SVKM's NMIMS
Mukesh Patel School of Technology Management & Engineering
Electronics & Telecommunication (2019 – 2020)

Program: B. Tech. (EXTC)				Semester: III	
Course: Mathematics III				Code: BTET03010	
Teaching Scheme				Evaluation Scheme	
Lecture (Hours per week)	Practical (Hours per week)	Tutorial (Hours per week)	Credit	Internal Continuous Assessment (ICA) (Marks - 50)	Term End Examinations (TEE) (Marks- 100 in Question Paper)
3	0	1	4	Marks Scaled to 50	Marks Scaled to 50

Pre-requisite:
Knowledge ofIntegration, Differential Equation, Periodic function, Even and odd Function, Beta-Gamma Function, Circular Function and Trigonometric series.

Objectives:

1. To provide an understanding of Laplace transform and its applications, Fourier series, Fourier Transform,Z-transform.
2. To provide students with mathematics fundamentals necessary to formulate, solve and analyses complex engineering problems.

Outcomes:
After completion of the course, students would be able to :

1. Solve problems using Laplace transform, Fourier series, Fourier Transform, Z -transform.
2. Analyze the concept of Laplace transform, Fourier series, Fourier Transform,Z -transform.
3. Apply the techniques of Laplace transform, Fourier series, Fourier Transform andZ -transform to engineering problems.

Detailed Syllabus:

Unit	Description	Duration
1	**Laplace transformation:** Definition of Laplace transform, Laplace transform of 1, e^{at}, $\sin at$, $\cos at$, $\sinh at$, $\cosh at$, t^n, Properties of Laplace transform: Linearity property, First and second shifting theorems of Laplace transform, Change of scale property, $L\{t^n f(t)\}$,	13

	$L\left\{\frac{f(t)}{t}\right\}, L\{f^n(t)\}, L\left\{\int_0^t f(u)\,du\right\}$, Evaluation of Inverse Laplace transform by partial fraction, Convolution theorem,Laplace transforms of Periodic functions, Unit step functions, Dirac delta functions. Applications: to solve initial and boundary value problems involving ordinary differential equations.	
2	**Fourier series:** Orthogonality and Orthonormality, Periodic function, Trigonometric Series, Dirichlet's conditions, Euler's formulae (Derivative of Fourier coefficients a_0, a_n, b_n is not expected), Fourier Series of Functions for the interval $[\alpha, \alpha+2\pi]$ and $[\alpha, \alpha+2c]$, Functions having points of discontinuity, Even and odd functions, half range sine and cosine expansions, Parseval's identities. Complex form of Fourier series, Fourier integral theorem, Fourier sine and cosine integral.	11
3	**Fourier Transform:** Fourier Transform, Fourier Sine Transform, Fourier Cosine Transform, Properties of Fourier Transform (Linearity property, Change of scale property, Shifting property), Inverse Fourier Transform, Inverse Fourier Sine Transform, Inverse Fourier Cosine Transform, Finite Fourier Transform. Application: Fourier transform to solve differential equations.	9
4	**Z-transforms:** Introduction, Sequences, Representation of sequences, Basic operators on Sequences, Z-transforms, Properties of Z-Transforms, Change of scale, Shifting Properties, Inverse Z-transform, Solution of Difference equations, Multiplication by K, Division by K, Initial value, Final value, Partial sum, Convolution, Convolution Property of Casual Sequence, Transform of important sequences, Inverse of Z-transform by division, binomial expansion and partial fraction, Inverse by residue Method, Solution of Difference equation.	12
	Total	45

Text Books:

1. B. V. Ramana (2017), "Higher Engineering Mathematics", *McGraw Hill Education, 1st Edition.*

Reference Books:

1. G. B. Thomas (2014), "Calculus", *Pearson, 13th Edition.*
2. Erwin Kreyszig (2017), "Advanced EngineeringMathematics", *Wiley India, 10th Edition.*
3. B. S. Grewal (2017), Higher Engineering Mathematics, *Khanna Publishers, 44thEdition.*

Details of Internal Continuous Assessment (ICA)

Test Marks : 20

Term Work Marks : 30

Term Work:

