B.E. COMPUTER ENGINEERING
FOURTH YEAR SEMISTER VII

SUBJECT: ADVANCED MICROPROCESSORS

Lectures: 4 Hrs per week **Practical: 2 Hrs per week**	**Theory: 100 Marks** **Term Work: 25 Marks** **Oral: 25 Marks**

Objective: To study microprocessor basics and the fundamental principles of architecture related to advanced microprocessors.

Pre-requisite: Microprocessors

DETAILED SYLLABUS

1. **Overview of new generation of modern microprocessors.**

2. **Advanced Intel Microprocessors:** Protected Mode operation of x86 Intel Family; Study of Pentium: Super-Scalar architecture & Pipelining, Register Set & special Instructions, Memory Management, Cache Organizations, Bus operation, Branch Prediction Logic.

3. **Study of Pentium Family of Processors:** Pentium I, Pentium II, Pentium III, Pentium IV, Pentium V: Architectural features, Comparative study.

4. **Advanced RISC Microprocessors:** Overview of RISC Development and current systems, Alpha AXP Architecture, Alpha AXP Implementations & Applications.

5. **Study of Sun SPARC Family**: SPARC Architecture, The Super SPARC, SPARC Implementations & Applications.

6. **Standard for Bus Architecture and Ports:** EISA, VESA, PCI, SCSI, PCMCIA Cards & Slots, ATA, ATAPI, LPT, USB, AGP, RAID

7. **System Architectures for Desktop and Server based systems**: Study of memory subsystems and I/O subsystems. Integration issues

BOOKS

Text Books:

1. Daniel Tabak, "*Advanced Microprocessors*", McGraw-Hill.
2. Barry Brey , "*The Intel Microprocessors, Architecture, Programming and Interfacing*"
3. Tom Shanley, "*Pentium Processor System Architecture*", Addison Wesley Press.

References:

1. Ray and Bhurchandi, "*Advanced Microprocessors and Peripherals*", TMH
2. James Antonakos, "*The Pentium Microprocessor*", Pearson Education.
3. Badri Ram, "*Advanced Microprocessors and Interfacing*", TMH Publication.
4. Intel Manuals.

TERM WORK
1. Term work should consist of at least 10 practical experiments and two assignments covering the topics of the syllabus.
ORAL EXAMINATION
An oral examination is to be conducted based on the above syllabus.

B.E. COMPUTER ENGINEERING
FOURTH YEAR SEMISTER VII

SUBJECT: INTELLIGENT SYSTEMS

Lectures: 4 Hrs per week **Practical: 2 Hrs per week**	**Theory: 100 Marks** **Term Work: 25 Marks** **Oral: 25 Marks**

Objectives: To understand and apply principles, methodologies and techniques in design and implementation of intelligent system.

Prerequisite: Data Structures, Programming Languages, and Algorithms

DETAILED SYLLABUS

1. **Artificial Intelligence**: An overview, Intelligent Systems: Evolution of the concept.
2. **Intelligent Agents**: How agent should act, Structure of intelligent agents, Environments
3. **Problem Solving:** Solving problems by searching, Informed search methods, Game playing
4. **Knowledge and Reasoning:** A knowledge based agent, The wumpus world environment, Representation, Reasoning, Logic, Proportional logic, First order logic: Syntax and Semantics, Extensions and Notational variation, Using first order logic
5. **Building a Knowledge Base:** Properties of good and bad knowledge base, Knowledge engineering, General ontology
6. **Interfacing First Order Logic:** Interface rules involving quantifiers, An example proof, Forward and backward chaining, Completeness
7. **Acting Logically:** Planning, Practical planning: Practical planners, Hierarchical decomposition, Conditional planning
8. **Uncertain Knowledge and Reasoning:** Uncertainty, Representing knowledge in an uncertain domain, The semantics of belief networks, Inference in belief networks
9. **Learning:** Learning from observations: General model of learning agents, Inductive learning, learning decision trees, Learning in neural and belief networks: Introduction to neural networks, Perceptrons, Multilayer feed-forward network, Application of ANN, Reinforcement learning: Passive learning in a known environment, Generalization in reinforcement learning, Genetic algorithms
10. **Agents that Communicate:** Communication as action, Types of communicating agents, A formal grammar for a subset of English
11. **Expert system:** Introduction to expert system, Representing and using domain knowledge, Expert system shells, Explanation, Knowledge acquisition
12. **Applications:** Natural language processing, Perception, Robotics

BOOKS

Text Books:

