WITH EFFECT FROM THE ACADEMIC YEAR 2002-2003

SCHEME OF INSTRUCTION & EXAMINATION

B.E III YEAR (REGULAR)

(INFORMATION TECHNOLOGY)

SEMESTER - II

Sl. No.	Syllabus Ref.No	SUBJECT	Scheme of Instructions		Scheme of Examination		
			Periods per Week		Dura-tion in Hrs	Maximum Marks	
			L/T	D/P		Univ. Exam	Sessi-onals
		THEORY					
1.	BIT 351	Neural Networks and Fuzzy Logic	**4**	**-**	**3**	**75**	**25**
2.	BIT 352	Real Time Systems	**4**	**-**	**3**	**75**	**25**
3.	BIT 353	Computer Networks	**4**	**-**	**3**	**75**	**25**
4.	BIT 354	Image Processing	**4**	**-**	**3**	**75**	**25**
5.	BIT 355	Software Engineering.	**4**	**-**	**3**	**75**	**25**
		ELECTIVE – I	**4**	**-**	**3**	**75**	**25**
1.	BIT 356	Theory of Automata					
2.	BIT 357	Network Security					
3.	BIT 358	Parallel Computing					
		PRACTICALS					
1.	BIT 381	Networking Practicals	**-**	**3**	**3**	**50**	**25**
2.	BIT 382	Real Time Systems Practicals	**-**	**3**	**3**	**50**	**25**
3.	BIT 383	Mini Project	**-**	**3**	**-**	**-**	**25**

		TOTAL	**24**	**9**	**-**	**550**	**225**

BIT-351

NEURAL NETWORK AND FUZZY LOGIC

Instruction	4 Periods per week
Duration of Examination	3 Hours
University Exam.	75 Marks
Sessionals	25 Marks

Unit –I

Basic neural computation models: Network and node properties. Inference and learning algorithms.

Unsupervised learning: Signal hebbian learning and competitive learning. Supervised learning: Back propagation algorithms.

Unit –II

Self organizing networks: Kohonen algorithm, bi-directional associative memories.

Hopfield Networks: Hopfield network algorithm.

Adaptive resonance theory: Network and learning rules. Neural network applications.

Unit –III

Fuzzy Sets: Operations and properties.
Fuzzy Relations: Cardinality, Operations and properties.
Value Assignments: Cosine amplitude and max-min method.
Fuzzy classification: Cluster analysis and validity, Fuzzy e-means clustering, hardening the Fuzzy e-partition.

Unit –IV

Fuzzification, Membership value assignments: Inference, rank ordering and angular Fuzzy sets, defuzzification methods, fuzzy logic, approximate reasoning.

Fuzzy –based systems: Canonical rule forms, decomposition of compound rules, likelihood and truth qualification, aggregation of Fuzzy rules, graphical techniques of inference.

Unit –V

Non linear simulation using Fuzzy rule-based systems, Fuzzy associative memories. Decision making under Fuzzy states and Fuzzy actions. Fuzzy grammar and syntactic recognition. General Fuzzy logic controllers, special forms of Fuzzy logic control system models, examples of Fuzzy control system design and control problems, industrial applications.

Suggested Reading:

1. Limin Fu. "Neural Networks in Computer Intelligence" McGraw Hill, 1995.
2. Freeman J.A., and Skapura D.Mu.. "Neural Networks Algorithms applications and Programming Techniques", Addison Wesley New York,1991.
3. Timoty J. Ross, "Fuzzy Logic with Engineering Applications", McGraw Hill1997.
4. Bart Kosho "Neural Network and Fuzzy Systems", Prentice Hall of India,1994.

BIT-352

REAL TIME SYSTEMS

Instruction	4 Periods per week
Duration of Examination	3 Hours
University Exam.	75 Marks
Sessionals	25 Marks

Unit –I

Definitions of real time systems, Typical real time applications, Hard versus soft real time systems, a reference model of Real -Time systems, commonly used approaches for real time scheduling.

Unit –II

Real time system life cycle, structured design approaches including even-based, process-based and graph based theoretical model, Real -Time programming. Ada as a real time programming language.

Unit –III

Real time operating systems, overview, time services and scheduling mechanisms, other basic operating system functions, capabilities of commercial real time operating systems.

