Program: B. Tech Integrated (EXTC)				Semester : III	
Course : Computer Programming – II				Code : BTIET03001	
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: Nil

Objectives:

1. To enable the students to understand the basic concepts of object oriented programming and help them build programming logic.
2. To help them build classes and understand the re usability of classes.

Outcomes:

1. Develop and execute C++ program using basic programming constructs, various data types and functions
2. Implement object oriented concepts classes, objects, constructor, destructor, operator overloading, type conversion
3. Implement object oriented concepts inheritance, virtual functions and polymorphism
4. Implement the concepts of file handling and generic programming using templates

Detailed Syllabus:

Unit	Description	Duration
1.	**Principles of Object Oriented Programming& Beginning with C++:** Software Crisis, Software Evolution, Basic Concepts of OOP, Introduction to C++, Applications of C++, Structure of C++ program, creating, compiling and linking C++ program, Data types, Variables, Operators in C++, Scope resolution operator, Manipulators.	04
2.	**Functions in C++:** Function Prototyping, Call by Reference, Return by Reference, Inline Functions, Default Arguments, Recursion.	04
3.	**Classes and Objects:** Specifying a Class, Defining member functions, Making an outside function inline, nesting of member functions, private member functions, Memory Allocation for Objects, Static Members, Arrays of Objects, Objects as Function Arguments, Returning Objects, friend functions.	05
4.	**Constructors & Destructors:** Constructors, Parameterized constructor, Multiple constructors in a class, Constructors with Default Arguments, Dynamic Initialization of Objects, Copy Constructor, Dynamic Constructors, Destructors	03

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5.	**Operator Overloading & Type Conversions:** Overloading Unary Operators, Overloading Binary Operators, Overloading Binary Operators Using Friends, Rules for Overloading Operators, Type Conversion	06
6.	**Inheritance:** Defining Derived Classes, Single Inheritance, Making Private member Inheritable, Multilevel, Multiple, Hierarchical, Hybrid Inheritance, Virtual Base Classes, Abstract Classes, Constructors in Derived Classes	07
7.	**Virtual Functions and Polymorphism:** Need for Virtual Functions, Pointer to Derived Class Object, Pure Virtual Functions, Dynamic or Late Binding	04
8.	**File Handling:** Files and Streams, Opening and Closing a File, File pointers and manipulations, Sequential I/O Operations, Updating a file: Random access, error handling during file operations.	05
9.	**Templates:** Introduction, Function Templates, Class Templates	03
10.	**Exception Handling:** Basics of exception handling, Exception handling mechanism, Throwing mechanism, Catching mechanism, Rethrowing an exception, exceptions in constructor and destructors.	04
	Total Hours	45

Text Book:

1. E. Balaguruswamy, "Programming in C++", Tata McGraw Hill Education, 5th Edition, 2011.

Reference Book:

1. Herbert Schildt, "The Complete Reference C++", Tata McGraw Hill Education, 4th Edition, 2003

Term Work:

As per Department and Institute Norms for Term-work.

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Program: B. Tech Integrated (EXTC)					Semester : III
Course : Electrical Technology					Code : BTIET03002
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. Concept of emf, potential difference, current, ohm's law, resistivity, power dissipation in resistance, effect of temperature on resistance.
2. Concept of ideal and practical voltage and current source
3. Concepts of magnetic field, Faraday's laws of electromagnetic induction, hysteresis and eddy current losses, energy stored in an inductor, rise and decay of current and time constant in R-L circuit.

Objectives:

1. Understand and solve simple ac and dc electrical and magnetic circuits using different theorems and laws.
2. To get a basic understanding of the working principle and applications of motors.
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. Analyze dc and ac circuits using network theorems & ac fundamentals.
2. Determine the resonant frequency of any given series or parallel RLC circuit.
3. Determine the efficiency and regulation of a single phase transformer.
4. Compare electric and magnetic circuits.
5. Solve simple and composite problems based on magnetic circuits.
6. Know various motors (dc and ac) and their applications.

