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

Program: B. Tech. Integrated (EXTC)					Semester : IV
Course : Digital Logic and Design					Code : BTIET04001
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: Basic Electronics

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. Convert different number systems, codes and compare logic gates.
2. Describe Boolean laws and theorem and use them to realize to minimum function using K-Map and Boolean algebra.
3. Design and implement different types of Combinational Logic Circuit using gates.
4. Design and implement Sequential Logic Circuits like counters and registers using flip-flops.
5. Describe and compare various logic families and data converters

Detailed Syllabus:

Unit	Description	Duration
1.	**Introduction to digital signal, Advantages of Digital System over analog:** Number Systems: Different types of number systems(Binary, Octal, Hexadecimal), conversion of number systems. Binary arithmetic: Addition, Subtraction, Multiplication, Division. Subtraction using 1's complement and 2's complement	08

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2.	**Codes :** BCD, Gray Code, Excess-3, ASCII code, error detecting codes, even parity, Hamming codes. Conversion of Binary to Gray and Excess-3 and vice versa	02
3.	**Logic Gates and Boolean Algebra:** Basic gates and Derived Gates, NAND and NOR as Universal gates. Boolean Algebra: Fundamentals of Boolean laws, Duality Theorem, De Morgan's theorems (numerical based on simplification of logic equations).	04
4.	**Logic Families:** Characteristics of logic families & Comparison between different logic families. Logic families such as TTL, CMOS, ECL. TTL NAND gate – Totem pole output, open collector. CMOS Inverter.	02
5.	**Combinational Logic Circuit Design:** Standard representation of canonical forms (SOP & POS), Maxterm&Minterm), conversion between SOP and POS forms. K-map reduction technique upto 4 variables. Binary arithmetic circuits– Design of adders, subtractors (half and full) using K-Map, BCD adder– subtractor, ALU. Code Converter using K-map: Gray to Binary, Binary to Gray Code. Multiplexers (MUX): Implementation of digital logic using Mux and MUX tree. Demultiplexers(DEMUX): Demux tree, Demux as decoder. IC 7447 as BCD to 7 segment decoder – driver	12
6.	**Sequential Logic Circuit Design:** Comparison between Combinational & Sequential circuits, One bit memory cell - RS latch – using NAND & NOR. Triggering Methods (Edge and level trigger) Flip-flops- SR, T, D, JK, master slave JK, excitation tables of all flip-flops, converting one flip-flop to another. Counter: Modulus of counter, their types as Asynchronous and Synchronous counter. Asynchronous counter: Design and Implementation using flip-flops, Ripple counter, 4 bit up/down Counter. Synchronous counter: Implementation of 3 bit synchronous counter, its truth table and waveforms. Block schematic and waveform , IC 7490 as MOD-N Counter	12
7.	**Shift Registers:** Serial input -serial output; serial input-parallel output; Parallel In -Parallel Out, Serial In -Serial Out, Bi Directional Shift Registers, 4-	02

	bit Universal Shift Registers. Applications of Shift Register (Logic Diagram with waveforms) of: Ring counter and Twisted ring counter.	
8.	**Data Convertors:** DAC: Weighted resistor method, (Mathematical derivation) and R-2R Method (Mathematical derivation up to 3 variable), ADC: Single slope ADC, Dual slope ADC, SAR ADC	03
	Total Hours	**45**

Text Books:

1. R.P Jain, Modern Digital Electronics, Tata McGraw-Hill, 4th Edition 2013.
2. G.K. Kharate, Digital Electronics, OXFORD Publication, 6th Edition, 2013.

Reference Books:

1. Morris Mano, Digital Design, PHI, 4th edition, 2008
2. Roth and John: Principles of Digital Systems Design, Ceneage Learning, Sixth Indian Reprint 2011.

Term Work:

1. At least ten laboratory experiments
2. Two term tests
3. Assignments based on the whole syllabus, duly recorded and graded.

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

Program: B. Tech. Integrated (EXTC)					Semester : IV
Course : Basic Electronics					Code : BTIET04002
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:

1. Theory of semiconductor materials, their atomic structures and properties.
2. DC circuit analysis, ac fundamentals.

Objectives:

1. Understand the construction, working principle, characteristics and simple applications of basic electronic devices.
2. Understand the application of these devices in making advanced circuits like amplifiers and oscillators.
3. To impart hands-on experience in assembling and testing circuits.
4. Get exposed to inter disciplinary engineering disciplines.

Outcomes:

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

1. Identify various types of diodes and illustrate simple circuits with diodes.
2. Explain bipolar junction transistor (BJT), modes of operation and analyze its applications.
3. Describe junction field effect transistor (JFET) and analyze its applications.
4. Design amplifiers and switching circuits using BJT and FET.
5. Describe different types of power amplifiers and oscillators.
6. Illustrate the working of amplifier and oscillator circuits.

