SGGS Institute of Engg & Technology,
Vishnupuri, Nanded

The following shall be the scheme of Instructions and Examinations for the **Final Year (Computer Science and Engineering) CSE B.Tech** students.

Sr. No.	Name of the course	Total No. of credits	Lectures/ week	Tutorials/ week	Practical/ week
I Semester					
CSE401	Industrial Training	**2 (Audit)**	**--**	**--**	**--**
CSE402	Advanced Database Management Systems	**5**	**4**	**-**	**2**
CSE403	Object Oriented Modeling and Design	**5**	**4**	**-**	**2**
CSE404	TCP/IP Networking	**5**	**4**	**-**	**2**
CSE405	*Elective-I	**5**	**4**	**-**	**2**
CSE406	Project-I	**4**	**--**	**--**	**8**
	Sub Total	**26**	**16**	**-**	**16**
II Semester					
CSE407	Computer Graphics	**5**	**4**	**-**	**2**
CSE408	Distributed Systems	**5**	**4**	**-**	**2**
CSE409	Data and Network Security	**5**	**4**	**-**	**2**
CSE410	**Elective-II	**5**	**4**	**-**	**2**
CSE411	Environmental studies	**--**	**(Audit)**	**-**	**--**
CSE412	Project-II	**4**	**--**	**--**	**8**
	Sub Total	**24**	**16**	**-**	**16**
	Total	**50**	**32**		**32**

Electives: The list of electives is stated below. The students will select any one from each group

*Elective-I:	CSE405A Artificial Neural Networks	**Elective-II:	CSE410A Mobile Computing
	CSE405B Real Time Systems		CSE410B Embedded Systems
	CSE405C Parallel Architecture and Computation		CSE410C Computer Vision
	CSE405D Digital Signal Processing		CSE410D Digital Image Processing

Examination System:
Examination system is given in the booklet of Rules and regulations of B. Tech. Programme for theory courses. Those courses which have practical component (Termwork/Sessional) or which are completely practical (Termwork/Sessional) in nature will be evaluated regularly during the regular schedule(50%). It also has mid-term evaluation (25%) and the end term evaluation (25%). The practical grades shall appear separately on the grade card.

NOTE: The term-work of any subject shall consist of at least eight practical assignments based on the syllabus. The practical examination will be based on the term-work and questions will be asked at the time of examination to judge the understanding of term-work performed.

(SEMESTER I)

CSE402 Advanced Database Management Systems (L-4,T-0,P-2,C_R-5)

[1] **Distributed Databases:** Introduction, Promises of DDBSs, Complicating factors, problem areas of DDBSs, Architectural models for Distributed DBMS, Distributed DBMS architecture. Distributed database Design: Alternative Design Strategies, Distribution Design issues.

[2] **Distributed Query Processing:** Query processing problem, objectives of Query processing, Complexity of Relational Algebra operation, Characterization of Query processors, Layers of Query processing. Distributed Transactions, Commit protocols, Concurrency control in Distributed Databases, Failures and fault Tolerance in Distributed databases.

[3] **Parallel Databases:** Database servers, Parallel architectures, parallel DBMS techniques, parallel execution problems, parallel execution for Hierarchical architecture.

[4] **Application development and administration:** Web interfaces to databases, performance tuning, performance benchmarks, standardization, e-commerce, and legacy systems

[5] **Advanced Querying and Information Retrieval:** Decision support systems, data analysis and OLAP, data mining, data warehousing, and information retrieval systems

[6] **Advanced Data Types and New Applications:** Motivation, time in databases, spatial and geographic data, multimedia databases, mobility and personal databases

[7] **Advanced Transaction Processing:** Transaction processing monitors, transactional workflows, main memory databases, real time transaction systems, long duration transactions, transaction management in multidatabases

[8] **Multidimensional Indexes:** Application needing multiple dimensions, hash like structures for multidimensional data, tree like structures for multidimensional data, bitmap indexes

[9] **Information Integration:** modes of information, wrappers in mediator based systems, on-line analytic processing, data cubes, data warehouses and data mining applications

[10] **XML:** Background, Structure of XML Data, XML Document Schema, Querying and Transformation, API, Storage of XML Data, XML Applications.

