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

In

Computer

Course Structure

Second Year

Third Semester

Paper Code	Subject
BSCO1	Mathematics III
BSCO2	Switching Circuits & Logic Design
BSCO3	Signals & Networks
BSCO4	Digital Electronics
BSCO5	Electrical Machine

Syllabus

BSCO1 : MATHEMATICS III

1. PARTIAL DIFFERENTIATION AND PARTIAL DIFFERENTIAL EQUATION

Introduction, Limit , Partial derivatives , Partial derivatives of Higher orders, Which variable is to be treated as constant, Homogeneous function, Euler's Theorem on Homogeneous Functions, Introduction, Total Differential Coefficient, Important Deductions, Typical cases, Geometrical Interpretation of $\frac{dz}{dx}, \frac{dz}{dy}$, Tangent plane to a surface, Error determination, Jacobians, Properties of Jacobians, Jacobians of Implicit Functions, Partial Derivatives of Implicit Functions by Jacobian, Taylor's series, Conditions for F(x,y) to be of two variables maximum or minimum, Lagrange's method of undermined Multipliers.

2. PARTIAL DIFFERENTIAL EQUATIONS

Partial Differential Equations, Order, Method of Forming Partial Differential Equations, Solution of Equation by direct Integration, Lagrange's Linear equation, Working Rule, Method of Multipliers, Partial Differential Equations non- Linear in p,q , Linear Homogeneous Partial Diff. Eqn., Rules for finding the complimentary function, Rules for finding the particular Integral, Introduction, Method of Separation of Variables, Equation of Vibrating Strain, Solution of Wave Equation, One Dimensional Heat Flow, Two dimensional Heat Flow.

3. FOURIER SERIES

Periodic Functions, Fourier Series, Dirichlet's Conditions, Advantages of Fourier Series, Useful Integrals, Determination of Fourier constants (Euler's Formulae), Functions defined in two or more sub spaces, Even Functions, Half Range's series, Change of Interval, Parseval's Formula, Fourier series in Complex Form, Practical Harmonic Analysis.

4. LAPLACE TRANSFORMATION

Introduction, Laplace Transform, Important Formulae, Properties of Laplace Transforms, Laplace Transform of the Derivative of f (t), Laplace Transform of Derivative of order n, Laplace Transform of Integral of f (t), Laplace Transform of t.f (t) (Multiplication by t), Laplace Transform of $\frac{1}{t}$ f(t) (Diversion by t), Unit step function, second shifting theorem, Theorem, Impulse Function, Periodic Functions, Convolution Theorem, Laplace Transform of Bessel function, Evaluation of Integral, Formulae of Laplace Transform, properties of Laplace Transform, Inverse of Laplace Transform, Important formulae, Multiplication by s, Division of s (Multiplication by 1/s), First shifting properties, second shifting properties, Inverse Laplace Transform of Derivatives, Inverse Laplace Transform of Integrals,Partial Fraction Method, Inverse Laplace Transform, Solution of Differential Equations, Solution of simultaneous equations, Inversion Formulae for the Laplace Transform.

5. NUMERICAL TECHNIQUES

Solution of Ordinary Differential Equations, Taylor's Series Method, Picard's method of successive approximations, Euler's method, Euler's Modified formula, Runge's Formula, Runge's Formula (Third only), Runge's Kutta Formula (Fourth order), Higher order Differential Equations.

6. NUMERICAL METHODS FOR SOLUTION OF PARTIAL DIFFERENTIAL EQUATION

General Linear partial differential equations, Finite-Difference Approximation to Derivatives, Solution of Partial Differential equation(Laplace's method), Jacobi's Iteration Formula, Guass-Seidal method, Successive over-Relanation or S.O.R. method, Poisson Equation, Heat equation(parabolic equations), Wave equation (Hyperbolic Equation).

BSCO2 : SWITCHING CIRCUIT & LOGIC DESIGN

1. BOOLEAN ALGEBRA

Introduction, Binary Logic Functions, Logic Gates, Boolean Algebra, Universal Property, Conversion of AND/OR/NOT Logic to NAND/NOR Logic.