Detailed Syllabus:

Unit	Description	Duration
1.	**D.C Circuit (only independent sources)** Superposition Theorem, Thevenin Theorem, Delta/Star Transformation, Norton's Theorem, Maximum Power Transfer Theorem.	12

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2.	**Single phase transformer** Emfconstruction, Emf equation, Equivalent circuit and phasordagram for different load, determination of efficiency &regulation by direct loading. Losses in transformer, Estimation of regulation and Efficiency by OC & SC test.	09
3.	**Magnetic Circuit** Laws of magnetic force, definitions of field intensity, magnetic potential, flux & flux density, permeability, intensity of magnetization & susceptibility. Simple and composite magnetic circuits, comparison between electric and magnetic circuits, leakage flux, Faraday's laws of electromagnetic induction, induced emf, selfinductance, mutual inductance, coefficient of magnetic coupling, inductances in series and parallel.	08
4.	**AC Motors** Phase induction motor, Construction and working principle, starting methods. 3 phase induction motor, Construction and working principle, slip, torque equation, torque speed characteristics, applications.	08
5.	**DC Motors** Construction and working principle, types of motors and their characteristics, applications.	08
	Total Hours	**45**

Text Books:

1. B. L. Theraja, Fundamentals of Electrical Engineering and Electronics, S. Chand & Co., 2nd Edition, 2004

Reference Books:

1. Vincent Del Toro, Electrical Engineering Fundamentals, Prentice Hall India Learning Pvt. Ltd , 2nd Edition, 2010.

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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Program: B. Tech Integrated (EXTC)				Semester: III	
Course : Electronic Materials and Components				Code: BTIET03003	
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)
2	0	2	3	Scaled to 50 Marks	Scaled to 50 Marks

Prerequisite: Nil

Objectives:

1. To understand the construction and working of electronics components.
2. To understand the operation and applications of electronics material & components.
3. To learn measurements of various electronic quantities.

Outcomes:

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

1. Describe the configuration of electronics components and its characteristics.
2. Identify and apply electronics components for different circuits.
3. Measure and compare the performance of various components for various electrical parameters.
4. Describe the working of simple circuits using different electronics components.

Unit	Description	Duration (Hrs)
1	**Resistors:** Introduction to Active & Passive Components, Fixed Resistors: Colour Coding, Tolerance Wattage, Temperature Coefficient, Operating Temperature Range, Carbon Composition Resistor, Cracked Carbon Resistor, Metal Film Resistor & Wire Wound Resistor. Ceramic & Aluminum Heat Sink, Variable Resistor, Linear & Logarithmic Potentiometer, Pots & Rheostat, Trimmers - Rectilinear Votary (Carbon, Wire Wound & Cermets) Non-linear Resistors, Thermistor - Bead, Probe, Disc & Rod Type, NTC, PTC, Varistors, Light Dependent Resister,	06

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2	**Capacitors** Fixed Capacitors, Principal of Capacitor, Capacitance Working Voltage, Insulation Resistance C/V Ratio, Power Factor, Capacitance Frequency Characteristics, Specifications & Applications of Glass, Impregnated Paper, Metallized Paper (With Self Healing Effect), Ceramic Aluminum & Tantalum Capacitor, Variable Capacitor - Straight-line Inverse Square Law & Square Law of Variable Capacitor Plates, Air Dielectric Gang Condenser, PVC Dielectric Gang Condenser, Trimmer Capacitor, Air dielectric- Rotary, Differential Rotary & Concentric Cylinder Type, Ceramic Rotary, Mica Compression & Plastic Dielectric.	06
3	**Inductor and Transformers** Inductor, Concept, Operation at Low & High Frequency, Self & Mutual Inductance Quality Factor, Inductive Reactance, Leakage Inductance, Construction & Applications: Air Core, Iron core, Ferrite Core, AFC, RFC, Filter Chokes. Transformer, Types of Coils - Shell, Core Type Laminations (E, I, L, F & Pot Core), Types of Transformer: Power, Auto, Variable, Audio Frequency, RFT & IFT, Driver, Isolation, Pulse, Current, High voltage (EHT), Losses in Transformer, Shielding of Transformer.	06
4	**Relays and Display** Relays, Definitions of NO, NC Contents, Operate Time, Release Time & Bounce Time, Mechanical & Electrical Life. Constructions, Specifications & Applications: General-Purpose Electromagnetic Relay, Dry Reed Relay, Ferried Relay Solid-State Relays, Display Devices - LED , Nixie Tube, Dual Color LED 7-Segment Display, LCD - Types, Reflected Light, Twisted Pneumatic Drive, Switching & Two Phase Drive, Alphanumeric Display Like Dot Matrix.	06
5	**Microphones, Speakers & Batteries** Principle, Construction & Applications: Microphone - Carbon, Capacitor, Moving Coil, Crystal, Ribbon, Loud speakers - Cone Type, Horn Type Speakers Woofer, Tweeter & Speaker, Batteries, Cells & Battery Fundamentals, Charging & Discharging Process Difference Between Primary & Secondary Cell, Types of Batteries - Lead Acid Battery - Construction,	06

