

COURSE STRUCTURE & SYLLABUS OF BACHELOR OF TECHNOLOGY (B.TECH)

In

Electronics and Telecommunication Engineering

Course Structure

Third Year

Fifth Semester

Paper Code	Subject
BTET1	Computer Organisation
BTET2	Control System
BTET3	Digital Communication
BTET4	Semiconductor Devices
BTET5	Digital Image Processing

BTET1 : Computer Organization

1. INTRODUCTION

The Nature Of Computing, The Elements Of Computers, A Turing Machine To Add Two Unary Numbers, The Evolution Of Computers, Electronic Computers, Organization Of A First-Generation Computer, A Nonstandard Architecture: Stack Computers, The Vlsi Era.

2. BASIC ORGANIZATION AT THE COMPUTER

Logic gates, cpu organization

3. ROLE OF OPERATING SYSTEMS AND COMPILERS

Opening remarks, what is an operating system, early history: the 1940s and the 1950s, the 1960s, the emergence of a new field: software engineering , distributed computing, the key architectural trend: parallel computation, input-output trends, open systems, unix, ethical issues, application bases, the key operating systems for the 1990s, compilers, target-language choice

4. INSIDE A CPU

Data representation, fixed-point numbers, floating-point numbers, Number represented, instruction sets, instruction types, risc versus cisc, programming considerations, registers and storage, common bus system

5. COMPUTER ARITHMETIC AND THEIR IMPLEMENTATION

Fixed-point arithmetic, multiplication, twos-complement multipliers, division, division by repeated multiplication, arithmetic-logic units, combinational alus, controller design, introduction, hardwired control, microprogrammed control, the amd 2909 bit-sliced microprogram sequencer , Microinstruction addressing.

6. MEMORY AND IO ACCESS

Ascii alphanumeric characters, input-output interface, i/o bus and interface modules, i/o versus memory bus, asynchronous data transfer, handshaking, asynchronous serial transfer, asynchronous communication interface, first-in, first-out buffer, modes of transfer, interrupt-initiated i/o, priority interrupt, daisy-chaining priority, priority encoder, interrupt cycle, software routines, initial and final operations, direct memory access (dma), dma controller, dma transfer, input—output processor (iop), keyboard devices, mouse, output devices, sequential and direct-access devices, magnetic disk, types of hard disks, optical disk, optical disk drive

7. INSIDE THE MEMORY

Hierarchical Memory Technology, Random Access Memories (Rams), Bipolar Rams, Static Mos Rams, Dynamic Mos Rams, Inclusion, Coherence, And Locality, Memory Capacity Planning, Virtual Memory Technology, Memory Replacement Policies, Cache Addressing Models, Direct Mapping And Associative Caches, Set-Associative And Sector Caches, Cache Performance Issues

8. INTRODUCTION TO PIPELINED OPERATION AND ARCHITECTURE

General Considerations, Instruction Execution Phases, Mechanisms For Instruction Pipelining, Branch Handling Techniques, Computer Arithmetic Principles, Superscalar And Superpipeline Design, Superscalar Pipeline Design, Superpipelined Design, Supersymmetry And Design Tradeoffs, The Vliw Architecture, Vector And Symbolic Processors, Pipelining Hazards

9. INTRODUCTION TO MULTIPROGRAMMING AND MULTIPROCESSING

Characteristics Of Multiprocessors, Interconnection Structures, Parallel Processing, Multiprocessors, Cluster Computers

10. NON VON NEUMANN ARCHITECTURES

Data flow computers, the genesis of data-flow, interpreting data-flow graphs, static and dynamic data-flow architectures, criticisms of data flow, reduction computer architectures, multiple instruction, single data (systolic architectures)

BTET2 : CONTROL SYSTEM

1 INTRODUCTION TO CONTROL SYSTEM

Classification Of Systems, Open-Loop Control System, Closed-Loop Control Systems, Elements Of Automatic Or Feedback Control System, Requirement Of Automatic Control Systems

2 MATHEMATICAL MODELS OF CONTROL SYSTEM

Representation Of a Control System, Description Of Some Of Typical Physics System, Tachogenerators, Potentiometers, LVDT and Synchros, Synchros, Hydraulic Actuation

3 BASIC PRINCIPLES OF FEEDBACK CONTROL

The Control Objectives, Feedback Control System Characteristics, Proportional Mode Of Feedback Control, Integral Mode Of Feedback Control, Derivative Mode Of Feedback Control

4 TIME DOMAIN ANALYSIS AND FREQUENCY RESPONSE

Standard Test Signals, Static Accuracy, Computation Of Steady State Errors, Transient Response: First Order System, Transient Response: Second Order System, Transient Response Specification, Conclusion, Frequency Response, Frequency Domain Specifications, Magnitude And Phase Angle Characteristics Plot, Frequency Response Specification, Representation Sinusoidal Transfer Function