1. At least ten Tutorials based on the entire syllabus duly recorded and graded.
2. Tutorials/Assignments/Viva-voce/ Quiz/Tutorial test/ Seminar/Presentation

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SVKM's NMIMS
Mukesh Patel School of Technology Management & Engineering
Electronics & Telecommunication (2019 – 2020)

Program: B. Tech. (EXTC)				Semester : III	
Course : Electronic Devices				Code : BTET03011	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Theory (3 Hrs, 100 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (50 Marks)
3	2	0	4	Scaled to 50 Marks	Scaled to 50 Marks

Pre-requisite: Engineering Physics

Objectives:

1. To understand the construction, working principle, characteristics and simple applications of basic electronic devices.
2. To understand the application of these devices in making advanced circuits like amplifiers and oscillators.

Outcomes:

After the successful completion of this course, the student will be able to

1. Understand construction and characteristics of various types of diodes and illustrate simple circuits with diodes.
2. Understand bipolar junction transistor (BJT) and Field Effect Transistor (FET), their modes of operation and analyse their applications.
3. Analyse different types of amplifier and oscillator circuits.
4. Understand the basic concepts of Operational amplifier.

Detailed Syllabus:

Unit	Description	Duration
1.	Diodes and Applications covering: Semiconductor Diode - Ideal versus Practical, Resistance Levels, Diode Equivalent Circuits, Load Line Analysis; Diode as a Switch, Diode as a Rectifier, Half Wave and Full Wave Rectifiers with and without Filters; Breakdown Mechanisms, Zener Diode – Operation and Applications; Opto-Electronic Devices – LEDs, Photo Diode and Applications, Schottky diode, solar cell;	08

2.	Introduction to Semiconductor Physics: Review of Quantum Mechanics, Electrons in periodic Lattices, E-k diagrams. Energy bands in intrinsic and extrinsic silicon; Carrier transport: diffusion current, drift current, mobility and resistivity; sheet resistance Generation and recombination of carriers; Poisson and continuity equation P-N junction characteristics, I-Vcharacteristics, and small signal switching models;	08
3.	Bipolar Junction Transistor covering, Bipolar Junction Transistor (BJT) – Construction, Operation, Amplifying Action, Common Base, Common Emitter and Common Collector Configurations, Operating Point, I-V characteristics, Ebers-Moll Model, Voltage Divider Bias Configuration;	07
4.	Field Effect Transistor covering, Field Effect Transistor (FET) – Construction, Characteristics of Junction FET, Depletion and Enhancement type Metal Oxide Semiconductor (MOS) FETs, Introduction to CMOS circuits; MOS capacitor, C-V characteristics, MOSFET, I-V characteristics, and small signal models of MOS transistor;	07
5.	Transistor Amplifiers and Oscillators covering, Classification, Small Signal Amplifiers – Basic Features, Common Emitter Amplifier, Coupling and Bypass Capacitors, Distortion, AC Equivalent Circuit; Oscillators – Classification, RC Phase Shift, Wien Bridge, High Frequency LC and Non-Sinusoidal type Oscillators;	09
6.	Operational Amplifiers covering, Introduction to Op-Amp, Differential Amplifier Configurations, CMRR, PSRR, Slew Rate; calculation of differential gain, common mode gain, CMRR and ICMR. Block Diagram, Pin Configuration of 741 Op-Amp, Characteristics of Ideal Op-Amp, Concept of Virtual Ground; OP-AMP Design of gain stages and output stages, compensation.	06
	Total Hours	45

Text Books:

1. G. Streetman, and S. K. Banerjee, "Solid State Electronic Devices," 7th edition, Pearson,2014.
2. D. Neamen , D. Biswas "Semiconductor Physics and Devices," McGraw-Hill Education
3. S. M. Sze and K. N. Kwok, "Physics of Semiconductor Devices," 3rd edition, John Wiley & Sons, 2006.
4. C.T. Sah, "Fundamentals of solid state electronics," World Scientific

Publishing Co. Inc, 1991.
5. Y. Tsividis and M. Colin, "Operation and Modeling of the MOS Transistor," Oxford Univ.Press, 2011.