Unit –IV

Real time data bases vs. general purpose databases, main memory databases, transactions and concurrency control issues, disk scheduling algorithms, predictability, serialization, consistency, databases for hard real time systems.

Unit –V

Fault tolerance techniques, definitions, fault types, fault detection , fault and error containment, redundancy, integrated failure handling.

Suggested Reading:

1. Jame W.S. Liu, "Real Time Systems", Pearson Education Asia-2001.
2. Shem Tov Levi & Ashok K. Agrawala, "Real Time System Design ", McGraw Hill publishing Company-1990.
3. C .M. Krishna and Kang G. Shin. "Real Time Systems ", McGraw Hill Com., 1997.

BIT-353

COMPUTER NETWORKS

Instruction	4 Periods per week
Duration of Examination	3 Hours
University Exam.	75 Marks
Sessionals	25 Marks

Unit-I

Introduction: Uses of computer networks, network hardware, network software, reference models (ISO-OSI. TCP/IP) Medium access control sub layer.
Multiple access protocols: CSMA Protocols, collision free protocols, wireless LAN protocols, Ethernet.
Wireless LANs: 802.11 protocol stack, MAC sub layer protocols, frame structure. Broad band wireless protocol stack. MAC sub layer protocol, frame structures. Bluetooth: Architecture, applications, protocol stack, frames structures.

Unit –II

Network Layer Design issues, services, internal organization (virtual circuits and data grams). Routing Algorithms: Optimal routing, shortest path routing, flooding distance vector & link state routing, hierarchical routing, broadest and multicast routing, routing in Ad Hoc networks. Congestion Control Algorithms: Principals of Congestion control, prevention policies, congestion control in virtual circuits and datagram subnets, load shedding and jitter control. Internetworking: Concatenated virtual circuits, connectionless internetworking, tunneling, inter network routing, fragmentation.
Network layer in the Internet: IP protocol, IP addressees Internet control protocols, internet multicasting mobile IP, quality of Service.

Unit –III

Transport Layer: Service provided to the upper layers, transport service primitives, Elements of transport protocols: Addressing, connection management, multiplexing and cash recovery.
Internet transport protocol (TCP. UDP): TCP Service mode, protocol, header, connection management, congestion control, timer management. Wireless TCP and UD Real-Time Transport Protocol.

Unit –IV

Application Layer
Domain name systems: DNS name space, recourse records, name servers.

Electronic mail: Architecture and services, user agent, message formats, message transfer and final delivery.
World Wide Web: Architectural overview static web documents, dynamic web documents, HTTP, wireless web, voice over IP.

Unit –V

Network security: Cryptography, symmetric key algorithms, public -key algorithms, Digital signature, communication security, authentication protocols, e-mail, security, web security. Network management: Need for network management, infrastructure SNMAP Protocol and operations, ASN.1 notation.

Suggested Reading:

1. Andrew S. Tanenbaum, "Computer Network ", 4th Edn. Pearson Education Asia, 2003.
2. James F. Kurose, Keith, "Computer Networks ", 2nd Edn. Pearson, 2002.

BIT-354

IMAGE PROCESSING

Instruction	4 Periods per week
Duration of Examination	3 Hours
University Exam.	75 Marks
Sessionals	25 Marks

Unit –I

Image processing : Introduction , examples, fundamental steps components.
Elements of visual perception, light & electromagnetic spectrum, image sensing & acquisition. Image sampling and quantization, basic relationships between pixels.
Image enhancements: Gray level transformation, histogram processing, arithmetic or logic operation, basics of spatial filters, smoothing spatial filters, sharpening spatial filters.

Unit –II

Fourier transforms and frequency domains, frequency domain filters, smoothing sharpening, homomorphic implementation.

Image restoration: Noisy models, restoration in the presence of noise only, spatial filtering. Periodic noise reduction by frequency domain filtering. Linear position, invariant degradations, estimating the degradation function, inverse filtering, min mean square error filtering, constrained least squares filtering, geometric, mean filtering. Geometric transformations.

Unit –III

Color image processing: Color fundamentals, color models, pseudocolor image processing, basics of full-color image processing, color transformations, smoothing and sharpening, color segmentation, noise in color images, color image compression.

Wavelets and milt resolution processing: Background, multiresolution expansions, wavelet transforms in one dimension, the fast wavelet transform, wavelet transforms in two dimensions, wavelet packets.