References:

1. Naveen Prakash, "Introduction to database management", *TMH*
2. Rob and Coronel, "Database Systems", Fifth Edition, *Thomson*
3. Molino, Ullman and Widom, "Database System Implementation", *Pearson Education Asia*
4. Ozsu and Valduriez, "Principles of Distributed Database Systems", *Pearson Education Asia*
5. Database management, Objectives, system functions and administration, Gordon Everest,
6. Ramkrishnan and Gehrke, "Database Management Systems", *MGH International Edition*
7. Silberchatz, Korth and Sudarshan, "Data base systems concepts", *MGH*, 4th edition

CSE403 **Object Oriented Modeling and Design (L-4,T-0,P-2,C_R-5)**

[1] Introduction: Object Orientation-System Development, Review of objects, Inheritance, Object Relationship, Dynamic binding, - OOSD life cycle, Process, Analysis, Design, Prototyping, Implementation- Testing

[2] Methodology and UML- Overview of Methodologies, OMT- Booch methodology, Jacobson Methodology, Unified approach-UML-Class Diagram, Dynamic modeling

[3] Analysis: Use case model- Creation of classes-Noun phrase approach- Responsibilities-Collaborators- Object Relationship- Super-Sub class- Aggregation.

[4] Design: OO Design Examples- Class visibility- Refining attributes- Methods- Access layers- OODBMS- Tables- Class mapping view layers- VI designing.

[5] Software Quality: Quality Assurance testing—Inheritance and testing- Test plan Usability testing- User satisfaction- Testing.

References

1. Ali Bahrami- " Object oriented System Development" Mcgraw Hill International Edition, 1999
2. Booch G. " Object Orineted Ananlysis and Design" Addition Wesley Publishing Company 1994.
3. Rambaugh J. Blaha, M. Premerlani W. Eddy F and Loresen W. " Object Oriented Modelling and Design". PHI 1997.

The term-work should consist of at least eight practicals based on the above syllabus. Practical examination will be based on above term-work and questions will be asked to judge the understanding of term-work performed at the time of examination.

CSE404 TCP/IP Networking (L-4,T-0,P-2,C_R-5)

[1] **Introduction:** Introduction and overview, Concepts and architectural model, Internet addresses.

[2] **Address mapping:** Mapping Internet addresses to physical addresses (ARP), Reverse address resolution protocol (RARP).

[3] **Internet protocols:** Connectionless datagram delivery, Routing IP Datagrams, Error and control messages (ICMP), Classless and Subnet address Extensions (CIDR), Protocol layering.

[4] **Transmission Protocols:** User datagram protocol (UDP), Reliable stream transport service (TCP).

[5] **Routing:** cores, peers and algorithms, Routing: Exterior gateway protocols and autonomous systems (BGP), Routing: In an autonomous system (RIP, OSPF, HELLO).

[6] **Other Topics:** Internet multicasting, TCP/IP over ATM networks, mobile IP, Private network interconnection (NAT, VPN), Client server model, Bootstrap and auto configuration (BOOTP, DHCP), The domain name system (DNS).

[7] **Applications:** Remote login (TELNET), File transfer and access (FTP), Electronic Mail (SMTP), world wide web (HTTP), voice and video over IP (RTP), Internet Security and Firewall design.

References:

1. Behrouz A. Forouzan, "TCP/IP Protocol Suite", TMH Edition
2. Stevens, "TCP/IP illustrated", Vol. 1, Pearson Education
3. William Stallings, "Data and computer communications" PHI
8. Siyan, "TCP/IP Unleashed", Third Edition, Pearson Education
9. Snader, "Effective TCP/IP Programming", Pearson Education
10. Comer, "Internetworking with TCP/IP", Vol. 1, Fourth Edition, Pearson Education
11. Laura A. Chappell, "Guide to TCP/IP", Thomson Learning

CSE405 Elective I (L-4,T-0,P-2,C_R-5)

Artificial Neural Networks

[1] **Feedforward networks:** Fundamental concepts- Models of artificial neural network (ANN); Learning and adaption; Learning rules, Classification model, Features and decision regions, Perceptron networks, Delta learning rules for multi-perceptron layer, Generalized learning rule, Error back-propagation training, Learning factors.