Detailed Syllabus:

Unit	Description	Duration
1.	**Diode and its Applications:** Introduction to Semiconductor Diode Theory, DC Analysis and Models of diode, AC Equivalent Circuits of diode. Diode Types: photodiode, Light-Emitting Diode, Schottky Barrier Diode, Zener Diode, Temperature Effects, Understanding Manufacturer's Specifications. Applications: Rectifier Circuits - Half Wave and Full Wave Rectification, Filter circuits, Ripple Voltage and Diode Current. Zener Diode Circuits - Zener diode as voltage regulator. Clipper and Clamper Circuits.	15

2.	**Bipolar Junction Transistor:** Basic Bipolar Junction Transistor, Transistor Structures, NPN Transistor: Forward-active Mode Operation, PNP Transistor: Forward-active Mode Operation, Circuit Symbols and Conventions, Current-Voltage Characteristics, Non ideal Transistor Leakage Currents and Breakdown, DC Analysis of Transistor Circuits. Basic Transistor Application: Switch, Amplifier. Bipolar Transistor Biasing – Bias Stability, Fixed Bias, Collector-to-Base Bias, Voltage Divider Bias. Understanding Manufacturer's specifications. BJT amplifier frequency response. Figure of merit of an amplifier.	15
3.	**Field Effect Transistor:** Junction Field-Effect Transistor. JFET Biaisng Methods (fixed bias, voltage divider bias and self bias). FET amplifier frequency response. Figure of merit of an amplifier.	08
4.	**Oscillators:** Positive feedback and basic Principles for Oscillation, Classification of transistor oscillators: Phase-Shift Oscillator, Wien-bridge Oscillator, Colpitts Oscillator, Hartely Oscillator, Crystal Oscillator.	07
	Total Hours	**45**

Text Books:

1. Donald A. Neamen, Electronic Circuit Analysis and Design, McGraw Hill International , 2nd Edition, 2001.
2. David A. Bell, Electronic Devices & Circuits, Prentice Hall India Pvt. Ltd, 5th Edition, 2008.

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.

Term Work:

1. At least ten laboratory experiments
2. Two term tests
3. Assignments based on the whole syllabus, duly recorded and graded.

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

Program: B. Tech. Integrated (EXTC)				Semester : IV
Course : Environmental Studies				Code : BTIET04003
Teaching Scheme				Evaluation Scheme
Lecture Hours Per week	Practical Hours Per week	Tutorial Hours Per week	Credit	Internal Continuous Assessment (ICA) As per Institute Norms (50 Marks)
2	0	0	2	Scaled to 50 marks

Pre-requisite: Nil

Objectives:

1. To provide knowledge/information on the emergence of Strategic options for environmental decision-making.
2. To provide the skills to prepare Corporate Environmental Reports- Sustainability Reports/ TBL reports.
3. To provide the foundations for corporate governance –non-financial implications and the significance of environmental governance and best practices.

Outcomes:

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

1. Recognize Role of the industries in managing the industrial pollution.
2. Identify the foundations for corporate governance.
3. Assess Urban Environmental problems and use of practices to minimize them.

Detailed Syllabus:

Unit	Description	Duration
1.	**Overview** of the nature and significance of emerging global environmental issues and trends. **Major** industrial and other environmental disasters like Bhopal Tragedy **International conventions** like Montreal Protocol, Basal Convention Climate Convention and similar other developments and their significance in policy formulation and policy enactment.	06
2.	**Industrial Pollution-** types of industrial pollution, - Hazardous Waste Management, Role of the industries in managing the industrial pollution. pollution prevention. ISO 14000 EMS certification	06
3.	**Triple Bottom Line (TBL), Sustainability Reporting Practices –** Strategic options for companies and competitive advantages for	

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	corporate reporting practices. Command and control strategies Vs market driven mechanisms. Carbon Credits/ carbon trading. Role of the Government in managing the environmental activities in all sectors. Organisational set up at the Central and state level to manage the environment.	06
4.	**Management Tools -** Regulatory and legal instruments available for Environmental Management. Environmental Statement and Environmental Impact assessment (EIA) in all sectors. Role of judiciary in managing the environment. Major Laws Air (P&C.P.) Act, Water (P & C.P) Act. Environment Protection Act EPA 1986. Wild life Protection Act etc., PIL	06
5.	Urban Environmental problems specific to cities, waste management issues (both domestic and industrial). Garbage disposal and management, solid waste management options for waste minimization. Role of Citizens, Role of NGOs/ Environmental Activists. Environmental footprints.	06
	Total	30

Text Books:

1. Dr.(Smt.).Bala Krishnamoorthy, Environment Management, Text and Cases, Prentice Hall of India, 2nd Edition, 2008.

Reference Books:

1. Agarwal S.K, Environmental Issues and Themes, A.P.H. Publishing Corporation, 1997 (Classic).
2. Dodds Felix, Earth summit 2002: A new deal by, Routledge, 2001.
3. Journal of Down to earth published by Centre for Science and Education CSE.