Reference Books:

1. Donald Schilling & Charles Belove, "Electronic Circuits Discrete and Integrated", McGraw Hill International, 3rd edition, 1989.
2. Martin Roden, Gordon Carpenter, William Wieserman, "Electronic Design", Shroff.Publishers, 4th edition, 2002.
3. Robert Boylestad& Louis Nashelsky, "Electronic Devices & Circuit Theory", Pearson Education India - 9th Edition, 2007.
4. B.L. Theraja, "Fundamentals of Electrical Engineering and Electronics", S. Chand & Co., 2nd Edition, 2004.

Details of Internal Continuous Assessment (ICA)

Test Marks : 20

Term Work Marks : 30

Term Work:

1. At least ten laboratory experiments based on the entire syllabus duly recorded and graded.
2. Experiments covering the following topics
   - PN Junction Diode Characteristics
   - Zener diode characteristics and load and line regulation
   - Rectifiers and filters
   - BJT Characteristics and biasing methods
   - FET Characteristics and biasing methods
   - BJT applications- Amplifier and switch
   - OP-AMP parameter measurements
   - Differential Amplifier
   - Oscillators: High and low frequency
   - Simulation on above topics
3. Lab Experiments/Tutorials/Assignments/Viva-voce/ Quiz/Lab Exam/ Seminar/Presentation

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SVKM's NMIMS
Mukesh Patel School of Technology Management & Engineering
Electronics & Telecommunication (2019 – 2020)

Program: B. Tech. (EXTC)				Semester : III	
Course : Digital System Design				Code : BTET03012	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Theory (3 Hrs, 100 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (50 Marks)
3	2	0	4	Scaled to 50 Marks	Scaled to 50 Marks

Pre-requisite:

Objectives:

1. To provide knowledge of digital logic & digital system as well as their applications in technical field.
2. To provide knowledge of basic building blocks and their working.
3. To provide knowledge of designing the digital logic circuit using basic building blocks and necessary techniques which is required in computer hardware design.

Outcomes:

After the successful completion of this course, the student will be able to

1. Understand concept of digital system and logic simplification.
2. Apply HDL & appropriate EDA tools for digital logic circuit design.
3. Design and analyze combinational and sequential circuits.
4. Understand different logic families and semiconductor memories.

Detailed Syllabus:

Unit	Description	Duration
1.	**Introduction To Digital Systems and logic simplification:** Number Systems: binary, octal, hexadecimal, BCD. Conversion from one system to another, Binary Subtractionusing 1's and 2's Complement method. Weighted codes: BCD and binary, non-weighted codes: grey and excess 3, conversion from one code to another. Logic gates and implementation of digital logic using universal gates, Review of Boolean Algebra and De Morgan'sTheorem, SOP & POS forms, Canonical forms, Karnaugh maps up to 4 variables	10
2.	**Introduction to VHDL:** VLSI Design flow: Design entry, Schematic, different modelling styles in VHDL: Dataflow, Behavioural and Structural Modelling.	06

	Data types and objects, Synthesis and Simulation of any digital logic	
3.	**Combinational logic circuit and its implementation:** Combinational circuits : Adders, Subtractors(half and full), BCD adder, Serial and Parallel adder, ALU, Comparators, Multiplexers, Demultiplexer, Encoder, Decoder, Design of digital logic using MUX. VHDL codes for combinational digital circuits.	**12**
4.	**Sequential Logic Circuits:** Flip-flops: SR, T, D, JK, master slave JK, converting one flip-flop to another.Shift registers, Synchronous and Asynchronous (Ripple) Counters and its designing. Ring counter, Johnson counter, pseudo random binary sequence generator. Finite state machines: mealy and moore circuits, Design of synchronous FSM, VHDL codes for sequential digital circuits.	**12**
5.	**Logic Families and Semiconductor Memories:** TTL NAND gate, Specifications, Noise margin, Propagation delay, fan-in, fan-out, ECL, CMOS families, Memory elements, Concept of Programmable logic devices like FPGA. Logic implementationusing Programmable Devices.	**05**
	Total Hours	**45**

Text Books:

1. Morris Mano, Digital Design, PHI, 4th edition, 2008.

Reference Books:

1. R.P Jain, Digital Electronics and Microprocessors, Tata McGraw-Hill, 25th reprint 2007.
2. Roth and John: Principles of Digital Systems Design, Ceneage Learning, Sixth Indian Reprint 2011.
3. Douglas Perry, "VHDL", Tata McGraw Hill, 4th edition, 2002.