5 CONCEPTS OF STABILITY AND THE ROUTH STABILITY CRITERION

Bounded-Input Bounded-Output Stability, Zero-Input Stability, The Routh Stability Criterion

6 NYQUIST STABILITY CRITERION

Stability Margin, Phase Margin

7 BODE PLOTS

8 ROOT LOCUS

The transfer function of a second order control system, General Rules

BTET3 : DIGITAL COMMUNICATION

1. ELECTRONIC COMMUNICATION SYSTEM

Introduction, Contaminations, The Audio Spectrum, Signal Power Units, Volume Unit , Signal-To-Noise Ratio, Modulation, Fundamental Limitations In A Communication System, Number Systems

2. AMPLITUDE MODULATION

Introduction, definition of am, generation of am wave, double-sideband suppressed-carrier modulation, single-sideband modulation (ssb), vestigial sideband modulation (vsb), demodulation of am.

3. EXPONENTIAL MODULATION1 FREQUENCY MODULATION

Introduction, frequency spectrum of frequency modulation, comparison of fm and am, frequency modulation band widths, narrow band and wide band frequency modulation (nbfm and wbfm) , phase modulation, generation and detection principle, fm demodulation : am-based method.

4. SAMPLING AND ANALOG PULSE MODULATION

Introduction, Sampling Theory, Sampling Analysis, Types Of Sampling, Practical Sampling: Major Problems, Types Of Analog Pulse Modulation, Pulse Amplitude Modulation, Pulse Position Modulation, Signal-To-Noise Ratios In Pulse Systems

5. DIGITAL DATA TRANSMISSION

Introduction, representation of data signal, parallel and serial data transmission, 20ma loop and line drivers, modems, data signal: signal shaping and signaling speed, partial response (correlative) techniques, noise and error analysis, repeaters, digital-modulation systems, amplitude-shift keying (ask), frequency shift keying (fsk), four-phase or quaternary psk, interface standards

6. DIGITAL MODULATION : DM AND PCM

Introduction, delta modulation, pulse code modulation, pcm bandwidth, pcm reception and noise, quantization noise analysis, aperture time, the S/N ratio and channel capacity of pcm, comparison of pcm with other systems, pulse rate, codecs, 24-channel pcm, the pcm channel bank, multiplex hierarchy, measurements of quantization noise, differential pcm

BTET4 : SEMICONDUCTOR DEVICES

1 FIELD EFFECT TRANSISTORS AMPLIFIERS

Advantages and Disadvantages of the FET, Basic Construction of the JFET, Characteristic Curves of the JFET, Principles of Operation of the JFET, Effect of V_{DS} on Channel Conductivity, Channel Ohmic Region and Pinch-Off Region, Characteristic Parameters of the FET, Effect of Temperature on FET, Common-Source AC Amplifier, Fixed Bias with Self-Bias, The Common-Drain or Source Follower, The Common-Gate FET Amplifier, Frequency Response of the FET Amplifier, Other Amplifier Configurations, Summary,

2 MOSFETS AND OTHER APPLICATIONS OF FETS

The Depletion MOSFET, The Enhancement MOSFET, Differences Between JFETs and MOSFETs, Handling Precautions for MOSFETs, Dual-Gate MOSFETs, Integral Gate Protection, Testing Field-Effect Transistors, Application of a Dual-Gate MOSFET in an AGC Amplifier, Other Applications of FETs, The Field-Effect Diode , Summary

3 LINEAR INTEGRATED CIRCUITS: OPERATIONAL AMPLIFIERS

The Operational Amplifier, The Inverting Differential Operational Amplifier, Analog Computer