[2] **Recurrent networks:** Mathematical foundation of discrete time and gradient type Hopefield networks, Transient response and relaxation modeling.

[3] **Self-organizing networks:** Hamming net and MAXNET, Unsupervised learning of clusters, Counterpropagation network, Feature mapping, Self organizing feature maps, Cluster discovery network (ART1).

[4] **Fuzzy Neural Networks:** Fuzzy set theory, Operations on fuzzy sets, Fuzzy neural networks, Fuzzy min-max neural networks, General fuzzy min-max neural network

[5] **Applications**: Handwritten character recognition, Face recognition, Forecasting, Image compression

References

1. Jacek Zurada, "Introduction to ANN", *Jaico Publishing House*
2. Bose and Liang, "Neural network fundamentals with Graphs, Algorithms, and Applications", *TMH edition*
3. Ham and Kostanic, "Principles of Neurocomputing for Science and Engineerin", *TMH edition*

Real Time Systems

[1] Introduction to Real Time systems, Reactive systems, Interactive systems, Transformational systems

[2] Classical approaches to model types of systems. Finite Automata, Petri net based models, Task based models, communicating processes

[3] Introduction to synchronous languages for real time applications, notion of tick, multiform notion of time, constructive causality, logical time vs. real time

[4] Typical real time applications, Hard versus soft real time systems: Jobs and processors, release times, deadlines and timing constraints

[5] Approaches to real time scheduling: Clock driven approach, weighted round robin approach, priority driven approach, dynamic versus static systems, challenges in validating timing constraints in priority driven approach, offline versus online scheduling. Clock driven scheduling: static, timer driven scheduler, general structure of cyclic schedules, scheduling sporadic jobs

[6] Formal methods, Logics and models of real time, temporal logic for real time systems, Timed automata, Boolean automata, synchronous automata

[7] Real time operating systems. Scheduling: periodic/ aperiodic, preemptive / non-preemptive, static/ dynamic

[8] Real time hardware architectures: Bus arbitration, Bus protocols, cache coherence protocols

References

1. Gerard Berry, "Esterel Primer - (1999)", available at www.esterel-technologies.com
2. Jane W. S. Liu, "Real Time Systems", *Prentice Hall*
3. Prof. Mathai Joseph, "Real-time Systems: Specification, Verification and Analysis:", Edited by Prentice Hall Pub. available in electronic form on authors website.
4. C M Krishna and Liu, "Real Time Systems", *McGraw Hill Publications*

Parallel Architecture and Computation

[1] **Introduction:** Parallel processing terminologies, The sieve of eratosthenes

[2] **PRAM Algorithms:** The PRAM model of parallel computation, PRAM algorithms, Reducing the number of processors.

[3] **Processor arrays, Multiprocessors, and Multicomputers:** Processor organisation, Processor arrays, Multiprocessors, Multicomputers, Speedup, Scaled speedup and parallelizability.

[4] **Parallel programming languages:** Programming parallel processors, FORTRAN 90, C*, Sequent C, nCube C, C-Linda.

[5] **Mapping and Scheduling:** Mapping data to processors on processor arrays and Multicomputers, dynamic load balancing on Multicomputers, Static scheduling on UMA multiprocessors, Deadlock.

[6] **Parallel algorithms and matrix multiplication:** Classification of MIMD algorithms, Reduction, Broadcast, Sequential matrix multiplication, Algorithms for arrays, Multiprocessors, Multicomputers.

