BTBSC301	**Engineering Mathematics-III**	4 Credits

Note: Syllabus for the Third Semester of Academic Year 2020-21 only

Unit-1: Laplace Transform **05 Hours**

Definition — conditions for existence; Transforms of elementary functions; Properties of Laplace transforms - Linearity property, first shifting property, second shifting property, transforms of functions multiplied by t^n scale change property, transforms of functions divided by t, transforms of integral of functions, transforms of derivatives; Evaluation of integrals by using Laplace transform.

(Points for Self-Study mode: Transforms of some special functions- periodic function, Heaviside-unit step function, Dirac delta function)

Unit-2: Inverse Laplace Transform **05 Hours**

Introductory remarks; Inverse transforms of some elementary functions; General methods of finding inverse transforms; Partial fraction method

(Points for Self-Study mode: Convolution Theorem for finding inverse Laplace transforms; Applications to find the solutions of linear differential equations and simultaneous linear differential equations with constant coefficients)

Unit-3: Fourier Transform **05 Hours**

Definitions — integral transforms; Fourier integral theorem (without proof); Fourier sine and cosine integrals; Complex form of Fourier integrals; Fourier sine and cosine transforms;

(Points for Self-Study mode: Properties of Fourier transforms; Parseval's identity for Fourier Transforms)

Unit 4: Partial Differential Equations and Their Applications **05 Hours**

Formation of Partial differential equations by eliminating arbitrary constants and functions; Equations solvable by direct integration; Linear equations of first order (Lagrange's linear equations)

(Points for Self-Study mode: Method of separation of variables – applications to find solutions of one-dimensional heat flow equation and two-dimensional heat flow equation.)

Unit-5: Functions of Complex Variables (Differential calculus) **05 Hours**

Limit and continuity of f(z); Derivative of f(z) ; Analytic functions; Cauchy- Riemann equations in Cartesian and polar forms; Harmonic functions in Cartesian form;

(Points for Self-Study mode: Mapping: Translation, magnification and rotation, inversion

and reflection, bilinear transformation; conformal mapping)

Unit-6: Functions of Complex Variables (Integral calculus) 05 Hours

Cauchy's integral theorem; Cauchy's integral formula; Residues; Cauchy's residue theorem (All theorems without proofs).

BTEXC302	**Analog Circuits**	4 Credits

Note: Syllabus for the Third Semester of Academic Year 2020-21 only

UNIT - 1 OP-AMP Basics **05 Hours**

Block diagram of OP-AMP, current mirror circuits. Feedback topologies: Voltage series and voltage shunt feedback amplifier and its effect on Ri, Ro, bandwidth and voltage gain.

(Points for Self-Study mode: Differential Amplifier configurations, Differential amplifier analysis for dual-input balanced-output configurations, Need and types of level shifter)

UNIT – 2 Linear Applications of OP-AMP **06 Hours**

Inverting and non-inverting amplifier configurations, voltage follower, summing, averaging scaling amplifier, difference amplifier, integrator, differentiator

(Points for Self-Study mode: Instrumentation amplifiers)

UNIT – 3 Non-linear Applications of OP-AMP **05 Hours**

Introduction to comparator, characteristics and applications of comparator, Schmitt trigger, clippers and clampers, voltage limiters, square wave generator, triangular wave-generator

(Points for Self-Study mode: Need of precision rectifiers, half wave and Full wave precision rectifiers.)

UNIT – 4 Converters using OP-AMP **04 Hours**

I-V and V-I converter, Digital-to-analog converters (DAC): Weighted resistor, R-2R ladder, Analog-to-digital converters (ADC): Single slope, dual slope

(Points for Self-Study mode: V-F converter, DAC: resistor string etc., ADC: successive approximation, flash type.)

UNIT – 5 Oscillators **04 Hours**

Principle of Oscillators, Barkhausen criterion, Oscillator types: RC oscillators (design of phase shift, Wien bridge etc.), LC oscillators (design of Hartley, Colpitts, Clapp.)

(Points for Self-Study mode:Non- sinusoidal oscillators, Voltage controlled oscillators.)

UNIT – 6 Active filters and PLL **06 Hours**

Design guidelines of Active filters: Low pass, high pass, band pass and band stop filters

(Points for Self-Study mode: Block diagram of PLL and its function.)

BTEXC303	**Electronic Devices and Circuits**	4 Credits

Note: Syllabus for the Third Semester of Academic Year 2020-21 only

UNIT - 1 JFET **05 Hours**

Introduction to JFET, Types, Construction, Operation, Static Characteristics, Pinch off voltage, FET Volt-Ampere characteristics, FET Configurations (CS/CD/CG) and their Comparison. Biasing of FET (Self). FET as an amplifier and its analysis (CS) and its frequency response.

(Points for Self-Study mode: Small signal model, FET as High Impedance circuits)

UNIT - 2 MOSFET& its DC Analysis **05 Hours**

Basics of MOS Transistor operation, Construction of n-channel E-MOSFET, E- MOSFET characteristics. MOSFET as switch, diode/active resistor, CMOS Inverter as amplifier: Active load.

(Points for Self-Study mode: MOSFET parameters, non-ideal voltage current characteristics viz. Finite output resistance, body effect, sub-threshold conduction, breakdown effects and temperature effects. Common source circuit, Load Line & Modes of operation, common MOSFET configurations: DC Analysis, constant current source biasing, Current sink and source, current mirror, Voltage references, Basic principle of band gap reference)

UNIT - 3 Electronics Amplifiers **05 Hours**

Classification of amplifiers, Fundamentals of Low noise and Power amplifiers.

Feedback amplifiers: Feedback concept and topologies, Effect of feedback on terminal characteristics of amplifiers.

(Points for Self-Study mode: Feedback amplifier analysis, cascade amplifiers, DC Amplifiers.)

UNIT - 4 Oscillators **05 Hours**

Barkhausen criterion, stability with feedback. Classification of oscillators, RC Oscillators: FET RC Phase Shift oscillator, LC Oscillators: Hartley and Colpitts oscillators, Crystal oscillators

(Points for Self-Study mode: Wein bridge oscillator , UJT Relaxation oscillator.)

UNIT - 5 Multivibrators **05 Hours**

IC555 Block diagram, Types of Multivibrators: Astable, Monostable and Bistable, Operation of Multivibrators using IC555. Applications of IC555 in Engineering

(Points for Self-Study mode: Operation of Multivibrators using FETs)

UNIT - 6 Voltage Regulator **05 Hours**

Block diagram of an adjustable three terminal positive and negative regulators (317,337) typical connection diagram, Introduction to Switch Mode Power supply (SMPS), Block diagram of SMPS, Types of SMPS. Comparison of Linear Power supply and SMPS.

(Points for Self-Study mode: current boosting, Low drop out voltage regulators)