Details of Internal Continuous Assessment (ICA)

Test Marks : 20

Term Work Marks : 30

Term Work:

1. At least ten laboratory experiments based on the entire syllabus duly recorded and graded.
2. Experiments covering the following topics
   - Logic gates and universal gates
   - De-Morgan's theorem
   - Codes and code conversion
   - Combinational circuits
   - Sequential circuits

- Study of logic families and Semiconductor Memories
- VHDL programming of combinational and sequential circuit

3. Lab Experiments/Tutorials/Assignments/Viva-voce/ Quiz/Lab Exam/ Seminar/Presentation

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Mukesh Patel School of Technology Management & Engineering
Electronics & Telecommunication (2019 – 2020)

Program: B. Tech. (EXTC)				Semester : III	
Course : Signals and Systems				Code : BTET03013	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Theory (3 Hrs, 100 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (50 Marks)
3	2	0	4	Scaled to 50 Marks	Scaled to 50 Marks

Pre-requisite: Engineering Mathematics

Objectives:

1. To provide knowledge of analog domain signals and systems for time and frequency domain analysis.
2. To study various continuous and discrete time transforms.

Outcomes:

After the successful completion of this course, the student will be able to

1. Define and identify various types of signals and systems.
2. Apply mathematical operations to analyze signals and systems.
3. Apply various mathematical transforms for continuous time signal and systems.
4. Use various transforms to analyze discrete time signal and systems.

Detailed Syllabus:

Unit	Description	Duration
1.	**Introduction to Signals and Systems:** Introduction to Signals and Systems, Classification of signals, Elementary signals: analog and discrete time, Basic operation of signals.	04
2.	**Time domain representation for linear time invariant systems (analog& discrete):** Classification of systems, Convolution of infinite and finite time continuous signals and discrete time signals, Impulse, step response for first and second order LTI systems	06
3.	**Fourier Series for continuous time and discrete time signals:** Representation of signals in terms of orthogonal and orthonormal functions, Dirichlet Conditions, Gibb's Phenomenon, Fourier series representation of continuous and discrete time signals.	07
4.	**Fourier Transform for continuous time signals:** Limitations of Fourier Series, Introduction to Fourier transform,	06

	properties, Fourier transform of periodic signal, Relation between Fourier and Laplace Transform, Frequency response.	
5.	**Laplace transforms:** Limitations of Fourier transform, Introduction to Laplace transform, ROC and properties, Application of Laplace Transform in electrical circuit, Laplace Transform of elementary signals, Unilateral Laplace transform, Inverse Laplace transform, Using Laplace Transform with or without initial conditions.	**12**
6.	**Z - transform:** Introduction to Z transform, Z transform of elementary signals, ROC, Properties of Z transform, Inverse of Z transform using Partial Fraction and long division rule, Solution of difference equation, Introduction to Unilateral Z transform.	**10**
	Total Hours	**45**

Text Books:

1. Tarun Kumar Rawat, Signals and Systems, Oxford University Press, July-2010.
2. NagoorKani , Signals and Systems, McGraw-Hill publication, 1st Edition, March-2010.

Reference Books:

1. Oppenheim &Willsky, Signal and Systems, Prentice Hall of India publication, 2nd edition, 2008.
2. Simon Haykin& Barry van veen, Signal and Systems, John Wiley publication. 2nd edition, 2008.