Unit –IV

Image compression: Fundaments, image compression models, elements of information theory, error-free compression, lossy compression, image compression standards.

Morphological image processing: Preliminaries, dilation and erosion, opening and closing, the hit-of-miss transformation, some basic morphological algorithms, extensions to gray-scale images.

Unit –V

Image segmentation: Detection of discontinuities, edge linking and boundary detection, Thresholding, region-based segmentation, segmentation by morphological watersheds, the use of motion in segmentation.
Object recognition: Patterns and pattern classes, recognition based on decision-theoretic methods, structural, methods.

Suggested Reading:

1. Rapel C Gonzalez and Richard E Woods. "Digital image Processing ", Pearson Education, 2nd Edtn., 2002.
2. William K. Pratt, "Digital Image Processing ", John Wiley & Sons Inc. 3rd Edtn. 2001.

BIT-355

SOFTWARE ENGINEERING

Instruction	4 Periods per week
Duration of Examination	3 Hours
University Exam.	75 Marks
Sessionals	25 Marks

Unit –I

Overview of system and software development life cycle system. Characteristics, problems in large system development. System engineering. System analysis, overview of system development, software development, lifecycle model, other models.

Analysis: Software requirement specification, structural approach to requirement analysis characteristics.
Data dictionary, decision support tools. DFD. FSM petrinets.

Unit –II

Design: Design requirement and criteria, levels, objectives, Input/ Output approach to design, generic design steps, and component design specification.
Implementation: Programming style and quality.

Unit –III

System Test and Integration: Test plan, levels of testing. Testing process. Module level testing Integration testing. System testing. Acceptance testing. Alpha and Beta testing.

Unit –IV

Software maintenance, tools, attributes, reverse engineering.
Software metrics: Function point, Feature point. SLOC process attributes and product attributes.

Unit –V

Project planning: Cost, staff, schedule. Risk assessment and containment, software quality assurance plan.

Quality attributes: Process, verification and validation configuration management.
Cast Tools: Overview.

Reliability : Definition, Model, Redundancy and fault tolerance.

Suggested Reading:

1. Ali Behforoz and Frederic J. Hudson. : Software Engg. Fundamentals “, Oxford Univ. Ptress, 1996.
2. Pankaj Jalote. “An Integrated approach to Software Engg, “ 2nd Edt , Narosa Publ. , 1997.

BIT-356

THEORY OF AUTOMATA

Instruction	4 Periods per week
Duration of Examination	3 Hours
University Exam.	75 Marks
Sessionals	25 Marks

Unit –I

Introduction, finite, state automata, non-deterministic finite state automata, NFA with moves, regular expressions, two-way finite automate. FA with outputs, applications of FA, properties of regular sets- Pumping lemma. Closure properties, myhill-nerode theorem, minimization of FA. Decision algorithms.

Unit –II

Context free languages- context tree grammar, derivation trees simplification, normal forms, push down automata and CFLs.

Unit –III

Properties of CFLs- pumping lemma, closure properties, decision algorithms determistic contest free languages- normal for DPDAs, closure of SCFL, prediction machines, decision properties. LR (O) grammars, LR (O) and DPDA, LR (K) grammars.

Unit –IV

Turning machines – Introduction, computational languages and functions, techniques for construction of turing machines, modifications of TM. TM as enumerator, restricted TM

Unit –V

Undecidability: Recursive and Recursively enumerable languages, UTM and undecidable problem, Rice theorem, post's correspondence problem.

Chomskeys hierarchy- Regular grammars, unrestricted grammar, CSL, relationship between classes of languages.

Suggested Reading:

1. John. E. Hoperoft, Jeffrey D Ullman, "Introduction to Automata Theory Languages and Computation ", Pearson Education 2001.
2. Zvi Kohavi, "Switching and Finite Automata Theory ", TMH, 1976.

BIT-357

NETWORK SECURITY

Instruction	4 Periods per week
Duration of Examination	3 Hours
University Exam.	75 Marks
Sessionals	25 Marks

Unit –I

Conventional encryption, Security attacks, Security, Model for network security, conventional encryption model, encryption techniques, DES, Triple Des, key distribution, random number generation.

Unit –II

Public – Key cryptology, principles of public – key crptosystems, RSA algorithm, key management, distribution of public keys, public key distribution of secret keys.