[7] **Sorting and Searching:** Enumeration sort, Lower bounds on parallel sorting, Odd-Even transposition sort, Bitonic merge, Quick sort-based algorithms, Dictionary operations, Graph algorithms, and Combinatorial search

References

1. Michael J. Quinn, "Parallel computing", *TMH,* 2002
2. Hwang and Briggs, "Computer architecture and parallel processing", *MGH*

Digital Signal Processing

[1] Introduction: Anatomy of digital filter, frequency domain description of signals and systems, application of DSP

[2] Discrete time description of signals and systems: Discrete time sequences, superposition principal for linear systems, unit sample response, time invariant systems, stability criterion for discrete time systems, causality criterion for discrete time systems, linear constant coefficient difference equations

[3] Fourier transform of discrete time signals: Definition of Fourier transform, its properties, properties of FT for real valued sequences, use of FT, FT of special sequences, inverse FT, FT of product of two sequences, sampling a continuous function to generate a sequence, reconstruction of continuous time signals from discrete time signals

[4] Discrete Fourier transform: Definition of DFT, computation of DFT, its properties, circular convolution, performing linear convolution with DFT, DIT and DIF algorithms for FFT, Comments about FFT and its performance, other realizations of DFT

[5] Z Transform: Definition and its properties, system function of a digital filter, combining filter sections to form complex filters, digital filter implementation from system function, complex z plane, ROC in Z plane, determining filter coefficients from singularity locations, geometric evaluation of Z transform in z plane, relation of Z transform to FT, Z transform of symmetric sequences, Inverse Z Transform

[6] Digital filter structures: Filter categories, Direct form First & second Form structures, cascade and parallel combinations of second order sections, linear phase FIR filter structures, frequency sampling structure for FIR filter

[7] FIR and IIR filter design techniques and inverse filtering

References

1. Roman Kuc, "Introduction to DSP", McGraw Hill Publication
2. R. G. Lyons, "Understanding DSP", Addison Wesley publication

The term-work should consist of at least eight practicals based on the above syllabus. Practical examination will be based on above term-work and questions will be asked to judge the understanding of term-work performed at the time of examination.

CSE401 Industrial Training (L-0,T-0,P-0,C_R-2)

Students undergone for training for a period of one month during summer vacation after second semester of third year has to prepare and submit a report that will be evaluated through a seminar given by them.

CSE406 Project-I (L-0,T-0,P-8,C_R-4)

Project shall be based on any recent topic selected by the students working in a group. In any group more than two students are not allowed. Teaching load of two hours per week per group shall be allotted to the teacher. The guide shall give the term-work marks by assessing the work done and the submitted bound report by the students in the group. External practical examination shall be based on the work demonstrated by the group, followed by the oral examination conducted by the panel of examiners, consisting of guide working as a senior examiner and other external examiner(s), appointed by the Institute.

(SEMESTER II)

CSE 407 Computer Graphics (L-4,T-0,P-2,C_R-5)

[1] Introduction: Types of displays, displays and display processors, display adapters-VGA, SVGA, graphic accelerators, file formats of BMP, TIFF, PCX, GIF

[2] Line and circle generation: Line, circle and character generation methods

[3] Polygons: Types, representations, polygon filling, scan conversion, run length encoding, cell encoding

[4] Geometrical transformation: 2-D transformations, 3-D transformations, concepts of parallel and perspective projections, 3-D clipping

[5] Windowing and clipping: viewing transformations, 2-D clipping, Sutherland Kohen algorithm, Cyrus Beck algorithm, Sutherland Hodgman algorithm

[6] Hidden surfaces and lines: Back face removal algorithm, hidden line methods, Z buffer, Warnock and Painter algorithm, floating horizon

[7] Light color and shading: Diffused illumination, point source illumination, shading algorithm, color models, eliminating back spaces, transparency, reflections and shadows

[8] Curves and fractals: Curve generation, interpolation and algorithms, B-splines curves, Bezier curves, fractals, fractal surfaces and lines

References:

1. David F. Rogers, "Procedural elements for computer graphics", Mc-Graw Hill Int. editions
2. Foley, Van dam, Feiner, Hughes, "Computer graphics principles and practice", Addison Wesley

The term-work should consist of at least eight practicals based on the above syllabus. Practical examination will be based on above term-work and questions will be asked to judge the understanding of term-work performed at the time of examination.