Details of Internal Continuous Assessment (ICA)
Test Marks : 20
Term Work Marks : 30
Term Work:

1. At least ten laboratory experiments based on the entire syllabus duly recorded and graded.
2. Experiments covering the following topics
   - Plotting of elementary signals like sine, cos and impulse
   - Find whether given signal is even or odd
   - Find whether given signal is periodic or aperiodic
   - Evaluate convolution integral
   - Evaluate convolution sum
   - Compute Laplace transform of the continuous time signal
   - Compute and plot poles and zeros of the system
   - Find whether given system is stable or unstable
   - Evaluate CTFT of the given signal

- Self-Experiment (Project)

3. Lab Experiments/Tutorials/Assignments/Viva-voce/ Quiz/Lab Exam/ Seminar/Presentation

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Program: B. Tech. (EXTC)				Semester : III	
Course : Circuit and Network Theory				Code : BTET03014	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Theory (3 Hrs, 100 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (50 Marks)
3	0	0	3	Scaled to 50 Marks	Scaled to 50 Marks

Pre-requisite: Knowledge of Basic Electrical Engineering

Objectives:

1. To provide knowledge of basic fundamentals of Electrical & Electronics network analysis and synthesis.
2. To expose students to simulation tools for circuit analysis.
3. To analyse and synthesize two port networks.

Outcomes:

After the successful completion of this course, the student will be able to

1. Apply knowledge of basic electrical engineering to analyze ac and dc circuits.
2. Apply knowledge of mathematics to evaluate the steady state and transient responses of electrical circuits.
3. Know different parameters of two-port networks and compute network parameters.
4. Synthesize L-C, R-C and R-L circuits.

Detailed Syllabus:

Unit	Description	Duration
1.	**Mesh & Node Analysis** Mesh & Node Analysis of circuits with independent & dependent AC and DC sources.	05
2.	**Network Theorems** Linearity, Superposition, Current & Voltage Source Transformation, Thevenin's& Norton's Theorem, Maximum power transfer theorem, Compensation and Tellegen's theorem – as applied with independent & dependent AC and DC sources.	09
3.	**Circuit Analysis** Introduction to Graph Theory. Tree, link currents, branch voltages, cut set & tie set. Mesh & Node Analysis, Duality.	04
4.	**Transient Analysis of Circuits using Classical Technique** First & second Order Differential equations for Evaluation &	05

	analysis of Transient and Steady state responses, initial conditions.	
5.	**Transient and steady state response of circuits using Laplace Transform** Circuit analysis using Laplace Transform. Transfer function, Concept of poles and zeros of immitance functions and their properties, sinusoidal response from pole-zero locations	05
6.	**Network functions and Two - port Networks** Concept of two- port network. Driving point & Transfer Functions, Open Circuit impedance (Z) parameters, Short Circuit admittance (Y) parameters, Transmission (ABCD) parameters. Inverse Transmission (A'B'C'D') parameters. Hybrid (h) parameters. Inter Relationships of different parameters. Interconnections of two – port networks. T & Pi representation. Terminated two - port networks.Introduction to band pass, low pass, high pass and band reject filters	10
7.	**Network Synthesis** Positive real functions, Properties of Positive real functions, Testing Positive real functions. Driving Point functions, Testing driving point functions. Properties of Hurwitz polynomials, Residue computations, Even & odd functions, Driving Point Synthesis with L-C, R-C and R-L circuits.	07
	Total Hours	45

Text Books:

1. William. H. Hayt, Jack E. Kemmerly& Steven M. Durbin, 'Engineering Circuit Analysis', McGraw Hill International, 6th edition, 2002.
2. M. E. Van Valkenburg, 'Network Analysis', Prentice Hall of India, 3rd edition, 2006.

Reference Books:

1. A. Sudhakar& S. P. Shyammohan, 'Circuits and Networks', Tata McGraw Hill, thirteenth reprint, 2000.
2. Artice M. Davis, 'Linear Circuit Analysis', Thomson Asia Pte. Ltd., Singapore, first edition, 2001
3. Raymond A. DeCarlo& Pen-Min Lin, 'Linear Circuit Analysis', Oxford University Press, second edition, 2001.

4. Ravish Singh 'Electrical Networks' Tata McGraw hill publication, 2009.
Details of Internal Continuous Assessment (ICA) **Test Marks : 20** **Term Work Marks : 30** **Term Work:** 1. Assignments/Viva-voce/ Quiz/Seminar/Presentation

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