- Solution of Linear Equations, Increasing Input Impedance in an Inverting Amplifier, The Noninverting Differential Operational Amplifier, The Differential Amplifier A General Purpose IC Operational Amplifier, Common-Mode Rejection Ratio, Emitter-Coupled Differential Amplifier, High-Performance Operational Amplifier, Increased Differential Input Impedance, Applications of Differential Operational Amplifiers, IC Audio Power Amplifier, Summary.
- 4 **AN INTRODUCTION TO THE FABRICATION OF INTEGRATED CIRCUITS**
Evolution of Integrated Circuits, The Monolithic Integrated Circuit, Integrated Circuit Components, Methods of Fabricating Integrated Circuits, Complementary Symmetry MOS Integrated Circuit COS/MOS, Large-Scale Integration (LSI), Summary.
- 5 **NON LINEAR INTEGRATED CIRCUITS I: COMBINATIONAL DIGITAL CIRCUITS**
The Binary Concept, Basic Logic Gates , De Morgan's Law , NAND and NOR Logic Gates Comparison of Logic Families , Implementing Logic Circuits with NAND-NOR Gates , The Meaning of Logic Implementation ,Summary.
- 6 **NONLINEAR INTEGRATED CIRCUITS II: SEQUENTIAL DIGITAL CIRCUITS**
The Basic R-S Flip-Flop , Clock Pulses , The Clocked R-S Flip-Flop, The Clocked J-K Flip-Flop - DTL, TTL ,The Clocked J-K Flip-Flop - RTL , Other Types of Flip-Flops , Clock Pulse Requirements , The Monostable Multivibrator (One-Shot) , The Schmitt Trigger, Applications of Flip-Flops in Binary Counters, Some Basic Applications of Counters , Summary.
- 7 **OPTOELECTRONIC DEVICES**
Fundamentals of Light, Photoconductive Sensors, Applications of Photodiodes and Phototransistors, Photovoltaic Sensors, Photoemissive Sensors, Light Emitters, Alpha Numeric Displays , Photocouplers, Summary.
- 8 **THYRISTORS AND THE UNIJUNCTION TRANSISTOR**
The Silicon Controlled Rectifier (SCR), The Triac, Triggering Devices, Typical Diac-Triac Phase-Control Circuit, The Unijunction Transistor (UJT), Summary.
- 9 **BASIC CHARACTERISTICS OF THE TRIODE AMPLIFIER**
Triode Construction, Triode Characteristics, Tube Properties, Relationship Between μ , r_p , g_m , Permissible Area of Operation, Operation of the Triode as a DC Amplifier, Theory of Operation of an AC Amplifier: Bias, Gain of an AC Amplifier, Maximum Output Voltage Available from an Amplifier, Use of a Blocking Capacitor, Equivalent Circuit for a Small Signal AC Amplifier - Grounded Cathode, Summary.
- 10 **ANALYSIS OF CLASS A TRIODE AMPLIFIERS**
Evolution of Self Bias, Bypass Capacitor, Grid-Leak Resistor, Determination of Operating Point, Bias Line, AC Load Line, Effect of an AC Load, Effect of Coupling Capacitor, Performance Calculations for a Class A Triode Amplifier, Other Amplifier Configurations, Cathode Follower, Grounded-Grid Amplifier, Summary.

BTET5 : DIGITAL IMAGE PROCESSING

1. CONTINUOUS IMAGE MATHEMATICAL CHARACTERIZATION

Image Representation, Two-Dimensional Systems, Two-Dimensional Fourier Transform, Image Stochastic Characterization

2. PSYCHOPHYSICAL VISION PROPERTIES

Light Perception, Eye Physiology, Visual Phenomena, Monochrome Vision Model, Color Vision Model

3. PHOTOMETRY AND COLORIMETRY

Photometry, Color Matching, Colorimetry Concepts, Tristimulus Value Transformation

4. IMAGE SAMPLING AND RECONSTRUCTION

Image Sampling And Reconstruction Concepts, Image Sampling Systems, Image Reconstruction Systems

5. DISCRETE IMAGE MATHEMATICAL CHARACTERIZATION

Vector-Space Image Representation, Generalized Two-Dimensional Linear Operator, Image Statistical Characterization, Image Probability Density Models, Linear Operator Statistical Representation

6. IMAGE QUANTIZATION

Scalar Quantization, Processing Quantized Variables, Monochrome And Color Image Quantization

7. SUPERPOSITION AND CONVOLUTION

Finite-Area Superposition And Convolution, Sampled Image Superposition And Convolution, Circulant Superposition And Convolution, Superposition And Convolution Operator Relationship

8. UNITARY TRANSFORMS

General unitary transforms, fourier transform, cosine, sine, and hartley transforms, hadamard, haar, and daubechies transforms, karhunen-loeve transform

9. IMAGE ENHANCEMENT

Contrast Manipulation, Histogram Modification, Noise Cleaning, Edge Crispening, Color Image Enhancement, Multispectral Image Enhancement

10. IMAGE RESTORATION MODELS

General Image Restoration Models, Optical Systems Models, Photographic Process Models, Discrete Image Restoration Models

11. MORPHOLOGICAL IMAGE PROCESSING

Binary Image Connectivity, Binary Image Hit Or Miss Transformations, Binary Image Shrinking, Thinning, Skeletonizing, And Thickening, Binary Image Generalized Dilation And Erosion, Binary Image Close And Open Operations, Gray Scale Image Morphological Operations

12. EDGE DETECTION

Edge, line, and spot models, first-order derivative edge detection, second-order derivative edge detection, edge-fitting edge detection, luminance edge detector performance, color edge detection, line and spot detection

13. IMAGE FEATURE EXTRACTION

Image feature evaluation, amplitude features, transform coefficient features, texture definition, visual texture discrimination