CSE408 Distributed Systems (L-4,T-0,P-2,C_R-5)

[1] **Introduction:** Definition, goals, hardware and software concepts, client/server model

[2] **Communication:** Layered protocols, RPC, ROI, MOI, SOC

[3] **Processes:** Threads, clients, servers, code migration, software agents

[4] **Naming:** Naming entities, locating mobile entities, removing un-referenced entities

[5] **Synchronization:** Clock synchronization, event ordering, mutual exclusion, deadlock, election algorithms
[6] **Consistency and replication:** Data centric consistency models, client centric consistency model, distribution protocols, consistency protocols,
[7] **Distributed file systems:** NFS, CODA, XFS, SFS
[8] **Distributed object based systems:** CORBA and COM DCOM
[9] **Distributed document based systems:** WWW

References:

1. Singhal and Shivaratri, "Advanced concepts in Operating Systems", *TMH edition*
2. P.K. Sinha, "Distributed operating system", *IEEE press*
3. Tenenbaum and Steen, "Distributed systems", *PHI*, 2002

CSE409 Data and Network Security
(L-4,T-0,P-2,C_R-5)

[1] **Introduction to cryptography:** What is Cryptography, Encryption Schemes, Functions, Secret Key Cryptography, Public Key Cryptography, Hash Algorithms
[2] **Conventional Encryption:** Classical techniques, Modern Techniques, Algorithms, Confidentiality using conventional encryption
[3] **Public Key encryption and Hash Function:** Public Key Cryptography, Introduction to number theory, Message authentication and hash function, Digital Signatures and authentication protocols
[4] **System Security:** Kerberos, Web security SSL, TSL, Firewalls

References:

1. King, Dalton, and Osmanoglu, "Security Architecture", *TMH edition*
2. Kaufman, Perlman, and Spenciner, "Network Security", *PHI*
3. William Stalling, "Cryptography and Network and Network security-Principals and practices", *Pearson Education*

CSE410 Elective-II: (L-4,T-0,P-2,C_R-5)

Digital Image Processing

[1] **Introduction:** What is digital image processing? Examples that use DIP, Fundamentals of image processing.
[2] **Digital Image Fundamentals:** Elements of visual perception, light & the electromagnetic spectrum, Image samplings & quantization, Some basic relationships between pixels, Linear and nonlinear operation
[3] **Image Enhancements in the Spatial Domain**: Histogram Processing, Enhancement Using Arithmetic/Logic Operations, Sharpening spatial filters, Combining Spatial Enhancement methods
[4] **Image Enhancement in the frequency domain**: Introduction to the Fourier Transform and the Frequency Domain, Smoothing frequency-domain filters, Sharpening frequency-domain filters, Implementation
[5] **Image restoration:** A model of the image degradation/restoration process, 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, Minimum mean square error (wiener) filtering, Constrained least squares filtering, Geometric mean filter, Geometric transformations
[6] **Wavelets and multiresolution processing:** Image pyramids, Subband coding, The haar transform, Multiresolution expansions, Series expansions, Scaling functions, Wavelet functions, Wavelet transform in one dimension, The wavelets series expansions, The discrete wavelets transform, The continuous wavelet transforms, The fast wavelet transforms, Wavelet transform in two dimensions, Wavelet packets
[7] **Image compression:** Fundamentals, Coding redundancy, Interpixel redundancy, Psychovisual redundancy, Fidelity criteria, Image compression models, The source encoder or decoder, The channel encoder or decoder, Elements of information theory, Measuring information, The information channel, Fundamental coding theorems, Using information theory, Error-free compression, Variable- length coding, LZW coding, Bit-plane coding, Lossless predictive coding, Lossy compression, Lossy predictive coding, Transform coding, Wavelet coding, Image compression standards, Binary image compression standards, Continuous tone still image compression standards, Video compression standards
[8] **Morphological image processing:** Preliminaries, Some basic concepts from set theory, Logic operations involving binary images, Dilation and erosion, Dilation, Erosion, Opening and closing, The hit-or-miss transformation, Some basic, morphological algorithm, Boundary extraction, Region filling, Extraction of connected components, Convex hull, Thinning, Thickening, Skeletons, Pruning, Extensions to gray scale images, Dilation, Erosion, Opening and closing, Some applications of gray scale morphology
[9] **Image segmentation:** Detection of discontinuities, Point detection, Line detection, Edge detection, Edge linking and boundary detection, Local processing, Global processing via the Hough transforms, Global processing via the graph-theoretic techniques, Thresholding, Foundation, The role of illumination, Basic global thresholding, Basic adaptive thresholding, Optimal global and adaptive thresholding, Use of boundary characteristics for histogram improvement and local thresholding, Thresholds based on several variables, Region based, segmentation, Basic formulation, Region growing, Region splitting and merging, Segmentation by morphological watersheds, Basic concepts, Dam construction, Watershed segmentation algorithm, The use of markers, The use of motion in segmentation, Spatial techniques, Frequency domain techniques

