SCHEME FOR EXAMINATION
B.TECH (FOUR YEAR) DEGREE COURSE
FOURTH YEAR, COMPUTER SCIENCE AND ENGINEERING

SEMESTER- VII

S.N.	Code No.	Subject	Periods			Evaluation scheme			Credits
			L	T	P	IA	ESE	TOTAL	
1	CS4101	Compiler Design	3	1	-	40	60	100	4
2	CS4102	Web Technologies	3	1	-	40	60	100	4
3	CS4103	Network Security	3	1	-	40	60	100	4
4		Open Elective – I	3	1	-	40	60	100	4
5		Professional Elective - I	3	1	-	40	60	100	4
		Practical							
1	CS4104	Compiler Design	-	-	3	30	20	50	2
2	CS4105	Network Security	-	-	3	30	20	50	2
3	CS4106	Project (to be cont. in VIII Sem)	-	-	3	30	20	50	2
4	CS4107	Vocational Training (Viva –Cum-Seminar)					50	50	2
		TOTAL	15	5	9			700	28

IA- Internal Assessment
ESE – End Semester Examination

SCHEME FOR EXAMINATION
B.TECH (FOUR YEAR) DEGREE COURSE
FOURTH YEAR, COMPUTER SCIENCE AND ENGINEERING

SEMESTER- VIII

S.N	Code no.	Subject	Periods			Evaluation scheme			Credits
			L	T	P	IA	ESE	TOTAL	
1	CS4201	Data Mining	3	1	-	40	60	100	4
2	CS4202	GUI Programming (using VB.Net)	3	1	-	40	60	100	4
3	CS4203	Artificial Intelligence & Expert Systems	3	1	-	40	60	100	4
4		Professional Elective – II	3	1	-	40	60	100	4
		Practical							
1	CS4204	GUI Programming Net (using VB.Net)	-	-	3	30	20	50	2
2	CS4205	Project	-	-	12	90	60	150	6
		TOTAL	12	4	15			600	24

IA- Internal Assessment
ESE – End Semester Examination

Open Elective- I	Professional Elective – I
1. CS4108 MIS 2 CS4109 Introduction to Bio – Informatics 3 CS4110 Technology Management 4. CS4111 Total Quality Management 5 CS4112 Multimedia System Design. 6 CS4113 E –Commerce	1 CS4114 Digital Signal Processing 2 CS4115 Advanced Database 3 CS4116 Soft Computing 4. CS4117 Digital Image Processing 5. CS4118 Real Time System 6. CS4119 Cellular Mobile Communication 7 CS4120 Embedded system

Professional Elective – II
CS4206: ERP CS4207 : Software Testing & Quality Management CS4208 : Cyber Crime & Laws CS4209 : Pattern recognition CS4210 : Natural Language Processing CS4211 : Inter Networking TCP/IP CS4212 : Distributed systems

CS4101   COMPILER DESIGN

UNIT I
Overview of translation process. Lexical analysis: Hand coding and automatic generation of lexical analyzers.

UNIT II
Parsing theory: Top down and bottom of parsing algorithms. Automatic generation of parsers.

Intermediate code generation: Different intermediate forms. Syntax directed translation mechanism and attributed definition.

UNIT III
Run Time Theory Management: static memory allocation and stack based memory allocation schemes.
Symbol table management.

UNIT IV
Code Generation: Machine model, order of evaluation, registers allocation and code selection.

UNIT V
Code Optimization: Global data flow analyses, A few selected optimizations like command sub expression removal, loop invariant code motion, strength reduction etc.

TEXTS/REFERENCES:

- A.V.Aho, Ravi Sethi, J.D.Ullman, Compilers tools and Techniques, Addison Wesley,
- D.M.Dhamdhere, Compiler Construction-Principles and practice Macmillan, India,
- Tremblay J.P. and Sorenson, P.G. the theory and practice of compiler writing, Mc Graw Hil,
- Waite W.N. and Goos G., Compiler construction' springer verlag,

CS4102 WEB TECHNOLOGIES

UNIT I
Fundamentals of Web, History of the Web, Growth of the Web in post decade, Web function. Security aspects on he web, Computational features encompassing the Web. Working Web Browsers, concepts of search Engines, Searching the Web, Web Servers.

UNIT II
Internet: - Networks, Client & Server, WWW, URL, HTTP, Internet requirements, Internet Services, Internet Java Script introduction, operators, statements, loops, object manipulation, function, objects, events handler, always, events.

UNIT III
HTML: - Introduction, cascading style sheets, content positioning HTML content, Downloadable fonts, vising Java Script with positioned content, Layer object, Handling events using localized scripts, Animating images, VB script, Introduction, Adding VB script to Web Range, Working with variables, constants, arrays, objects, conditional statements loop statements, Forms.

UNIT IV
Active Server Page(ASP)Introduction , Hs Internet Information System , A authentication , Basic authentication , NT challenge response , active server page, asp objects , server objects , file system objects , session ,accessing database with an ASP page, create an ODBC ADO connection object, common methods & Properties events , collections ADO record set object.

UNIT V
XML :- Introduction, TO XML ,XML schemas ,DOM structure model, using XML queries. Building a path , sharing functions. Introduction of personal home page (PHP) design

Text /References Book:

- NP Akilandeswari "Web Technology" : A neveloper's perspechive " PHI"
  - C Xavier "Web Technology & Design"   Tata Mcgraw Hill

CS4103   NETWORK SECURITY

UNIT I
Services , Mechanisms ,and Attacks , The OSI Security Architecture , A Model for Network Security , symmetric cipher model , substitution techniques Transposition techniques, Rotor machines , Steganography .

