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

In

# **COMPUTER SCIENCE**

### **Course Structure**

# **Fourth Year**

# **Seventh Semester**

Paper	Name of the Subject
Code	
BECO1	Pattern Recognition & Application
BECO2	Digital Signal Processing
BECO3	Data structures & Object Representation
BECO4	Advanced Computer System Architecture
BECO5	Elective-I
BECO2P	Digital Signal Processing Practical
BECO4P	Advanced Computer System Architecture Practical

#### **BECO1: PATTERN RECOGNITION & APPLICATION**

**CHAPTER 1: APPLICATIONS OF PATTERN RECOGNITION:** Statistical Decision Theory; Image Processing and Analysis;

**CHAPTER 2: STATISTICAL DECISION MAKING:** Decision Boundaries, Estimation of Error rates, Estimating the Composition of Populations; Nearest Neighbor Classification Techniques; Choosing a Decision Making Technique;

**CHAPTER 3: CLUSTERING:** Hierarchical, Partitional; Geometric Image Scaling and Interpolation; Smoothing Transformations; Logarithmic Gray Level Scaling; The Statistical Significance of Image Features; Image

**CHAPTER 4: ANALYSIS:** Hough Transforms, Shapes of Regions, Morphological Operations, Texture, System Design, Image Sequences, Image Compression.

### **BECO2: DIGITAL SIGNAL PROCESSING**

**CHAPTER 1: INTRODUCTION :** Signal, Systems, and Signal Processing, Classification of Signals, The concept of frequency in continuous–time and discrete–time signals.

**CHAPTER 2: DISCRETE-TIME SIGNALS AND SYSTEMS :** Discrete-time signals, Analysis of discrete – Time linear time – Invariant systems, Discrete – Time systems described by Difference equations.

**CHAPTER 3: THE Z-TRANSFORM AND ITS APPLICATION TO THE ANALYSIS OF LTI SYSTEMS**: The z-Transform, Properties of the z-Transform, Inversion of the z-Transform, The one-sided z-Transform.

**CHAPTER 4: FREQUENCY ANALYSIS OF SIGNALS AND SYSTEMS** : Frequency analysis of continuous –time signals , Frequency analysis of discrete-time signals, Properties of the fourier Transform for Discrete-Time signals.

**CHAPTER 5: THE DISCRETE FOURIER TRANSFORM:** Its properties and applications, Frequency domain sampling the discrete Fourier transform, Properties of the DFT,

**CHAPTER 6: SAMPLING AND RECONSTRUCTION OF SIGNALS :** Introduction, Representation Of A Continuous-Time Signal By Its Samples: The Sampling Theorem, Sampling With A Zero-Order Hold, Sampling Of Bandpass Signals, Discrete-Time Processing Of Continuous-Time Signals.

### **BECO3 : DATA STRUCTURES AND OBJECT REPRESENTATION**

CHAPTER 1: ABSTRACT DATA TYPES: ADT Specification; Efficiency of Algorithms;

**CHAPTER 2: ALGORITHMIC ANALYSIS:** Worst-Case, Average- Case; Matrix ADT Implementation in C; Classes and Objects; Sequential Mapping ; Linked List Implementation; Dynamic Set Operations; The Stack and Queue ADTs ; Hash Tables; Hash Functions; Analysis of Uniform Hashing; The Priority Queue ADT; Graph Problems; Breadth-First Search; Depth- First Search; Shortest Paths;

CHAPTER 3: AMORTIZED ANALYSIS: Accounting Method, Potential Method; Splay Trees;

**CHAPTER 4: NON AMORTIZED DATA STRUCTURES** – Binary Heaps; Amortized Data Structures – Skew Heaps, Lazy Binomial Heaps; List-Based Data Structures; Quad Trees; The Disjoint-Set ADT.

#### **BECO4 : ADVANCED COMPUTER SYSTEM ARCHITECTURE**

#### **CHAPTER 1: INTRODUCTION**

CHAPTER 2: CENTRAL PROCESSING UNIT: CISC Characteristics, RISC Characteristics

**CHAPTER 3: PIPELINE AND VECTOR PROCESSING:** Pipelining, Arithmetic Pipeline, Vector Processing, Array Processors, SIMD Array Processor

**CHAPTER 4: MULTIPLICATION ALGORITHMS:** Introduction, addition & subtraction, multiplication algorithms, hardware implementation for signed-magnitude data, hardware algorithm, Booth multiplication algorithm, array multiplier, divide overflow, floating-point arithmetic operation, multiplication, division, floating-point operations

**CHAPTER 5: Asynchronous Data Transfer:** Strobe Control, Handshaking, Direct Memory Access (DMA)- DMA Controller, DMA Transfer

**CHAPTER 6: MEMORY ORGANIZATION:** Memory Hierarchy, Cache Memory-Associative Mapping, Direct Mapping, Set Associative Mapping, Virtual Mapping, Memory Management Hardware

**CHAPTER 7: MULTIPROCESSORS:** Interconnection structures- Time Shared Common Bus; Multiport Memory; Crossbar Switch; Multistage Switching Network; Hypercube Interconnection, Dynamic Arbitration Algorithms, Cache Coherence-Conditions for Incoherence, Solutions to the Cache Coherence Problem, problems

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