1. Struart Russell and Peter Norvig, "*Artificial Intelligence: A Modern Approach*"
2. George F.Luger, *"Artificial Intelligence: Structures and Strategies for Complex Problem Solving"*, Pearson Education

References:

1. Nils J. Nillson, *"Artificial Intelligence: A New Synthesis"*, Harcourt Asia
2. Elaine Rich and Kevin Knight, "*Artificial Intelligence"*, TMH
3. Patrick Winston, "*Artificial Intelligence"*, Pearson Education
4. Ivan Brakto, "*Prolog Programming for Artificial Intelligence*", Pearson Education
5. Efraim Turban Jay E.Aronson, "*Decision Support Systems and Intelligent Systems*"
6. Ed. M. Sasikumar and Others, *"Artificial Intelligence : Theory and Practice"* Proceedings of the International Conference KBCS-2002, Vikas Publishing House

TERM WORK

2. Term work should consist of at least 10 practical experiments and two assignments covering the topics of the syllabus.

ORAL EXAMINATION

An oral examination is to be conducted based on the above syllabus.

B.E. COMPUTER ENGINEERING
FOURTH YEAR SEMISTER VII

SUBJECT: DIGITAL SIGNAL PROCESSING

Lectures: 4 Hrs per week	**Theory: 100 Marks**
Practical: 2 Hrs per week	**Term Work: 25 Marks**
	Oral: 25 Marks

Objective: Digital Signal Processing continues to play an increasingly important role in the fields that range literally from A (astronomy) to Z (zeugmatography, or magnetic resonance imaging) and encompass applications such as Compact Disc player, Speech Recognition, echo cancellations in communication systems, image Enhancement, geophysical exploration, and noninvasive medical imaging. This course aims to build concepts regarding the fundamental principles and applications of Signals, System Transforms and Filters.

Pre-requisites: Nil

DETAILED SYLLABUS

1. **Discrete Time Signals & System:** Discrete–time signals, Discrete–time systems, Analysis of discrete-time LTI systems, Discrete-time systems described by differential equations, Implementation of discrete-time systems, Correlation of discrete-time systems
2. **Z-Transform:** Definition and Properties of Z-transform, Rational Z-transforms, Inverse Z-transform, one-sided Z-transform, Analysis of LTI systems in Z-domain
3. **Frequency Analysis of Signals and Systems:** Frequency analysis: Continuous time signals and Discrete-time signals, Properties of the Fourier transform for discrete-time signals, Frequency domain characteristics of LTI systems, LTI system as a frequency selective filter, Inverse systems and deconvolution
4. **Discrete Fourier Transform:** Frequency domain sampling, Properties of DFT, Linear filtering method based on DFT, Frequency analysis of signals using DFT, FFT algorithm, Applications of FFT, Goertzel algorithm, Quantisation effects in the computation of DFT
5. **Implementation of Discrete Time Systems:** Structure of FIR systems, Structure of IIR systems, quantization of filter coefficients, round-off effects in digital filters
6. **Design of Digital Filters:** Design of FIR filters, Design of IIR filters from analog filters, frequency transformations, Design of digital filters based on least-squares method digital filters from analogue filters, Properties of FIR digital filters, Design of FIR filters using windows, Comparison of IIR and FIR filters, and Linear phase filters.
7. **Introduction to DSP co-**processors: TMS 320C40/50, Analog Devices.
8. **Applications :** Image processing, Control, Speech, Audio, Telecommunication

BOOKS

Text Books:

1. J.G. Proakis, "*Introduction to Digital Signal Processing*", PHI
2. Oppenhiem and Schaffer, "*Discrete Time Signal Processing*"

References:

1. S.K. Mitra, "*Digital Signal Processing*", TMH.

2. T.J. Cavicchi, "*Digital Signal Processing*", John Wiley.
3. L.C. Ludeman," *Fundamentals Of Digital Signal Processing*", John Wiley.
4. E.C. Ifeachor, B.W. Jervis, "*Digital Signal Processing*", Pearson Education.
5. S Sallivahanan, *"Digital Signal Processing*", TMH.
6. Ashok Ambardar, "*Analog and Digital Signal Processing*", Thompson Learning.

TERM WORK

3. Term work should consist of at least 10 practical experiments and two assignments covering the topics of the syllabus.

ORAL EXAMINATION

An oral examination is to be conducted based on the above syllabus.

B.E. COMPUTER ENGINEERING
FOURTH YEAR SEMISTER VII

SUBJECT: SOFTWARE ENGINEERING

Lectures: 4 Hrs per week **Practical: 2 Hrs per week**	**Theory: 100 Marks** **Term Work: 25 Marks** **Oral: 25 Marks**

Objectives: Apply various software Engineering principles and methodologies while dealing with the various phases of software development.