Term Work:

1. At least two assignments, covering the whole of syllabus, duly recorded and graded.
2. At least one case study with presentation.

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Program: B. Tech. Integrated (EXTC)				Semester: IV	
Course: Engineering Mathematics-II				Code: BTIET04004	
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	2	4	Scaled to 50 marks	Scaled to 50 marks

Objectives:

1. To provide an understanding of Matrices and differential equations in technical subjects.
2. To impart knowledge of Beta & Gamma functions and double integrals, its applications to solve engineering problems.

Outcomes:

After successful completion of this course, students will be able to:

1. Solve system of linear equations
2. Evaluate problems using Beta and Gamma functions
3. Analyse suitable method to solve differential equations
4. Relate the concepts of double integral to solve engineering problems.

Detailed Syllabus:

Unit	Description	Duration
1.	**Matrices:** Rank of a matrix, Rank by Normal form and Echelon form, Reduction of a matrix A to normal form PAQ, Linear dependence and independence of rows and columns of a matrix over real field. **Applications:** Solving system of linear homogeneous and non-homogeneous equations using Cramer's rule, matrix inversion method, reduction to echelon form.	12
2.	**Beta and Gamma functions:** Definition of Beta and Gamma functions and their properties; Relation between Beta and Gamma functions; Duplication formula.	08
3.	**Ordinary Differential Equations:** Definition of differential equation, order and degree of differential equation, formulation of differential equation. **Solution of differential equation of first order and first degree:** Variable separable method, reducible to variable separable method, Homogeneous differential equation, reducible to homogeneous differential equation, exact differential equation and those which can be reduced to exact form using integrating factor (four rules), Linear differential equations, Bernoulli's differential equation.	15

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for

	Solution of Linear differential equations of higher order with constant coefficients: Complementary functions, Particular integrals of the differential equations of the type $f(D)y = X$ where $X = e^{ax}, \sin(ax+b), \cos(ax+b), x^m, e^{ax}V(x), xV(x)$. Applications of differential equations in modelling: First-order Equations, Free Mechanical Oscillations, Forced Mechanical Oscillations.	
4.	**Double Integration:** Double integration in cartesian and polar co-ordinates, evaluation of integrals over a given region, change of order of integration, change of co-ordinate system, application of double integration to compute area, mass of a lamina and volume.	10
	Total Hours	**45**

Text Books:

1. Robert Wrede (2010), Murray Spiegel, *Schaum's Outline of Advanced Calculus, Third Edition.*
2. B. S. Grewal (2013), "Higher Engineering Mathematics", *Khanna Publishers.*

Reference Books:

1. Erwin Kreyszig (2010), "Advanced Engineering Mathematics", *Wiley Eastern Ltd, 10th edition.*
2. Howard Anton (2012), "Calculus", *Wiley, 10th edition.*
3. G. Birkhoff and G. C. Rota, Ordinary Differential Equations (2003), *4th Edition, Wiley Singapore Edition.*
4. Alan Jeffrey (2003), Handbook of Mathematical Formulas and Integrals, *Academic Press, 3rd edition.*

Term Work:

As per institute norms.

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

Program: B. Tech. Integrated (EXTC)				Semester: IV	
Course: Engineering Physics				Code: BTIET04005	
Teaching Scheme				Evaluation Scheme	
Lecture Hours Per week	Practical Hours per week	Tutorials Hours per week	Credit	Theory (3 hrs, 100 Marks)	Internal Continuous Assessment (ICA) As per Institute Norm (50 Marks)
2	2	0	3	Scaled to 50 marks	Scaled to 50 marks

Objectives

1. To enable the students understand the basic principles of physics, making them meet the needs of engineering and technology.

Outcomes

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

1. Apply the concept of interference, diffraction in various engineering applications.
2. Understand the quantization effect in reduced dimensional materials and their consequences.
3. Implement the concepts of clean energy for power generation.
4. Illustrate the usage of nanomaterial in various applications.