2. COMBINATIONAL LOGIC

Introduction, Switching Equations, Simplification of Boolean Expressions, Algebraic Simplification, Karnaugh Map Simplification – The Karnaugh Map, Quine – McCluskey or Tabular Method, NAND and NOR Implementation.

3. ANALYSIS & DESIGN OF COMBINATIONAL LOGIC

Introduction , Design Procedure, Code Conversion, Decoder, Multiplexer.

4. SEQUENTIAL LOGIC

Introduction, Flip-Flops, Triggering of Flip-Flops, Flip-Flop Conversions, Registers, Applications of Shift Registers, Counters, State table, Flip-Flop Excitation Tables, Design Procedure, Modulus N Synchronous Counter, UP/DOWN Synchronous Counters, Typical ICs for Counters.

5. SEQUENTIAL CIRCUITS

Introduction, Synchronous or Clocked Sequential Circuits, Sequence Generator, Asynchronous Sequential Circuits.

6. PROGRAMMABLE LOGIC

Introduction, Read Only Memory (ROM), Programmable Logic Array (PLA).

7. DIGITAL INTEGRATED CIRCUITS

Introduction, Definition of Parameters, TTL, Open Collector Outputs, Wired AND Connection, Comparison between TOTEM Pole Collector Output, Tri-State Logic and Bus Drivers, CMOS, Interfacing CMOS and TTL Devices.

BSCO3 : SIGNALS & NETWORKS

1. SIGNALS, SYSTEMS AND WAVEFORMS

Signals; Characteristics of Signals; Step,Ramp, and Impulse Functions (Signals); Systems (Types of Networks) --- Linear and NonLinear Network (Systems), Time Invariant and Time Variant Networks, Casual and Non Casual Networks, Passive and Active Networks, Lumped and Distributed Networks.

2. LAPLACE TRANSFORMS

Introduction, Definition of Laplace Transform, Properties of Laplace Transform, Inverse Laplace Transform, Inverse Laplace Transform Using Partial Fraction Expansion, Inverse Laplace Transform Using Convolution Integral.

3. APPLICATIONS OF LAPLACE TRANSFORMS

Introduction, Laplace Transformation For Solving Differential Equations, Application of Laplace Transform for Network Analysis, Definition of System Function, Impulse and Step Response of Networks.

4. NETWORK FUNCTIONS

Driving Point Functions, Transfer Functions, Poles and Zeros, Necessary Conditions.

5. TWO PORT NETWORKS

Introduction, Open Circuit Impedance Parameters or Z-Parameters, Short Circuit Admittance Parameters or Y- Parameters, Hybrid Parameters, Transmission or ABCD Parameters, Interrelationships between the Parameters, Interconnection of Two Port Networks, Input Impedance Interms of Two Port Parameters, Output Impedance Interms of Two Port Parameters.

6. NETWORK TOPOLOGY

Graph of the Network; Graph Theory for Network Analysis ---Network Equilibrium Equations On Loop or KVL Basis, Network Equilibrium Equations On Node or KCL Basis; Network Equilibrium Equations in Matrix Form --- Mesh or Loop or KVL Equilibrium Equations, Node or KCL Equilibrium Equations.

7. DRIVING POINT SYNTHESIS

Synthesis of Networks with Two Kinds of Elements; LC – Driving Pont Immitance Functions --- Synthesis of L-C networks; RC Driving Point Immittance Functions ---Synthesis of RC functions; RL Driving Point Immittance Functions --- Note about RL and RC Networks; RLC Network Synthesis.

BSCO4 : DIGITAL ELECTRONICS

1. NUMBER SYSTEMS AND CODES:

Binary Number System, Octal Number System, Hexadecimal Number System, Bits and Bytes , 1's and 2's Complements, Decimal –to- Binary Conversion, Decimal-to- Octal Conversion, Decimal –to-Hexadecimal Conversion, Binary –octal and Octal – Binary Conversions , Hexadecimal – Binary and Binary –Hexadecimal Conversion, Hexadecimal –Octal and Octal –Hexadecimal Conversion. BCD Code, Excess -3 Code , Gray code , Alphanumeric Codes ,Parity Bits, Hamming Code, Floating Point Numbers.