Pre-requisite: Programming concepts.

DETAILED SYLLABUS

1. **Product:** Evolving role of software, Software Characteristics, Software Applications, Software myths.
2. **Process:** Software Process, Process Models, Linear sequential model, Prototyping model, RAD model, Evolutionary software models, Component-based development, Formal methods model, Fourth generation techniques, Process technology, Product and process.
3. **Project Management:** Management spectrum, People, Product, Process, Project, W^5HH principle.
4. **Software Process and Project Metrics:** Measures-Metrics-Indicators, Metrics in the process and project domains, Software measurement, Metrics for software quality, Integrating metrics within the software engineering process, Statistical quality control, Metrics for small organizations, Establishing a software metrics program.
5. **Software Project Planning:** Objectives, Software scope, Resources, Software project estimation, Decomposition techniques, Empirical estimation models, Make/Buy decision, Automated estimation tools.
6. **Risk Analysis and Management:** Reactive versus proactive risk strategies, Software risks, Risk identification, Risk projection, Risk refinement, Risk mitigation-monitoring-management, Safety risks and hazards, RMMM plan.
7. **Project Scheduling and Tracking:** Basic concepts, Relationship between people and effort, Defining a task set for the software project, Selecting software Engineering tasks, Refinement of major tasks, Defining a task network, Scheduling, Earned value network, Error tracking, Project plan.
8. **Software Quality Assurance:** Quality concepts, Quality Movement, Software quality assurance, Software reviews, Formal technical reviews, Formal approaches to SQA, Statistical software quality assurance, Software reliability, Mistake-proofing for software, ISO 9000 quality standards, SQA plan.
9. **Software Configuration Management:** Introduction, SCM process, Identification of objects in the software configuration, Version control, Change control, Configuration audit, Status reporting, SCM standards.
10. **System Engineering:** Computer-based systems, System engineering hierarchy, Business process engineering, product engineering, Requirements engineering, System modeling.
11. **Analysis Concepts and Principles:** Requirement Analysis, Requirement elicitation for software, Analysis principles, Software prototyping, Specification.
12. **Analysis Modeling:** Introduction, Elements of analysis model, Data modeling,

Functional modeling and information flow, Behavioral modeling, Mechanics of structured analysis, Data dictionary, Other classical analysis methods.

13. **Design Concepts and Principles:** Software design and software engineering, Design process, Design principles, Design concepts, Effective modular design, Design heuristics for effective modularity, Design model, Design documentation.
14. **Architectural Design:** Software architecture, Data design, Architectural styles, Analyzing alternative architectural designs, Mapping requirements into a software architecture, Transform mapping, Transaction mapping, Refining architectural design.
15. **User Interface Design:** The golden rules, User interface design, Task analysis and modeling, Interface design activities, Implementation tools, Design evaluation.
16. **Component-Level Design:** Structured programming, Comparison of design notation.
17. **Software Testing Techniques:** Software testing fundamentals, Test case design, White-box testing, Basis path testing, Control structure testing, Black-box testing, Testing for specialized environments, architectures and applications.
18. **Software Testing Strategies:** Strategic approach to software testing, Strategic issues, Unit testing, Integration testing, Validation testing, System testing, Art of debugging.
19. **Technical Metrics for Software:** Software quality, framework for technical software metrics, Metrics for the analysis model, Metrics for the design model, Metrics for source code, Metrics for testing, Metrics for maintenance.

BOOKS

Text Books:

1. Roger Pressman, "*Software Engineering*", McGraw Hill, Fifth Edition.
2. James Peter, "*Software Engineering An Engineering Approach*", John Wiley
3. Ian Sommerville, "*Software Engineering*", Pearson Education.

References:

1. W.S. Jawadekar, "Software *Engineering*", TMH.
2. Pankaj Jalote, "*An Integrated Approach To Software Engineering* ", Narosa.
3. R. Mall, "*Fundamentals of Software Engineering"*, Prentice Hall of India
4. A. Behferooz & F. J. Hudson, "*Software Engineering Fundamentals"*, Oxford University Press
5. S. L. Pfleeger, "*Software Engineering Theory and Practice*", Pearson Education

TERM WORK

4. Term work should consist of at least 10 practical experiments and two assignments covering the topics of the syllabus.

ORAL EXAMINATION

An oral examination is to be conducted based on the above syllabus.