UNIT II
Block ciphers and the data encryption standard , simplified DES , Block cipher principles , The data Encryption Standard ,The Strength of DEC. Differential and Linear Cryptanalysis ,Block Cipher Design principles ,Block Cipher Modes of Operation , Evaluation Criteria for AES The AES cipher , Triple DES , blowfish , RC5, Rc4 Stream Cipher ,

UNIT –III
principles of public –Key Cryptosystems , public –Key cryptosystems , Applications for public –Key Cryptosystems , Requirements for public –Key Cryptosystems , Public –Key Cryptosystems , The RAS Algorithm , Computational Aspects , The Security of RSA , Key management , Distribution of public keys , public –Key Distribution of Secret Keys , Differ –Hellmann Key Exchange,

UNIT-IV
Web Security :Web Security Threats , Web Traffic Security Approaches , SSL Architecture , SSL Record Protocol , Change Cipher Spec Protocol ,Alert Protocol , Handshake Protocol , Cryptographic Computations ,Transport Layer Security , Secure Electronic Transaction ,

UNIT V
Intruders : Intrusion Techniques ,Intrusion Detection , Audit Records , Statistical Anomaly Detection ,Rule –Based Intrusion Detection ,The Base –Rate Fallacy , Distributed Intrusion Detection , Honeypots , Intrusion Detection Exchange Format Firewall Design principles , Firewall Characteristics , Types of Firewalls , Firewall Configurations .

Books :
- Cryptography and Network Security, Principles and Practice Third edition , William Stallings .

CS4108   Management Information System

UNIT I
Introduction Of Information System, Fundamentals of Information System, Strategic Role of Information in Organisation and Management, Information System and Organisation , Business Process Re-Engineering .

UNIT II
Integration of Information, Decision Making Process , Models and Decision Support , Decision in business Areas , Strategic Analysis .

UNIT III
Information System Planning, Controlling Information System , Development of MIS Methodology and Tools/Techniques for Systematic Identification, Evaluation , Modification of MIS . Information System Success and Failure Implementation .

UNIT IV
Information System for Business Operations : Cross Functional Information System , A study of major Financial , Production , Human Resource Information System and Marketing Information System , Inventory, Management Information System.

UNIT V
Management of Information System and End - User Computing , Security and Ethical issues of Information System , Major issues in Information System , Auditing of Information System.

Reference Books
- Management Information System : Solving Business Problems with Information Technology by Gerald V,. Post and David L. Anderson [Tata McGraw - Hill Edition]
- Management Information System : Managing Information Technology in the Internet worked Enterprise by James A. O'Brien [Tata Mcgraw -Hill Edition , Fourth Edition]
- Management Information System : A Contemporary Perspective by Kenneth C. Laudon and Jane Price Laudon [Maxwell Macmilan International Editions]

CS4109 INTRODUCTION TO BIOINFORMATICS

UNIT I
Introduction The dawn of sequencing , What is bio informatics ?, The biological sequence/ structure deficit ,Genome projects , Status of the human genome project , why is bio informatics important.? Pattern recognition and prediction , The role of chaperones , Sequence analysis , Homology and analogy , the devil is in the detail , Further reading . Information networks
What is the Internet , How do computers find each other ? ,Facilities used on the Internet ,what is the World Wide Wed ? , web browsers , HTTP, HTML ,and URLs , The European Molecular Biology network –EM B net, the National Center for Biotechnology Information –NCBI ,Virtual tourism , Further reading , Web addresses .

UNIT I I
Protein information resources Biological databases , primary sequence databases , Composite protein sequence databases , Secondary databases , Composite protein pattern databases ,Structure classification databases , Further reading , Web addresses. Genome information resources
DNA sequence databases , Specialized genomic resources , Further reading , Web addresses

UNIT III
DNA Sequence Analysis   Why analysis DNA ? , Gene structure and DNA sequences , features of DNA sequence analysis , Issues in the interpretation of EST searches , Two approaches to gene hunting , The expression profile of a cell , cDNA libraries and EST s ,Different approaches to EST analysis , Effects of EST data on DNA databases , A practical example of EST analysis   Pair wise alignment techniques Databases searching , alphabets and complexity , Algorithms and programs , Comparing two sequences –a simple case , Sub- sequences , Identity and similarity , The Detplot , Local and global similarity ,Global alignment : the needle man and wunsch algorithm ,Local alignment : the Smith –Waterman algorithm ,Dynamic programming , pair wise databases searching .

UNIT I V
Multiple sequence alignment The goal of multiple sequence alignment , Multiple sequence : a definition , The consensus , Computational complexity , Manual methods , Simultaneous methods , Progressive methods , Databases of multiple alignments ,Searching databases with multiple alignments .Secondary a sequence search protocol Why bother with secondary database searches ? What's in a secondary databases.

UNIT V
Building a sequence search protocol ,A practical approach , When to believe a result , Structural and functional interpretation, Analysis packages   What's in an analysis package ? , Commercial databases , Commercial software , Comprehensive packages, packages special sing in DNA analysis , Intranet packages , Internet packages Further reading , Web addresses

Reference Books
- Gopal & Tones , BIOINFOMATICS with fundamentals of Genomics & profeomics , TMH pub .
- Rastogi , Bioinformatics – Concepts, Skill & Application CBS Pub
- Bergeron , Bioinformatics Computing PHI

CS4110 TECHNOLOGY MANAGEMENT

UNIT I
Introduction to technology Management , Business Strategy for New Technologies : Adding value, Gaining competitive advantage , timing and capability development

UNIT II
Technology Forecasting Techniques of Forecasting , Technology Forecasting – Relevance , Strategic alliance and practicality , and Technology transfer .

UNIT III
Management of Research , Development and Innovation ,Technology mapping , Comparison of types of R& D projects and development approaches -radical platform and Incremental projects, Innovation process.

UNIT IV
Management of Intellectual property Right Strategic value of patents ,Trade secrets and licensing ,Managing Scientist and Technologists, Identification ,Recruitment, Retention , team work and Result orientation Investment in Technology
Management roles and skills for New technology

UNIT V
Technology for managerial Productivity and Effectiveness , Just – in –Time .
Venture capital and Technology Development .