References

1. Gonzalez and Woods, "Digital image processing", Second edition
2. A. K. Jain, "Fundamentals of image processing"
3. Milan sonka, Vaclav hlavac, "Image processing, analysis, and machine vision"
4. Pratt, "Digital image processing", Third edition

Mobile Computing

[1] **Introduction to Wireless Communication Systems:** Evolution of mobile radio communications, examples of wireless communication systems
[2] **The Cellular Concepts–System Design Fundamentals:** Introduction, frequency reuse, channel assignment strategies, handoff strategies, interference and system capacity, trunking and grade of service, improving coverage and capacity in cellular systems

[3] **Multiple Access Technology:** Introduction to multiple access, FDMA, TDMA, SSMA, SDMA, PACKET RADIO
[4] **Wireless Networking:** Introduction to wireless N/Ws, differences between wireless and fixed telephone N/Ws, development of wireless N/Ws, fixed N/W transmission hierarchy, traffic routing in wireless N/Ws wireless data services, PCS/PCN, protocols for wireless N/W access, N/W databases, UMTS
[5] **Wireless LANs:** Infrared Vs radio transmission, infrastructure and ad-hoc N/Ws, IEEE 802.11, HIPERLAN, bluetooth
[6] **Mobile Network Layer:** Mobile IP, DHCP, ad hoc N/Ws
[7] **Mobile Transport Layer:** Traditional TCP, indirect TCP, snooping TCP, mobile TCP, fast retransmit/fast recovery, transmission/time-out freezing, selective retransmission, transaction oriented TCP
[8] **Support for Mobility:** File systems, World Wide Web, WAP architecture, WDP, WTLS, WTP, WSP, WAE, WML, WML Script, WTA, Examples, stacks with WAP
[9] **Wireless WAN:** GSM, GPRS, TDMA, CDMA, WATM

References:

1. T.S. Rappaport, "Wireless Communications: principles and practice", *Pearson Education*
2. Jochen Schiller, "Mobile Communications", *Pearson Education*
3. Pahlavan and Krishnamurthy, "Principles of Wireless Networks", *Pearson Education*
4. Pahlavan and Krishnamurthy, "Wireless Application Protocol", *Pearson Education*

Computer Vision

[1] **Introduction:** Image formation-image model, imaging devices
[2] **Early processing:** Recovering intrinsic structure, Filtering Image, finding local edges, Range information from geometry, Surface orientation, Optical flow, Resolution pyramids.
[3] **Boundary detection:** Searching near and approximate location, Hough method for curve detection, Edge following as graph searching, Edge following as dynamic programming, Contour following
[4] **Region growing:** Regions, local technique, Blob coloring, Global techniques, Splitting and merging
[5] **Texture:** Structural models, Texture as a pattern recognition problem, Texture gradients
[6] **Motion:** Motion understanding, Optical flow, Image sequences
[7] **Representation of 2-D geometrical structure:** Boundary representation, Region representation, Simple shape properties, Representation of 3-D structures, Solids and their representation, Surface representation, Generalized cylinder representation, Volumetric representation, Understanding line drawings
[8] **Knowledge representation and use:** Knowledge base models and processes, Semantic nets, Control issues in vision systems
[9] **Matching:** Aspects, Graph theoretic algorithms, Implementation, Matching in practice
[10] **Inference:** First order predicate Calculus, computer reasoning, Production systems, Scene labeling, Active knowledge

References:

1. Ballard and Brown, "Computer Vision", *Prentice Hall publication*
2. Jain, Kasturi and Schunck, "Machine Vision", *McGraw-Hill International Editions*

Embedded Systems

[1] Embedded Systems
Introduction, hardware/software co-design, issues in deciding where to split the problem., examples of embedded systems, sensors and interfacing techniques. Design Challenges, Processor Technology, IC Technology, Design Technology, Trade-offs.