2. BINARY ARITHNETIC:

Basic Rules of Binary , Addition of Larger Bit Binary Numbers, Subtraction of Larger Bit Binary Numbers, Addition Using 2's Complement Method, Subtraction Using 2's Complement Method, Binary

Multiplicity –repeated Left Shift and Add Algorithm , Binary Divison – Repeated Right Shift and Subtract Alogrithm.

3. LOGIC GATES AND LOGIC FAMILIES:

Positive and Negative Logic, Truth Tables, Logic Gates, Fan out of Logic Gates, Logic Families, TTL Logic Family, CMOS Logic Family, ECL Logic Family,NMOS AND PMOS Logic Families.

4. BOOLEN ALGEBRA AND MINIMISATION TECHNIQUES:

Boolean Algebra vs. Ordinary Algebra , Boolean Expressions- Variables and Literals, Boolean Expressions – Equivalent and Complement,Theorems of Boolem Algebra, Minimisation Techniques ,Sum –of – products Boolen Expressions, Quine- Mccluskey Tabular Method, Karnaugh Map Method,Karnaught Maps for Boolean Expressions : With More Than Four Variables.

5. COMBINATIONAL LOGIC CIRCUITS:

Combinational Circuits, Implementating Combinational Logic, Arithmetic Circuits –Basic Building Blocks, Adder- Subtractor, BCD Adder, Carry Propagation- Look Ahead Carry Generator, Arithmetic Logic Unit (ALU), Mulitpliers, Magnitude Comparator, Parity Generator and Checker, De- multiplexers and Decoders, Encoders, Read Only Memory (ROM), Programmable Logic Array (PLA)

6. FLIP FLOPS AND RELATED DEVICES:

R-S Flip Flop , Level Triggered and Edge Triggered Flip Flops, J.K Flip Flop, Master-slave Flip Flops, T-flip Flop, D-flip Flop, Synchronous and Asynchronous Inputs.

7. COUNTERS AND REGISTERS:

Ripple Counter vs. Synchronous Counter, Modulus (or Mod-Number)of a Counter, Propogation Delay in Ripple Counters, Binary Ripple Counters- Operational Principle, Binary Ripple Counters with Modulus Less Than (2^n),Synchronous (or Parallel) Counters, Up/Down Counters, Decade and BCD Counters , Presettable Counters, Shift Register, Serial-in Serial –out Shift Register, Serial –in Parallel-out Shift Register, Parallel – in ,Serial –out Shift Register, Parallel-in , Parallel –out Shift Register, Shift Register Counters- Ring Counter, Shift Counter.

8. SEMI- CONDUCTOR MEMORY:

RAM Architecture, Static RAM (SRAM),Dynamic RAM (DRAM),

BSCO5 : ELECTRICAL MACHINES

1 INTRODUCTION

Basic concept of Electrical Engineering; Resistance
Inductance
Capacitance
Resistance connected in series and Parallel
Capacitance connected in series and parallel
Concept of AC/DC currents and AC/DC Voltages,
EMF
Potential difference, Work, Power and Energy.

2 DC NETWORKS

Kirchhoff's Laws,
Node voltage and Mesh current Methods
Delta – Star and Star - Delta Conversion
Superposition principle
Thevenin's and Norton's Theorems

3 TRANSFORMER

Construction and principle of X'Mers
EMF equation
Ideal X'Mer

Shell type & Core type X'Mer
Phasor Diagrams
Equivalent Circuits,
Regulation and Efficiency of X'Mer,
Capacity of X'Mer, and Losses,
Introduction to Auto X'Mer

4 DC MACHINES

Contruction and Principle of DC generation and DC Motor,
Back emf of DC Motor,
Types of DC Motor,
Reversal of Direction of Rotation of DC Motor,
Starting of DC Motor,
Characteristics of DC Motor,
Uses of DC Motor, Losses in DC Machine.

5 ALTERNATOR

Contruction and Working principle of Alternator,
Application of Alternators.

6 SYNCHRONOUS MOTORS

Principle of Operation,
Application of Synchronous Motors
Comparision between Synchronous Motor and Induction Motors

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