Laboratory :
- Technology forecasting and technology mapping
- Technology strategy development
- Exercise on Just –in – Time
- Case on venture capital

Recommended Books :
- Technology and management, Cassell Educational Ltd . London
- John Humbleton elsevoer , Management of High Technology Research and development .
- Charles W.L. hill / Gareth R . Jones , Strategic Management, Houghton Mifflin Co.
- S.A. Bergn , R& D Management , Basil Blackwell Inc
- Richard M. Burton & Borge Obel Elsevier, Innovation and Entrepreneurship in Organisations
- spyros Maksidakis & Steven C Wheelwright , The Bandbook of Forecasting – A management Guide , John Wiley & Sons
- C. Marle Crawford ,New product Management , IR WIN ,USA
- David Hutchin , Just –in –Time Grower Technical Press

CS4111 TOTAL QUALITY MANAGEMENT

UNIT I
Objectives, The major objectives of this course is to orient the participants in basic concepts and applications of total quality management. This course also aim at developing skills and competencies required for applying TQM in various sectors of economics and industrial development Quality and total quality management –concepts, definition and applications of TQM

UNIT II
Just-In-Time (JIT), JIT manufacturing and waste elimination, layout for JIT, Kanban, MRP Vs. JIT, JIT cause effect chain, JIT implementation and benefits, Total employees Involvement (TEI), Empowering Employee, team building Quality circles, transparent communication, Reward and recognition, Education and training, suggestion and schemes.

UNIT III
Statistical Process Control (SPC) 7 QC tools of problem solving 7 new tools, Advanced TQM tools, Control Charts. Benchmarking: Definition, concept, process and types of benchmarking.

UNIT IV
Quality Systems: Concept of Quality Systems Standard (QSS), Relevance and origin of ISO 9000 and ISO 14000, elements, benefits. Customer Satisfaction ,Internal and External customers, Quality chain, customer focus, satisfaction and delight, customer complain and redresser mechanism.

UNIT V
Quality Planning Process, Policy deployment and implementation plan formulation and implementation.
Process Management, Factors affecting process management, quality function development (QFD), quality assurance system and quality audit

Recommended Books:
- Total Quality Management by Dr.D.D.Sharma, Sultan Chand & Sons, New Delhi.
- Total quality management by Sunder Raju Tata Mcgraw Hill, Delhi.
- TQM for engineers by M. Zairi, Aditya Books.
- Environmental Engineering and Management by Dr. S.K. Dhameja.
- Total Quality Management handbook by JL Hradeky, McGraw Hill.
- M/s S.K. Kataria & Sons, Delhi.

CS4112   MULTIMEDIA SYSTEM DESIGN

UNIT I
An introduction, Multimedia elements, Multimedia Applications, Multimedia System Architecture, Evolving Technologies for Multimedia Systems, Defining Objects for Multimedia systems, Multimedia Data Interface Standard, The need for data Compression, Multimedia databases. Compression and Decompression, Types of compression, Binary Image Compression schemes, Color, Gray Scale, Still-video image Compression, Video Image Compression, Audio Compression, Fractal Compression.

UNIT II
Data and Format Standards, Rich-text Format, TIFF File Format, Resource Interchange File Format (RIFF), MIDI File Format, JPEG DIB File Format for still and Motion Images, MPEG standards, TWIN, Multimedia input/output Technologies, Key Technology Issues, Pen Input, Video and Image Display systems, Print Output Technologies, Image Scanners, Digital Voice and Audio, Digital Camera, Video Images and Animation, Full-Motion Video.

UNIT III
Storage and Retrieval Technologies, Magnetic Media Technology, Optical Media, Hierarchical Storage Management, Cache management for storage systems, Multimedia Application Design, Multimedia application classes, Types of multimedia systems, Virtual reality design, Components of multimedia systems, Organizing multimedia databases, Application workflow design issues, Distributed Application design issues.

UNIT IV
Multimedia Authoring and User Interface, Multimedia authoring system, Hypermedia application design consideration, User interface design, Object display/playback issues, Multimedia Operating Systems Introduction, real time, Resource management, process management, file systems, Additional operating systems issues.

UNIT V
Multimedia Database Systems Multimedia database management systems, Characteristics of MDBMS, Data analysis, Data structure, Operation on data, Integration on database model. Distributed Multimedia Systems Components of distributed multimedia systems, Distributed client server operation, Multimedia object servers, multiserver network Topologies, Distributed multimedia database, Managing distributed objects.

Laboratory
- Familiarization with the multimedia hardware.
- Installation of various multimedia components.
- Recording and playing back the sound at various parameters and judging quality.
- Write a programme which reads various video formats and play it.
- Write a programme which compresses and decompresses data using various compression techniques.
- Write a programme which reads AVI format and plays it.
- Workflow diagram for video conferencing, multimedia system.

Recommended Books :

- Prabhat K.Andleigh & Kiran Thakrar, multimedia system design, Prentice PTR, NJ.
- Ralf Steinmetz and Klara Nahrstedt multimedia computing communications and applications, innovating technology series by Pearson Edu. Asia.
- Jerry D.Gibson, multimedia communications directions & innovations, Harcourt India Pvt.Ltd.
- Borko, Handbook of multimedia computing,CRC Press.
- Mark J.Bunzel Sandra K.Morris, multimedia applications development McGraw Hill.
- Ze-Nian Li, Mark S.Drew, fundamentals of multimedia, by Pearson Edu. Asia

CS4113 E-COMMERCE

UNIT I
Electronic Commerce Basics The commerce in e-commerce , Internet Commerce , Models of Electronic Commerce , Managing Internet Marketing Marketing Channels The channels for the Net , Internet branding , A different pitch for the online advertising

UNIT II
CRM & Retailing Steps to make an online purchase Retailing in Internet Marketing
E- Commerce is indispensable The supply chain , Electronic Commerce and global business processes , the E- Commerce Eras , Market pricing , what should your e- Commerce site have , A minimum e- commerce site –in five easy steps

UNIT III
Transaction in Electronic Commerce How would you make an e-commerce deal safe ? , online money e cash , The steps to the Anatomy of a Transaction , The latest in e-commerce security , The actors in an electronic commerce transactions , More business through electronic commerce , Applications emerging on the Internet . The future Business –to Business Commerce Opportunity , Internet Commerce , Today and Tomorrow , The beginning : The Internet as a Retail Store , The future

UNIT IV
Legal aspects in Electronic Commerce Legal Issues ,Facilitating e-commerce through legislation ,Does internet commerce beats tax , New laws for e- commerce success in India , The legal future for e- commerce and e- tailing The dotcom world Launching an e- commerce site , A method in the dotcom pricing madness , Going public . The IPO Issue , Dotcom funding ,

UNIT V
Venture capital What is venture capital ? Getting venture funding structuring deal , Strocks and Shares , India venture Capital , Investment conditions and restrictions for a venture capitalist , The global Scenario , Venture Capital Issues , Other financing options
Case studies

- "EXPOPOINT .COM" – An Indian Portal , "e-cGurucool . COM" – An Indian portal .