[2] Custom Single purpose processors
Hardware, Combinational logic design, Sequential logic design, Custom single purpose processor design, RT level Custom Single purpose processor design, Optimization.

[3] General Purpose processors
Software, Datapath, control unit, Memory, pipelining, superscalar and VLIW architectures, Programmers view: Instruction set, program and data memory space, I/O, interrupts, operating system, Development environment: design flow and tools, testing and debugging, Application specific instruction set processors (ASIPs), microcontrollers, digital signal processors, less-general AIP environments, selecting microprocessors, general purpose processor design.

[4] Standard single purpose processors: peripherals
Introduction, timers, counters and watchdog timers, UART, Pulse width modulators, controlling a DC motor using PWM, LCD controllers, Keypad controllers, stepper motor controllers, ADCs, Real time clocks.

[5] Memory
Memory write ability and storage permanence, common memory types, composing memory, memory hierarchy and cache, advanced RAM.

[6] Interfacing
Introduction, Communication basics, Basic protocol concepts, ISA bus protocol: memory access, Arbitration, Priority arbiter, Daisy chain Arbitration, Network oriented Arbitration methods, multilevel bus architectures, Advanced communication principles, Parallel and serial communication, wireless communication, Layering, error detection and correction, serial protocols, parallel protocols, wireless protocols: IrDA, Bluetooth, IEEE802.11

[7] Digital camera example
Requirement specification, design

[8] State machine and Concurrent process Models:
Introduction, Models and Languages, Basic state machine model: FSM, FSM with datapath model, using state machines, concurrent process model, Concurrent processes, communication among processes, synchronization among processes, implementation, dataflow model, Real Time systems.

[9] Real-time OS and concepts
Introducing the problem domain an d tools, RTOS services/capabilities (in contrast with traditional OS), Resource Management/scheduling paradigms: static priorities, static schedules, dynamic scheduling, best effort, current best practice in scheduling (e.g. Rate Monotonic vs. static schedules), Real-world issues: blocking, unpredictability, interrupts, caching, examples of OSs for embedded systems (RT Linux/ VRT), selected case studies.

[10] Programming Languages for Embedded Systems
Tools for building embedded systems - with case studies. Esterel is good for control applications / Handel-C is good for cast-

ing algorithms into re-configurable hardware, Embedded Software Development Methodology.

Reference Books

1. Frank Vahid and Tony Givargis, Embedded system design: A unified hardware/software introduction, John Wiley and sons, 2002
2. D. E. Simon, An embedded software primer, Pearson Education, 2002
3. Wayne Wolf, Computers as components: Principles of embedded computing system design, Morgan Kaufman/Harcourt India, 2000
4. C. M. Krishna, Kang G Shin, Real time systems, McGraw Hill
Embedded Micocomputer Systems, Real time interfacing, Thomson Brooks/Cole
5. D. W. Lewis, Fundamentals of embedded software, Pearson Education
6. J. W. S. Liu, Real time systems, Pearson Education
Silberchatz, Galvin, Gagne, Operating system concepts, John Wiley

CSE411 Environmental Studies (Audit)

Examination scheme for Audit course – Environmental Studies: The examination scheme in the compulsory audit course- Environmental Studies shall be as under:

1) Assignments 30 marks
2) End term examination (Major) 60 marks
3) Attendance and activity 10 marks
----------Total marks 100

To get the pass grade in the audit course the students will have to get atleast 40 marks out of 100 marks.