Detailed Syllabus:

Unit	Description	Duration
1.	**Optics:** Interference: Analytical treatment of interference. Interference in thin film in reflected system. Wedge shaped film. Newton's rings and applications. Diffraction: Fraunhoffer's diffraction at single slit, double slits, N Parallel slits (multiple slits). Diffraction grating, resolving power of grating, dispersive power of grating.	08
2.	**Quantum physics:** The origin of quantum theory, Blackbody radiation, Wein's law, Rayleigh- Jeans Law, Stefen's law, Plank's theory, dual nature of radiation. Wave nature of Matter: De Broglie's hypothesis, Davisson-Germer Experiment, the double slit experiment with particles, the need for a wave function, Born's interpretation of the wave function. Wave Packets and Uncertainty Principle: General statement of Heisenberg's Uncertainty Principle, Energy-Time and Position-momentum uncertainty relation and its applications	08
3.	**Energy technology :** Need for clean energy, different methods for obtaining clean energy viz. nuclear energy (including basics of nuclear physics like fission and fusion etc.) solar cells (including conventional and Nano	06

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	material based solar cells), hydrogen fuels and wind mills. Advantages and limitations of each method.	
4.	**Introduction to Nanotechnology:** Definition of nanotechnology, quantum confinement effect [how the material properties differ as the size is reduced: Coloumb Blockade, Surface plasmon resonance, some basic Nano materials like carbon nanotubes, graphene, quantum dots, applications of nanotechnology (scratch resistance coatings, clothing, antimicrobial applications, drug delivery, IC technology), Nano- toxicity (basic idea). Scanning and Transmission electron microscopes, Scanning Tunneling Microscope, Atomic Force Microscope.	08
	Total Hours	30

Text Books:

1. Jenkins and White (2013), Optics, *MC Graw Hill.*
2. Arther Beiser (2009), Concept of Modern Physics, *Tata McGraw Hill, 6th edition.*

Reference Books:

1. Halliday and Resnick (2014), Fundamentals of Physics, *Wiley India, 10th edition.*
2. L. I. Schiff (1968), Quantum Physics, *McGraw Hills.*
3. V. V. N. Kishore (2009), Renewable Energy Engineering and Technology – A Knowledge Compendium, *TERI Press.*
4. Sulabha K. Kulkarni (2011), Nanotechnology: Principles and Practices, *Springer.*
5. Richard P. Feynman (2011), Feynman lectures on physics, *The New Millennium Edition.*
6. Dattu R Joshi (2010), Engineering Physics, *Tata McGraw Hill, 1st Edition.*

Term work:

As per Institute norms.

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

Program: B. Tech. Integrated (EXTC)				Semester: IV	
Course: Numerical Techniques				Code: BTIET04006	
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	2	4	Scaled to 50 marks	Scaled to 50 marks

Objectives:

1. To bring awareness of various numerical techniques to solve Engineering problems.

Outcomes:

After successfully completion of this course, students will be able to:

1. Analyse error in numerical data.
2. Solve algebraic, transcendental and system of linear equations using different numerical techniques.
3. Understand the concept of interpolation and regression.
4. Apply the techniques learnt in numerical differentiation and integration to solve engineering problems.
5. Evaluate ordinary differential equation numerically.

Detailed Syllabus:

Unit	Description	Duration
1.	**Introduction to Numerical Computing:** Introduction, Types of Errors: Absolute error, Relative error, Percentage error, Round-off error, Truncation error.	02
2.	**Roots of Equations:** Bisection Method, False Position Method, Newton-Raphson Method, Secant Method, Convergence of Numerical Methods.	10
3.	**Systems of Linear Algebraic Equations:** Gaussian Elimination Method, Gauss Jordan Method, Gauss Seidel Method, Jacobi Method.	06
4.	**Interpolation:** Finite Differences, Forward Differences, Backward Differences, Newton's Forward Interpolation, Newton's Backward Interpolation, Lagrange's Interpolation. Application of this technique to estimate data type such as income, distance, production etc.	07
5.	**Curve Fitting:** Method of Least Square to fit the straight line and the parabola.	03
6.	**Numerical differentiation & Integration:** Derivatives using Forward and Backward difference formula, Trapezoidal Rule for Numerical Integration, Simpson's 1/3 Rule,	09

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	Simpson's 3/8 Rule. Application to estimate the distance covered in given time and volume of a solid.	
7.	**Solution to Ordinary differential equations:** Picard's method, Taylor series method, Euler's method, Fourth-Order Runge-Kutta method.	**08**
	Total	**45**

Text Books:

1. E. Balagurusamy (2008), Numerical Methods, *Tata-Mc Graw Hill.*

Reference Books:

1. S. S. Sastry (2007), Introductory methods of Numerical Analysis, *PHI, 5th edition.*
2. B. S. Grewal (2010), Numerical Methods in Engineering & Science with Programs in C & C+ +, *Khanna Publishers.*
3. John Heinbockel (2004), Numerical Methods for Scientific Computing, *Trafford Publishing.*

Term Work:

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