CS4114   DIGITAL SIGNAL PROCESSING

UNIT I
Classification of Signals and systems Introduction, Classification of signals, Singularity Functions. Amplitude and Phase Spectra, Classification of System, Simple Manipulations of Discrete-time Signals, Representation of Systems, Analog-to-Digital Conversion of Signals. z-Transforms - Introduction, Defination of the z-transform, Properties of z-transform, Evaluation of the Inverse z-transform.

UNIT II
linear time invarient systems Introduction, Properties of a DSP System, Difference Equation and its Relationship with System Function, Impulse Response and Frequency Response, Frequency Response.

UNIT III
discrete and fast fourier transforms.Introduction, Discrete Convolution, Discrete-Time Fourier Transform (DTFT), Fast Fourier Transform (FFT). Computing of Inverse DFT by Direct DFT, Composite-radix FFT, Fast (sectioned) Convolution. Correlation.

UNIT IV
finite impulse response (fir) filters Introduction, magnitude response and phase response of digital filters. Frequency response of Linear phase FIR filters, design techniques for FIR filters, design of optimal linear phase FIR filters.
infinite impulse response (iir) filters Introduction, IIR filter designed by approximation of derivatives, IIR filter design by impluse invariant method, IIR filter design by the bilinear transformation, butter worth filters Chebyshev filters, Inverse Chebyshev filters, Elliptic filters, Frequency Transformation.

UNIT V
Realization of digital linear systems Introduction, basic realisation block diagram, singal-flow graph, basic structures for IIR systems, basic structures for FIR systems applications of digital signal processing ;
Introduction, voice processing, application of radar, applications to image processing , Introduction to Wavelets.

RECOMMENDED BOOKS:
* Digital signal processing- S. Salivahanan, A. Vallavraj, C. Gnanapriya;TMH
* Discrete time signal processing- A.V. Oppenheim, Schaffer.

CS4115   ADVANCED DATABASE DESGIN

UNIT I
Object Oriented Database
Need, object oriented data model, object oriented languages, President programming languages, President C++ and President Java Systems. Object Relational Databases Nested relations, complex types, Inheritance, Reference types, Qyuering with complex, types, junctions & procedures, object oriented versus object relational.

UNIT II
XML & Web Interfaces
Structure of XML data, XML Document Scheme, Querying and Transformation, Storage of XML data, Applications, Web Interfaces to Database, Performance tuning, performance benchmarks, standardization.

UNIT III
Distributed Databases
Homogeneous and heterogeneous, Distributed data storage, Distributed transactions, Commit protocols, Concurrency control in distributed databases, Distributed query processing, Heterogeneous distributed databases, Directory systems.   (10 hrs)

UNIT IV
Parallel Databases Introduction, I/O parallelism, Inter query parallelism, Intra query parallelism, intra operation parallelism, Inter operation parallelism.

UNIT V
Advanced Transaction Processing Transaction processing monitors, Transactional workflows, Main memory databases, Real time transaction systems, Long duration transactions, Transaction management in multi databases.

Recommended Books:
- C.J.Date, Introduction to database systems, Seventh edition, Pearson Education Asia.
- Elmasri & Navathe, Fundamentals of database systems, 3rd Edition, Pearson Education Asia.
- Silbersshetz, Korth, Sudarshan, Database system concepts, 4th edition, Mcgraw Hill.

CS4116   SOFT COMPUTING

UNIT I

Introduction to ANS technology: Elementary Neurophysiology, models of a neuron, neural networks viewed as directed graphs, feedback from neurons to ANS, artificial intelligence and neural networks.

UNIT-II

Learning & Training: Hebbian memory based, competitive, error-correction.
Learning Credit Assignment Problem: supervised and unsupervised learning, memory models, recall and adaptation, network architecture, single layered feed forward networks, multilayered feed forward networks, recurrent networks, topologies

UNIT-III

Activation and Synaptic dynamics, stability and convergence. A suevey of neutral network models: Single layered perception, least mean square algorithm, multi-layered perceptrons, back propagation algorithm XOR- problem, the generalized delta rule, BPN applications, Adalines and Madalines- Algorithm and applications.

UNIT-IV

Applications: The traveling salesperson problem, talking network and phonetic typewriter: Speech generation and Speech recognition, character recognition and retrieval, handwritten digital recognition.

UNIT-V

Adaptive fuzzy systems**:** Introduction to Fuzzy sets, and operations, Examples of Fuzzy logic, Fuzzy Associative memories, fuzziness in neural networks, comparison of fuzzy and neural Truck-Backer upper control systems.

Books Recommended:

- Artificial Neural Networks by **B. Yagna Narayan**
- Neural Networks by James A. Freeman and **David M.Strapetus**
- Neural Networks- A comprehensive foundation by **Simon Hay kin (LPE)**

CS4117   DIGITAL IMAGE PROCESSING

UNIT I
Introduction: digital image representation, elements of digital image processing systems,elements of visiual perception structure of human eye, simpleimage model, sampling and quantization, basic relationship between pixels, imaging geometry, photographic films.

UNIT II
Statistical Properties: Histogram means, standard deviation, profile different distributions. IMAGE TRANSFORM: One and two dimentional DFT the discrete cosine transform, hadamand transform, haar transform, slant transform.

UNIT III
Image Enhancement: Spatial and frequency domain methods points operations,contrast stretching, bit extraction, range compression, histogram equalization, modification local enhancement, image smoothing spatial operations, filtering multispectral, color image processing, Pseudo-color image enhancement.

UNIT IV
Image Restoration: degradetion model, Restoration in spatial domain geometric transformation spatial transformation, approach to restoration, Inverse & Wiener filtering, image compression: basic of image compression, models, elements of information theory, error free compression, lossy compression, image segmentation, line detection, edge detection, edge linking and boundary detection, thresholding & region oriented segmentation.