B.E. COMPUTER ENGINEERING
FOURTH YEAR SEMISTER VII

SUBJECT: IMAGE PROCESSING
(ELECTIVE-I)

Lectures: 4 Hrs per week **Practical: 2 Hrs per week**	**Theory: 100 Marks** **Term Work: 25 Marks** **Oral: 25 Marks**

Objective: Digital Image Processing is a rapidly evolving field with growing applications in science and engineering. Image processing holds the possibility of developing the ultimate machine that could perform the visual functions of all living beings. There is an abundance of image processing applications that can serve mankind with the available and anticipated technology in the near future.

Pre-requisites: Digital Signal Processing, & Computer Graphics

DETAILED SYLLABUS

1. **Digital Image Processing Systems:** Introduction, Structure of human eye, Image formation in the human eye, Brightness adaptation and discrimination, Image sensing and acquisition, Storage, Processing, Communication, Display. Image sampling and quantization, Basic relationships between pixels
2. **Image Transforms (Implementation):** Introduction to Fourier transform, DFT and 2-D DFT, Properties of 2-D DFT, FFT, IFFT, Walsh transform, Hadamard transform, Discrete cosine transform, Slant transform, Optimum transform: Karhunen - Loeve (Hotelling) transform.
3. **Image Enhancement in the Spatial Domain:** Gray level transformations, Histogram processing, Arithmetic and logic operations, Spatial filtering: Introduction, Smoothing and sharpening filters
4. **Image Enhancement in the Frequency Domain:** Frequency domain filters: Smoothing and Sharpening filters, Homomorphic filtering
5. **Wavelets and Multiresolution Processing:** Image pyramids, Subband coding, Haar transform, Series expansion, Scaling functions, Wavelet functions, Discrete wavelet transforms in one dimensions, Fast wavelet transform, Wavelet transforms in two dimensions
6. **Image Data Compression:** Fundamentals, Redundancies: Coding, Interpixel, Psycho-visual, Fidelity criteria, Image compression models, Error free compression, Lossy compression, Image compression standards: Binary image and Continuous tone still image compression standards, Video compression standards.
7. **Morphological Image Processing:** Introduction, Dilation, Erosion, Opening, Closing, Hit-or-Miss transformation, Morphological algorithm operations on binary images, Morphological algorithm operations on gray-scale images
8. **Image Segmentation:** Detection of discontinuities, Edge linking and Boundary detection, Thresholding, Region based segmentation
9. **Image Representation and Description:** Representation schemes, Boundary descriptors, Regional descriptors

BOOKS

Text Books:

1. R.C.Gonsales R.E.Woods**, "***Digital Image Processing*", Second Edition, Pearson Education

2. Anil K.Jain, "*Fundamentals of Image Processing*", PHI

References:

1. William Pratt, "*Digital Image Processing*", John Wiley
3. Milan Sonka,Vaclav Hlavac, Roger Boyle, "*Image Processing, Analysis, and Machine Vision*" Thomson Learning
2. N Ahmed & K.R. Rao, "*Orthogonal Transforms for Digital Signal Processing*" Springer
3. B. Chanda, D. Dutta Majumder, "*Digital Image Processing and Analysis*", PHI.

TERM WORK

5. Term work should consist of at least 10 practical experiments and two assignments covering the topics of the syllabus.

ORAL EXAMINATION

An oral examination is to be conducted based on the above syllabus.

B.E. COMPUTER ENGINEERING
FOURTH YEAR SEMISTER VII

SUBJECT: PROJECT-A

Tutorial: 2 Hrs per week	**Term Work: 25 Marks** **Oral: 25 Marks**

GUIDELINES

1. Project-A exam be conducted by two examiners appointed by university. Students have to give seminar on the project-A for the term work marks. All the students of the class must attend all the seminars. Seminars should be conducted continuously for couple of days.
2. Project-A should preferably contain abstract, existing system, problem definition, scope, proposed system, its design, introduction to programming tools, hardware and software platforms requirements etc.
3. Out of the total projects 35 percent may be allowed as to be industry projects. 65 percent projects must be in-house. Head of dept and senior staff in the department will take decision regarding projects.
4. Every student must prepare hand written synopsis in the normal journal format.
5. Internal guide has to interact at least once in fortnight and maintain the progress and attendance report during both the terms.
6. Two research projects may be allowed only for outstanding students with research aptitude.
7. In case of industry projects, visit by internal guide will be preferred. Industry project will attract demos either at site or in college.
8. Make sure that external project guides are BE graduates.
9. Number of students for a project should be preferably 2 to 4. Only one student should be avoided and up to 6 may be allowed only for exceptional and complex projects.