analogical, EBG, EBL, Chunking. | 7 |
| 3 | Evaluating hypotheses, Bayesian learning, Minimum Description Length, Naïve Bayes, Custering Reinforcement Learning | 8 |
| 4 | Learning by examples - Version space algorithm and ID3 algorithm. Utilizing ensembles of classifiers, Bagging and boosting, Instance based learning, RIPPER, Rule Learning | 6 |
| 5 | PCA, Multi dimensional scaling. Important systems and applications to the problem of knowledge acquisition for expert system. | 7 |
|  | **Total** | **35** |

**Reference Books:**

1. Michalsky, T. Mitchell, J.Corbonell, Machine Learning Springer-Verlag.

2. T. M. Mitchell. Machine Learning, McGraw-Hill, 1997.

**HS 501 SOFT SKILLS TRAININIG I C (L, T, P) = 3 (3,0,0)**

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| --- | --- | --- |
| **Unit** | **Course Contents** | **Hours** |
| I |  Spoken English – PICTURE (p=pronunciation, I=inflection, C=Clarity & courtesy, T=Tone, U=Understanding and feedback, R=Rate of speech and Repeatition, E=Emphasis), Body Language Training, Active Listening | 8 |
| **II** | Introduction to business terms, Economic Times Reading, Communication skills | 8 |
| **III** | Johari Window Training, Firo-B Training, Relationship Management | 10 |
| **IV** | Role Plays, Conflict Management | 7 |
| **V** | I’m OK U’r OK Training, Time Management Training | 6 |
|  | **Total** | 39 |

**CP 556 ADVANCE DATABASE LAB C(L,T,P) = 3 (0,0,3)**

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| **S.No.** | **List of Experiments**  | **Hours** |
|  | The experiments will be based on the topics covered in the corresponding theory Course. | 8 |

**CP 615 E-SECURE TRANSACTIONS C(L,T,P) = 3 (3,0,0)**

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| **Units** | **Course Contents** | **Hours** |
| **I** | **Electronic Money and E-Payment Transaction Processing:** Introduction, E-Money, E-Payment transaction Process, E-Cash Transaction Process, Credit Card transaction process (Customer’s view, merchant’s view and Third party view, Overall view), Smart Card transaction process, EFT, Challenges of E-Payment Systems. | **7** |
| **II** | **Electronic Security:** Introduction of E-security, Threats and Attacks, Developing a sound E-Security policy, E-Security solutions, Introduction to new challenges and new threats. | **8** |
| **III** | **Secure Electronic Transactions (SET):** Business requirement, key features, participants, transaction, working of SET, SET technology, SET protocols, Symmetric and Asymmetric encryption in SET, Transaction authenticity, importance of secure transactions, Safety with SET, Payment without JEPI v/s Payment with JEPI, Participants and roles, JEPI architecture, the UPP layer. | **7** |
| **IV** | **Sound Practices of Risk Management Issues:** Practices of Risk Management Issues, Security control practices, Authorization Practices, Audit Trial Practices, Privacy practices, business continuity and contingency planning practices, Management and supervision of operational risk.  | **8** |
| **V** | **Laws regulation and guidelines:** Electronics money, Regulating E-Transactions, Role of RBI and Legal issues, transactions of E-Cash, Credit Card and Internet, Laws relating to Internet credit cards, Secure Electronic Transitions, Basel Committee and its recommendations, IT Act 2000, RBI Act, EFT Act. | **7** |
|  | **Total** | **37** |

**Reference Books:**

1. Banerjee C. “E-Banking and Security Transactions”, Genius Publications
2. Mark O' Neill "Web Services Security".

**SOFTWARE PROJECT MANAGEMENT C(L,T,P)=(3,0,0)**

**Unit-1: Introduction to software project management (SPM):** Definition of a Software Project (SP), SP Vs. other types of projects activities covered by SPM, categorizing SPs, project as a system, management control, requirement specification, information and control in organization.

Stepwise Project planning: Introduction, selecting a project, identifying project scope and objectives, identifying project infrastructure, analyzing project characteristics, identifying project products and activities, estimate efforts each activity, identifying activity risk, allocate resources, review/ publicize plan.

**Unit-2 : Project evaluation & estimation:** Cost benefit analysis, cash flow forecasting, cost benefit evaluation techniques, risk evaluation. Selection of an appropriate project report; Choosing technologies, choice of process model, structured methods, rapid application development, water fall-, V-process-, spiral- models. Prototyping, delivery. Albrecht function point analysis.

**Unit-3: Activity planning & risk management**: Objectives of activity planning, project schedule, projects and activities, sequencing and scheduling activities, network planning model, representation of lagged activities, adding the time dimension, backward and forward pass, identifying critical path, activity throat, shortening project , precedence networks.

Risk Management: Introduction, the nature of risk, managing risk, risk identification, risk analysis, reducing the risks, evaluating risks to the schedule, calculating the z values..

**Unit-4: Resource allocation &Monitoring the control**: Introduction, the nature of resources, identifying resource requirements, scheduling resources creating critical paths, counting the cost, being specific, publishing the resource schedule, cost schedules, the scheduling sequence.

**Monitoring the control**: Introduction, creating the frame work, collecting the data, visualizing progress, cost monitoring, earned value, prioritizing monitoring, getting the project back to target, change control.