UNIT V
Image Analysis: boundary extraction, boundary representation, region representation structure shape feature, texture, scene matching & detection. APPLICATION OF IMAGE PROCESSING: Charector recognisation, diagram understanding , medical imaging, scientific analysis, military guidance & reconnaissance remote sensing, telecommunication.

Reference Books:
- Gonzawlez & woods, digital image prcessing addison wesley, 1992.
- Pratt, digital image image processing wiley int. 1991.
- Sid ahmed digital image prcessing McGraw Hill, 1995.

CS4118   REAL TIME SYSTEM

UNIT I
Typical Real Time:
Application Digital control High-level control, signal processing,Other Real time Application hard verses soft real time system jobs and processors, release times, deadlines, and timing constraints, hard and soft timing constraints, hard real time system, soft real time systems.

UNIT II
A Reference Model Of Real Time Systems:
Processors and resources, temporal parameters of real-time workload, periodic task model, precedence constraints and data dependency, other type of dependencies, functional parameters, resourse parameters of jobs and parameters of resources, scheduling heirarchy commonly used approaches to real-time scheduling Clock-driven approach, weighted round robin approach, priority driven, approach, dynamic versus static system, effective release times and deadlines. Optimative of the EDF and LST algorithms, non optimality of the EDF and the LST algorithms, challenges in validating timing constraints, in priority-driven system Off-line versus On-Line Scheduling.

UNIT III
Clock-Driven Scheduling:
 Notations and assumptions, static, timer-driven scheduler, general structure of cyclic schedules, cyclic executives, improving the average response time of a periodic jobs, practical considerations and generalizations, aigorithm for constructing static schedules, prons and cons of clock-driven scheduling priority-driven scheduling of periodic tasks static assumption, fixed priority versus dynamic priority algorithm maximum schedulable uutilization, optimality of the RM and DM algorithms. A schedulabilty test for fixed priority tasks, with short response times sufficient schedulability condition for the RM and DM algorithm.

UNIT IV
Scheduling Aperiodic And Sporadic Jobs In Priority-Driven Systems:
Assumption and approches, deferrable server, sporadic server, constant utilisation. Total bandwidth, and weighted, fair-queuing server slackstealing in deadline driven system? Slack stealing in fixed-priorty system. Scheduling of sporadic jobs, real-time performence for jobs withsoft timing constraints, A two-level scheme for intergrated scheduling resources and resourse access control assumptions on resources and their usage, effect of resourse contention and resourse access control, nonpremptive critical sections, basic priority inheritance protocol, basic priority ceiling protocol, stack based, priority ceiling (ceiling priority) protocol, use of pririty ceiling protocol in dynamic priority system, preemption ceiling protocol, controlling accesses to multiple unit resourses, controlling concurrent accesses to data objects.

UNIT V:
Tiprocessor Scheduling, Resource Access Control, And Synchronization:
Model of multiprocessor and distributed system, task assignment, multiprocessor priority ceiling protocol, foment of scheduling algorithm for end-to-end periodic task, schedulability of fixed priority end-to-end periodic task, end-to-end task in heterogeneous system, predictability and validation of dynamic multiprocessor system scheduling flexible computations and tasks with temporal distance constraints.

flexible applications, tasks with temporal distance constraints REAL-TIME communications model of real-time communication. Priority-based service disciplines for switched networks, weighted round-robin service disciplines, medium access control protocol of broad-cast networks, internet and resourse reservation protocols, real-time protocol, communication in multicomputer system.
 OPERATING SYSTEM Overview ,time services and scheduling mechanisms, other basic operating system fuctions, processor reserves and resources kernal, open system architecture, capabilities of commercial real-time operating system

Reference Books:
- Jane W.S.Liu.pearson education India.

CS4119 : CELLULAR & MOBILE COMMUNICATION

UNIT 1:
Introduction to cellular mobile system A basic cellular system , performance criteria Uniquences of Mobile radio Environment, Operation of cellular system , planning and cellular system , Analog and digital cellular systems.
Element of cellular radio system design : General description of the problem , Concept of frequency channels, Co channel interface reduction factor , cell splitting , Consideration of the components of cellular systems.

UNIT 2 :
Interface: Introduction to Co-channel interface , Real time Co-channel interface Co-channel measurement , Design of antenna system , Antenna parameter and their effects , diversity receiver non co-channel interface- different types.

UNIT 3 :
Cell Coverage For Signal And Traffic : General introduction , obtaining the mobile point –to –point mode propagation over water or flat open area , foliage loss, propagation near in distance , long distance propagation ,point –to –point predication model –characteristics ,cell site, antenna heights and signal coverage cells, mobile –to mobile propagation.

UNIT 4 :
Cell Site Antennas And Mobile Antennas :
Characteristics , Antennas at cell site , Mobile antennas .
Frequency management and Channel Assignment : Frequency management, fixed channels assignment , non fixed channel assignment, Traffic and channel assignment .

UNIT 5 :
Hand –off , Dropped Calls: Why hand –off , types of hand off and their characteristics , Dropped call rates and their evaluation .
Operational Techniques: Parameters, Converge hole filter, leaky feeders , Cell splitting and small cells , Narrow beam concept.

Reference Books :
- Cellular and mobile Communication by Lee (McGraw Hill)
- Wireless Digital Communication by dr. Kamilo Faher (PHI)

CS4120   EMBEDDED SYSTEMS

UNIT I
Hardware Fundamentals: Gates , timing diagram , memory , microprocessor , buses , DMA, Interrupts:- Microprocessor architecture , interrupt basics, interrupt latency, shared data problem . System partitioning building the architectural model, Input and output processing , Hard ware and software partitioning Timing requirements.

UNIT II
Microprocessor selection, Microprocessor versus Micro- controller analysis CISC versus RISC Study of major embedded processor architectures Memory design , system optimization . Architecture for Embedded software :- Round robin, round robin with interrupts , function queue scheduling real time operating system .