Unit –III

Authentication and digital systems, authentication requirements- functions cyrptographics checksum, hash function, digital signatures authentication protocols, kerboros, x-509 directory authentication services Diffie – Helloman key exchange, digital signature standers.

Unit –IV

Cryptographic algorithms: The MD 5 message digest algorithm, secure has algorithm, international data encryption algorithm.

Unit –V

LUC public key encryption – Electronic mail and management security – pretty good privacy (PGP) privacy enhanced mail.

Suggested Reading:

1. William Stallings, "Cryptography and Network Security ", Pearson Education, 1999.
2. Bruce Schneier, "Applied Cryptography", John Wiley and Sons, 2000.

BIT-358

PARALLEL COMPUTING

Instruction	4 Periods per week
Duration of Examination	3 Hours
University Exam.	75 Marks
Sessionals	25 Marks

Unit –I

Elements of Parallel Computer Architecture, Review of Pipelines and Multiprocessor Architectures, Topologies of Parallel architecture. Network operating system. Distributed operating systems,. Operating systems for parallel computing. Decomposition techniques for parallel programming.

Unit –II

Data parallelism. Basic Operations. Automatics parallelisation. Controlling and exploiting data placement. Shared variable approach creating and coordinating processes scheduling and mapping parallel Programmes, parallel I/O systems.

Unit –III

Message passing approach, channels, Procedural message passing system. Generating communications, Generative model.

Unit –IV

Parallel Programming languages and algorithms, von newmann-type languages and no-von newmann type languages. Parallel C++ Fortran K programming language.

Unit –V

The Client – Serve model, file Servers, name and directory serves, E-mail Serve Distributed database systems,. Introductory concepts, Distribution problem. Queries and updates in DDBs, Failures. Example Systems.

Suggested Reading :

1. Greogry V. Wilson "Practical Parallel Programming ", PHI, 1998.
2. Joel M. Chichlow, "An Introduction to Distributed and Parallel Computing ", 2nd Edtn . PHI, 1998.

BIT-381

NETWORK PRACTICALS

Instruction	3 Periods per week
Duration of Examination	3 Hours
University Exam.	50 Marks
Sessionals	25 Marks

1. Understanding and using the following commands.
   Ifconfig, netstat, ping, arp, telnet, fftp, ftp, tinge.

2. Understanding Socket system calls and STI – D/Open Transport Interface functions.
3. Implementation of concurrent and iterative echo serves using both connection – oriented and connectionless socket system calls.
4. Implementation of time of the day service as connection – oriented concurrent serve using socket system calls.
5. Implementation of ping Service using Socket system calls.
6. Implementation of Remote Program execution using Socket system calls.
7. Programs to demonstrate the usage of Advance socket system calls like Getsockopt (). Setsockopt(). Select(). Readv () . getpeernamet () Getsockname().
8. Program to demonstrate the Non-Blocking (Asynchronous) Input-Output.
9. Program to demonstrate the implementation of preforked serve design.
10. Implement a concurrent chart severs that allows currently logged in users to communicate with on another. Use socket system calls.
11. Implementation of Rlogin Client and Rlogin Serve.
12. Implementation of the above programs with XTI-X/Open Transport Interface Primitives.

13. Understanding of rpegen Tool and Middlel Layer and Higher Layers of RPC Interface.
14. Implementation of Echo Server Using Middle Layer RPC interface.
15. Implementation of Remote files Access using RPC.

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REAL TIME SYSTEMS PRACTICALS

Instruction	3 Periods per week
Duration of Examination	3 Hours
University Exam.	50 Marks
Sessionals	25 Marks

Unit –I

1. Implementation of Traffic controller at a junction where 3 or more number of roads meet.

2. Simulation of Real – Time scheduling algorithms.

3. Implementation inter-task communication patterns such as Mutual exclusion, rendezvous, client-server using semaphores.

4. Implementation of atomicity and serialization mechanisms.

5. Implementation of fault detection algorithms.

6. Implementation of Triple redundancy fault tolerance algorithms.

7. Concurrent programming in ADA.

8. Concurrent programming in Real- Time LINUX.

9. Simulation of memory management algorithms.

10. Study an usage of commercial operating systems as Vx-WORKS.

11. Using CASE tool develop finite state machine for any real – time applications.

Curricula and Syllabi for the B.E. Programmes as approved by the University