1. **The Multidisciplinary nature of environmental studies: (Lect:2)**
Definition, scope & importance, Need for public awareness.
2. **Natural Resources:**
(Lect:8)
Renewable & non-renewable resources:
Natural resources & associated problems.
a) **Forest resources:** Use & over-exploitation, deforestation, case studies, Timber extraction, mining, dams & their effects on forests & tribal people.
b) **Water resources:** Use & over-utilization of surface & ground water,
floods, drought, conflicts over water, dams-benefits & problems**.**
c) **Mineral resources:** Use & exploitation , environmental effects of
extracting & using mineral resources, case studies**.**
d) **Food resources:** World food problems, changes caused by agriculture
& overgrazing, effects of modern agriculture, fertilizer-pesticide
problems, water logging, salinity, case studies**.**
e) **Energy resources**: Growing energy needs, renewable and non renewable
energy sources, use of alternate energy, Case studies.
f) **Land resources**: Land as a resource, land degradation, man induced
landslides, soil erosion and desertification.
Role of an individual in conservation of natural resources, equitable use of
resources for sustainable lifestyles.

3. Ecosystems: (Lect: 6)
Concept of an ecosystem, Structure and function of an ecosystem, Producers, Consumers and decomposers, Energy flow in the ecosystem, Ecological
Succession, Food chain, food webs and ecological pyramids,
Introduction, types, characteristics features, structure and function of the
Following ecosystem:-Forest ecosystem, Grassland ecosystem, Desert ecosystem
Aquatic ecosystem (ponds, streams, lakes, rivers, oceans, estuaries)

4. Biodiversity and its conservation
(Lect: 8)
Introduction- definition: genetic, species and ecosystem diversity, Biographical
Classification of India, Value of biodiversity: consumptive use, productive use,
Social, Ethical, aesthetic & option values, Biodiversity at global, National & local
levels, India as a mega diversity nation, Hot –spots of biodiversity, Threats to
biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts,
Endangered and endemic species of India, Conservation of biodiversity: In-situ
and Ex-situ conservation of biodiversity.

5. Environmental pollution
(Lect: 8)
Definition, Causes, effects and control measures of: -Air pollution, Water pollution, Soil
pollution, Marine pollution, Noise pollution, thermal pollution, nuclear hazards, Solid
waste Managment: cause, effects & control measures of urban & industrial wastes, Role of
an individual in prevention of pollution, Pollution case studies.

Disaster management: Floods, earthquake, cyclone & landslides.

6. Social Issue & the Environment:
(Lect: 7)
From Unsustainable to Sustainable development. Urban problems related to
Energy, Water conservation, rain water harvesting, watershed management,
Resettlement & rehabilitation of people; its problems & concerns, Case studies,
Environmental ethics: Issues & possible solutions, Climate change, global
Warming, acid rain, ozone layer depletion, nuclear accidents & holocaust,
case studies, Wasteland reclamation, Consumerism & waste products,
Environment Protection Act, Air (Prevention & control of Pollution) Act.
Water (prevention & control of pollution) Act, Wildlife Act, Forest conservation
Act, Issues involved in enforcement of environmental legislation, Public
awareness**.**

7. Human Population & the Environment: (Lect: 6)

Population growth, variation among nations, Population explosion- Family

Welfare Programme, Environment & human health, Human Rights, Value

Education, HIV/AIDS, Women & Child Welfare, Role of Information

Technology in Environment & human health, Case studies.

8. Field Work:

(Lect: 5)

Visit to a local area to document environmental assets-river / forest/

grassland/ hill/ mountain, visit to a local polluted site-Urban/ Rural / Industrial/

Agricultural, Study of common plants, insects, birds,

Study of simple Ecosystems: - pond, river, hill slopes etc.

CSE412 Project -II (L-0,T-0,P-8C_R-4)

Project shall be based on any recent topic selected by the students working in a group. In any group more than two students are not allowed. Teaching load of two hours per week per group shall be allotted to the teacher. The guide shall give the term-work marks by assessing the work done and the submitted bound report by the students in the group. External practical examination shall be based on the work demonstrated by the group, followed by the oral examination conducted by the panel of examiners, consisting of guide working as a senior examiner and other external examiner(s), appointed by the Institute.