UNIT –III
Real Time Operating System:
 Tasks and task states, task and data, semaphores and shared data, Operating system services :- Inter task communication , timer services. Memory management ,event and interaction between interrupt routines and real time operating system . Software selection issues , selecting an RTOS TROS performance metrics . RTOS scalability and tool support ,compiler selection .

UNIT –IV
Embedded System Design Using A Real Time Operating System:
Encapsulating semaphores and queues hard real time scheduling considerations saving memory space .

UNIT- V
Development tools and debugging:
Host and target machines, linker / locators , target system , testing instruction set, assert , macro. Establishing a software development environment C runtime environments embedded debuggers cross – development methods embedded file formats, readers Creating object files the process loading software into remote targets .

References :-
- "an embedded software primer " by David E Simon ISBN 0201- 61569-X
- "Embedded system Design " by Around S. Berger ISBN 1- 57820-073-3

CS4201   DATA MINING

UNIT-1
Data ware Housing :-
What is a data warehouse ?, definition ,Multidimensional data model, OLAP operation , warehouse schema ,data ware housing architecture, warehouse serve ,metadata , OLAP , engine ,Data warehousing backend process, other features.

Data Mining:- what is data mining ? KDD Vs. data mining ,DBMS Vs DM other related areas , DM techniques , other mining problem , issues & challenges in DM , Dm application areas.

UNIT-II
Association rules:- what is an association rule ? , methods to discover association rules, a priori algorithm ,partition algorithm, pincer –search algorithm , Dynamic Itemset counting algorithm , FP-tree Growth algorithm , Incremental algorithm, Border algorithm , generalized association rules, Association rules with item constraints .

UNIT-III
Clustering Techniques:-
 Introduction , clustering paradigms , partitioning algorithms, k-Medoid Algorithm, CLARA ,CLARANS , Hierarchial clustering , DBSCAN , BIRCH, CURE, Categorical clustering algorithms , STIRR, ROCK , CACTUS,

UNIT -IV
Decision Trees: - what is a Decision tree? Tree construction principal , Best spilt splitting indices, splitting criteria , Decision tree construction algorithm, CART, ID3, C4.5 , CHAID , Decision tree construction with presorting , rainforest, approximate method , CLOUDS, BOAT , pruning technique , integration of pruning & construction .

UNIT-V
What is neural network ? Learning in NN, unsupervised learning , data mining using NN , genetic algorithm ,Rough sets, Support Vector machines.
Web Mining :- Web mining ,web content mining ,web structure mining ,web usage mining ,text mining , unstructured text , Episode rule discovery for texts , Hierarchy of categories , text clustering .

Books & References :-
- Data Mining Techniques – Arun K Pujari Universities Press
- Data Mining Concepts & Techniques – Jiawei Han , Micheline Kamber Morgan Kaufmann Publisher Elsevier India
- Data Mining Methods For Knowledge Discovery –Cios , Pedrycz , Swiniarski Kluwer Academic Publishers London

CS4202   GUI Programming (using VB.Net)

UNIT –I
Introduction to .Net Framework , Understanding web programming web browser and web server , How to create HTML page and HTML forms .Role of Net in web development , NET framework and platform base classes , XML as Dot Net Meta language , relation with COM , overview OF CLR , Dot NET class frame , an overview of DOT NET components .
IDE OF VB.NET –menu bar , toolbars, project Explorer , toolbox , properties window , from designer, from layout , Immediate window , visual Development and Event –Driven Programming –Event Driven programming method and events , Concept of VB.NET project, types of VB .NET project , opening and saving the projects, Elements of the user interface, Designing the interface , Creating forms and code modules ,Running the application, Grouping controls, Customizing The Environment –Editor tab ,format tab general tab ,docking tab ,environment tab , working with forms, loading , showing and hiding forms, Controlling one form within another .

UNIT –II
Variables – Declaring variables , Types of variables Converting variables types, User- defined data types, special values ,Forcing variables declarations , Scope and lifetime of a variables , Constants ,Arrays ,Types of array ,control array ,collections ,procedures, subroutines ,Functions. Control flow statements and conditional statements, Loop statements, Designing menus and popup menus , programming menu commands ,using access and shortcut keys , Using message box and input , Using standard modules .

UNIT –III
The text box control –Tex selection, Search and replace operations, The List box Combo controls, Indexing with the List box controls, Searching a Sorted list , The scroll bar and slider controls, using the common dialog controls, Color common dialog box , Font common dialog box , the file open and save common dialog boxes, print dialog box , Help common dialog box , The file controls,

UNIT –IV
Classes , instances , objects, Encapsulation and abstraction , Derived classes and lose classes , classes in Object linking and embedding (OLE) OLE at runtime , OLE control, Graphics , with visual Basic . NET , from , picture box and image box controls sizing images , loading saving images, coordinate systems, scale properties and methods. The drawing methods : drawing text ,drawing , drawing boxes filling, Drawing curves , manipulating pixels , specifying colors, using timer controls, Multiple Document Interface (MDI) , MDI- built –in capabilities , Parents –child menus , Objects and instances , Loading and unloading of child forms, New and open commands .

UNIT- V
Windows management , Graphics device interface , Accessing the win 32 API from VB.NET , Dynamic –link – libraries (DLL) ,Declaring a DLL procedure , calling a DLL Procedure ,Special considerations when calling DALL with special data types, the bitmaps and graphics API functions system API functions
Programming and interfacing with Office 97 –
Programmer with objects, the New VB for applications (VBA) Editor . Automating office applications spell- checking documents , working with excel objects .

Text & Reference Books:-

- APPLICATIONS Development using visual Basic . NET by Robert J. Oberg peter Thorsteinson , Dana L. Wyatt
  Other book will be recommend at the beginning of the semester .

CS4203   ARTIFICIAL INTELLIGENCE & EXPERT SYSTEMS

Unit I
Basic Problem solving methods: Production systems-state space search, control strategies, Heuristic search, forward and backward reasoning, Hill climbing techniques, Breadth first search, Depth first search, Best search, staged search.

Unit II
Knowledge Representation: Predicate logic, Resolution question Answering, Nonmonotonic Reasoning, statistical and probabilistic reasoning, Semantic Nets, Conceptual Dependency, frames and scripts.