**Unit-5: Managing contracts and people**: Introduction, types of contract, stages in contract, placement, typical terms of a contract, contract management, acceptance, Managing people and organizing terms: Introduction, understanding behavior, organizational behavior: a back ground, selecting the right person for the job, instruction in the best methods, motivation, working in groups, becoming a team, decision making, leadership, organizational structures, conclusion, further exercises..

**Text Book(s):**

1. Software Project Management (2nd Edition), by Bob Hughes and Mike Cotterell, 1999, TMH

**Reference Book(s):**

1. Software Engineering – A Practitioner’s approach, Roger S. Pressman (5th edi), 2001, MGH
2. Software Project Management, Walker Royce, 1998, Addison Wesley.
3. Project Management 2/c. Maylor
4. Managing Global software Projects, Ramesh, 2001, TMH.

**CP 603                    KNOWLEDGE MANAGEMENT & DATA MINING**

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| **Unit** | **Course Contents** | **Hours** |
| I | Knowledge Management: Introduction, Evolution, from Information Management to Knowledge Management. Key Challenges Facing the Evolution of Knowledge Management, Ethics for Knowledge Management. |  |
| II | KM Tools: Telecommunications and Networks in Knowledge Management, Internet search Engines and Knowledge Management, Information Technology in Support of Knowledge Management, Knowledge Management and Vocabulary Control, Information Mapping in Information Retrieval, Information Coding in the Internet Environment, Repackaging Information, KM Applications. |  |
| III | Data Mining: Introduction: What is data mining, Challenges, Other issues, Data quality, Data preprocessing, Data Reduction, Data mining functionalities, data mining primitives, data mining query language, Architectures of data mining systems. Generalization, Summarization and Characterization Association analysis: Problem definition, frequent item set generation, Rule generation, Challenges, Interestingness measures, Generalization of association patterns (Apriori, fptree algo, etc) |  |
| IV | Classification and prediction Problem definition, General approach, Decision tree induction, Rule based classifiers, Cluster analysis: Introduction, Similarity and distance, Characteristics of clustering algorithms (like partitioning, Hierarchical clustering), Cluster evaluation. |  |
| V | Application & Warehousing: Mining complex type of data ( E.g. spatial databases, multimedia databases, time series and sequence data, text databases, www), application of data mining, and trends in data mining, what is data warehouse, data warehouse Architecture data warehouse implementation, data cube technology, data mart, application of data warehouse, data warehouse and competitive advantage, OLAP, ROLAP, MOLAP, OLTP. |  |
|  | Total |  |

**Text / Reference Books:**

 1. Srikantaiah, T. K. Koenig, M., Knowledge Management for the Information Professional, Information Today, Inc, 2000.

2. Daryl Morey, Mark Maybury, Bhavani Thuraisinghan, Knowledge Management, Classic and Contemporary Works the MIT Press.

3. Bellover Richard F, Knowledge Management Strategy and Technology, Artech House, Boston.

4. Anahory / Murray, Data Warehousing in the Real World, Addison Wesley

5. Data Warehousing in the Real World, Anahory / Murray, Addison Wesley.

6. Introduction to Data Mining by Pang Ning Tan, Michael Steinbach, and Vipin Kumar, 2003 ( not published yet)

7. Data Mining Concepts and Techniques by Jiawel Han and Micheline Kamber, 2000.

**HS 502 SOFT SKILLS TRAININIG I I C (L, T, P) = 3 (3,0,0)**

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| **Unit** | **Course Contents** | **Hours** |
| I |  Making impact making business presentations | 6 |
| **II** | Team Management and Collaborative Work Culture | 8 |
| **III** | Training in Anchoring and Public Speaking | 6 |
| **IV** | Emotional Intelligence Training | 7 |
| **V** | Business Games, Business Etiquettes | 10 |
|  | **Total** | 37 |

**CP 611 NEURAL NETWORK & FUZZY SYSTEMS C(L,T,P) = 3 (3,0,0)**

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| **Unit** | **Course Contents** | **Hours** |
| **I** | Neuro-Fuzzy and Soft Computing: Introduction to Neuro-Fuzzy and Soft Computing, Fuzzy Set Theory, Fuzzy Rules and Fuzzy Reasoning. | 7 |
| **II** | Fuzzy Inference Systems, Adaptive Neural Networks, Supervised Learning Neural Networks, Learning from Reinforcement, Unsupervised Learning and Other Neural Networks. | 8 |
| **III** | ANFIS: Adaptive Neuro-Fuzzy Inference Systems, Neuro-Fuzzy Control. | 7 |
| **IV** | ANFIS Applications (Printed Character Recognition, Adaptive Noise Cancellation). | 8 |
| **V**  | Fuzzy Sets and Genetic Algorithms in Game Playing, Soft Computing for Color Recipe Prediction. | 7 |
|  | **Total** | **37** |

**Reference Books:**

1. J.S.R. Jang, C. – T, Son, E.Mizutani “Neuro-fuzzy and Soft Computing” PHI

2. Russel and Norvig: "AI, a modern approach", Pearson Education

3. Rich and Knight: "AI" Tata McGraw Hill

4. KM Fu: "Neural Networks in Computer Intelligence", McGraw Hill