Unit III
AI languages: Important characteristics of AI languages - PROLOG, LISP.

Unit IV
Introduction to Expert Systems: Structure of an Expert system interaction with an expert, Design of an Expert system.

Unit V
Neural Network: Basic Structure of a neuron, Perception Feed forward, Back propagation, Hopfield Network.

Reference Books:
- Rich E and Knight K - Artificial Intelligence, TMH New Delhi.
- Nelsson N.J. - Principles of Artificial Intelligence, Springer Verlag, Berlin.
- Barr A, Fergenbaub E.A. and Cohen PR. Artificial Intelligence, Addisonwesley, Reading (Mars) 1989.
- Waterman D.A. A guide to Expertsystem, Adision - Wesley, Reading (Mars) 1986.
- Artificial Intelligence Hand book, Vol. 1-2, ISA, Research Triangle Park 1989.
- Kos Ko B Neural Networks and Fuzzy system -pH.
- Neural Network Design, Martin Hagar, Vikas-Thomson Learning, Vikas Pub. House Pvt. Ltd., Delhi.
- Expert Systems: Principals & Programming, Joseph Giarrantons & Rilay, Vikas – Thomson Learning, Vikas Pub. House Pvt. Ltd., Delhi.

CS4206 ENTERPRISE RESOURCE MANAGEMENT   (ERP)

UNIT I
Function of Business Organizations : Personnel management, Financial management, marketing management, Sales order Processing , Manufacturing managements , Human Resource Management etc , data and information , Operation of functional areas. Integrated view of ERP

UNIT II
Technologies of ERP : knowledge based system , Decision support system , Executive information system , Electronic commerce, , Databases system , Business Engineering , Business process Engineering , Networking , 3 tier and 2 tier architecture.

UNIT III
Management information system : MIS ,data & information . levels of Management , information requirement , objectives of information channels, information strategies

UNIT IV
Information and planning : Resource management benefit of management planning process objective and its characteristic , policy and procedures ,forecasting and its varies aspects . Scheduling , MRP , MRP-II

UNIT V
 ERP implement issues : software development life cycle , pre Evaluation schemes , post implement issues case studies .

Reference Book :
- Management Information Systems : Louden & Louden
- ERP by Garg and Ravichandran
- Information System and MIS : J Kanter
- Management Information System : Jawardekar

CS4207- SOFTWARE TESTING AND QUALITY MANAGEMENT

UNIT I
Software Quality
Ethical Basis for software Quality , Total quality Management Principles, Software Processes and Methodologies , Quality Standards , Practices & conventions

UNIT II
Software management
Reviews and Audits . Enterprise Resource Planning Software , Measurement Theory , Software Quality Metrics, designing Software Measurement Programs , Organizational Learning.

UNIT III
Improving Quality with methodologies
Structured information Engineering , Object-Oriented Software , Reverse Engineering , Measuring Customer Satisfaction Defect Prevention , Reliability Models , Reliability Growth Models .

UNIT IV
 Software Quality Engineering
Defining Quality Requirements Management , Complexity Metrics and Models, Management issues for software Quality , Project Tracking and Oversight , Use of CASE tool Technology , Role of Groupware , data Quality Control.

UNIT V
Project Configuration management
Configuration Management Concepts, Configuration Management Process, Document Control, Configuration Management plan of the WAR Project.

Software Testing
Unit , Integration & System testing , Benchmarking and Certification .

Recommended Books:
- Stephan Kan, Metrics and Models in Software quality, Addison Wesley.
- Mark Paulik, The capability Maturity Model-guidelines for Improving the software Process, Addison Wesley.
- Michael, Deutsch, Willis, Ronald r-Software Quality Engineering- A Total Technical and Management approach, Prentice Hall.
- Ginac, Frank P, Customer Oriented Software Quality Insurance, Prentice Hall.
- Wilson, Rodney C, Software RX secrets of Engineering Quality Software, Prentice Hall.
- Pressman, Software Engineering-A practitioner's approach
- Pankaj Jalote, CMM Project

CS4208 :   CYBER CRIME AND LAWS

Unit I
Introduction to Cyber Law Evolution of Computer Technology, emergence of Cyber space. Cyber Jurisprudence, Jurisprudence and law, Doctrinal approach, Consensual approach, Real Approach, Cyber Ethics, Cyber Jurisdiction, Hierarchy of courts, Civil and criminal jurisdictions, Cyberspace-Web space, Web hosting and web Development agreement, Legal and Technological Significance of domain Names, Internet as a tool for global access.

Unit II
Information technology Act Overview of IT Act, 2000, Amendments and Limitations of IT Act, Digital Signatures, Cryptographic Algorithm, Public Cryptography, Private Cryptography, Electronic Governance, Legal Recognition of Electronic Records, Legal Recognition of Digital Signature, Certifying Authorities, Cyber Crime and Offences, Network Service Providers Liability, Cyber Regulations Appellate Tribunal, Penalties and Adjudication.

Unit III
Cyber law and related Legislation Patent Law, Trademark Law, Copyright, Software – Copyright or Patented, Domain Names and Copyright disputes, Electronic Data Base and its Protection, IT Act and Civil Procedure Code, IT Act and Criminal Procedural Code, Relevant Sections of Indian Evidence Act, Relevant Sections of Bankers Book Evidence Act, Relevant Sections of Indian Penal Code, Relevant Sections of Reserve Bank of India Act, Law Relating To Employees And Internet, Alternative
Dispute Resolution , Online Dispute Resolution (ODR).

Unit IV
Electronic Business and legal issues: Evolution and development in E-commerce, paper vs paper less contracts E-Commerce models- B2B, B2C,E security.

Unit V
 Application area **:** business, taxation, electronic payments, supply chain, EDI, E-markets, Emerging Trends

Text Book:
1 Cyber Laws: Intellectual property & E Commerce, Security- Kumar K, dominant Publisher
2 Information Security policy &implementation Issues, NIIT, PHI

Reference Books:

- Cyber CRIME notorious Aspects of the Humans & net Criminals activity in Cyber World Barna Y Dayal D P Dominant Publisher
- Cyber Crime Impact in the new millennium, Marine R.C. Auther press
- Spam Attack, Cyber Stalking & abuse, Barna Y, Dayal D P Dominant publisher
- Frauds & Financial criouses in Cyber space, Barna Y, Dayal D P , Dominant publisher
- Information Security , NIIT: PHI

CS4209 PATTERN RECOGNITION

UNIT I
Introduction; Probability- Probability of events, Random Variables, Joint distributions and density , Moments of Random Variables, estimation, Minimum Risk Estimator.; Matrix Algebra – Eigen values & Eigen Vectors.

UNIT II
Statistical Decision Making- Bayes' Theorem, Multiple features, Conditional independent features, Decision boundaries, Unequal cost of errors, Leaving- one-out technique, Characteristics curves Nonparametric Decision making- Histograms, Kernel & window estimation, Nearest neighbor classification technique, Adaptive Decision boundaries & Discriminate Function, choosing a decision making Technique; Clustering.

UNIT III
Artificial Neural Networks- Introduction, Nets without hidden layers, Nets with hidden layers, The Back-Propagation Algorithm, Hopfield Nets, Classifying Sex from facial Images.
Pattern recognition using SAS.

UNIT IV
Processing of Waveforms and Images- Introduction, Gray level scaling Transformation, Equalization, Interpolation, Edge detection, Line detection & Template Matching, The Statistical Significance of Image Features.

UNIT V
Image Analysis- Scene segmentation & labeling, Counting Objects, Perimeter measurement, Representing boundaries, Projection, Hough transformation, shapes of regions, texture, color, system design, the classification of white blood cell, Image Sequence

Text Books:
- Pattern Recognition And Image Analysis By Earl Gose ; Prentice- Hall Of India
- M. I. Schlesinger, V. Hlavác, *Ten Lectures On Statistical And Structural Pattern Recognition*,Kluwer Academic Publishers, 2002.

References:
- S. Theodoridis, K. Koutroumbas, *Pattern recognition*, Academic Press, 1999
- J. Sklanski and G.N. Wassel, *Pattern Classifiers and Trainable Machines*, Springer, New York
- Foryth , Computer Vision, PHI

CS4210 NATURAL LANGUAGE PROCESSING

Unit-I
Introduction to Natural Language Understanding: The study of Language, Applicationsof NLP, Evaluating Language Understanding Systems, Different levels of Language Analysis, Representations and Understanding, Organization of Natural language Understanding Systems, Linguistic Background: An outline of English syntax.

Unit-II
Introduction to semantics and knowledge representation, Some applications like machine translation, database interface.

Unit-III
Grammars and Parsing: Grammars and sentence Structure, Top-Down and Bottom-Up Parsers, Transition Network Grammars, Top-Down Chart Parsing. Feature Systems and Augmented Grammars: Basic Feature system for English, Morphological Analysis and the Lexicon, Parsing with Features, Augmented Transition Networks.

Unit-IV
Grammars for Natural Language: Auxiliary Verbs and Verb Phrases, Movement Phenomenon in Language, Handling questions in Context-Free Grammars. Human preferences in Parsing, Encoding uncertainty, Deterministic Parser.

Unit-V
Ambiguity Resolution: Statistical Methods, Probabilistic Language Processing, Estimating Probabilities, Part-of-Speech tagging, Obtaining Lexical Probabilities, Probabilistic Context-Free Grammars, Best First Parsing. Semantics and Logical Form, Word senses and Ambiguity, Encoding Ambiguity in Logical Form.

Reference Books:
- Akshar Bharti, Vineet Chaitanya and Rajeev Sangal, *NLP: A Paninian Perspective*, Prentice Hall, New Delhi
- James Allen, *Natural Language Understanding,* 2/e, Pearson Education, 2003
- D. Jurafsky, J. H. Martin, *Speech and Language Processing*, Pearson Education, 2002
- L.M. Ivansca, S. C. Shapiro, *Natural Language Processing and Language Representation*
- T. Winograd, *Language as a Cognitive Process*, Addison-Wesley

CS4211 INTERNETWORKING TCP/IP

UNIT –I
INTRODUCTION
Introduction to internetworking, Overview of OSI Model TCP/IP protocol suite, Basics of switching technologies and switches, Comparisons of different models, Gateways.

UNIT – II
INTERNET PROTOCOL
Purpose of Internet Protocol, Internet datagram, Options, Checksum, ARP and RARP, Routing Methods: Routing Table and Routing module, ICMP, IGMP.
IP Addresses: Introduction, Address Classification, A sample internet with classful addressing, Subnetting, Supernetting, Classless addressing, Security at the IP Layer, IPSec, IPv4 and IPv6 packet formats.

UNIT –III
ROUTING PROTOCOLS: UNICAST ROUTING PROTOCOLS
Interior and Exterior routing, RIP, OSPF, BGP, **Multicasting:** Introduction, Multicast Routing, Multicast Routing Protocols, Multicast Trees, DVMRP, MOSPF, CBT, PIM, MBONE.

UNIT –IV
TRANSPORT CONTROL PROTOCOL: TCP
TCP operation, Segment, Sliding window, Silly window, Options, TCP state machine, Karn's Algorithm, Congestion control- Leaky bucket and Token bucket algorithms.
UDP: User Datagram, UDP operations, Checksum calculation.

UNIT-V
TCP/IP OVER ATM NETWORKS
ISDN and B-ISDN, ATM reference model, ATM Switch, Interconnection Network, Virtual circuit in ATM, Paths, Circuits and identifiers, ATM cell transport and adaptation layers, packet type and multiplexing, IP Address binding in an ATM Network, Logical Subnet Concept and Connection Management.

Text Book:
- Internetworking with TCP/IP by Comer (Vol. 1)(PHI Pub.)
- TCP/IP Protocol suite by Behrouz A. Forouzan.(TMH Pub.)

Reference Book:
- Computer Networking by James F. Kurose, Keith W. Ross (Pearson Education)
- TCP/IP Illustrated By Wright and Stevens (Vol.2) (Pearson Education)
- An Introduction to Computer Networks by Kenneth C. Mansfield Jr. James L. Antonakes (PHI)