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	Open Circuit Voltage Specific Gravity, Discharge, Ampere - Hour Rating, Ni-Cd battery Construction, Specifications, Charging Methods of Above Batteries, Maintenance Free Battery (Introduction).	
	Total Hours	**30**

Text Books:

1. Electronic Components and Materials by SM Dhir, Tata McGraw Hill, New Delhi, 4th edition, 2011.

Reference Books:

1. Text book of Applied Electronics by R.S. Sedha, S. Chand Publication, 5th edition, 2014.

Term Work:

1. Two term tests
2. 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 : III	
Course: Engineering Mathematics – I				Code: BTIET03004	
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 impart knowledge of complex numbers and its applications to solve Engineering problems.
2. To provide an understanding of principles of vector algebra, single variable and multivariable calculus.

Outcomes:

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

1. Understand the concepts of complex numbers, hyperbolic functions, Mean value theorems and vector products to solve Engineering problems.
2. Express functions in series using Taylor's and Maclaurin's expansions, and evaluate limits of indeterminate forms using L' Höspital's Rule.
3. Find partial derivatives of functions and carry out the knowledge to error and approximations, maxima and minima.
4. Apply the concepts such as gradient, directional derivative, curl and divergence to solve real life problems.

Detailed Syllabus:

Unit	Description	Duration
1.	**Complex Numbers:** Introduction to complex numbers, modulus and amplitude of a complex number, Argand's diagram, cartesian, polar and exponential forms of a complex number. **Algebra of complex numbers:** equality, addition, subtraction, multiplication and division. De-Moivre's theorem, Roots of complex numbers, Euler's form of circular functions, Hyperbolic functions, relation between circular and hyperbolic functions.	12
2.	**Mean value theorems, Series expansion and Indeterminate forms:** Rolle's theorem, Lagrange's mean value theorem, Cauchy's mean value theorem.	10

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	Taylor's formula, Maclaurin's series. **Indeterminate forms:** $\frac{0}{0}, \frac{\infty}{\infty}, 0\times\infty, \infty-\infty, 0^0, \infty^0, 1^\infty$ by L'Höspital's rule.	
3.	**Partial Derivatives and its applications:** Partial Derivatives of two and three variable functions, Partial derivative of composite function, Homogeneous functions in two or three variables, Euler's theorem, error and approximations, Maxima and Minima in 2 variables by second derivative test.	**13**
4.	**Vectors:** Scalar and vector triple products, Product of four vectors, curves in space, Differentiation of a vector function of a single scalar variable, Theorems on derivatives, concept of tangent vector, scalar and vector point functions, gradient, directional derivative, Curl and Divergence, Irrotational and Solenoidal Fields.	**10**
	Total Hours	**45**

Text Book:

1. Erwin Kreyszig (2010), "Advanced Engineering Mathematics", *Wiley Eastern Ltd, 10th edition.*

Reference Books:

1. Andreescu Titu, Andrica Dorin (2014), Complex Numbers from A to ... Z, *Birkhäuser Basel Publishers, 2nd edition.*
2. Thomas, Calculus (2014), *Pearson Education, 7th edition.*
3. Howard Anton (2012), "Calculus", *Wiley, 10th edition.*
4. B. V. Ramana (2010), "Higher Engineering Mathematics", *Tata McGraw Hill, 1st edition.*
5. Alan Jeffrey (2003), Handbook of Mathematical Formulas and Integrals, *Academic Press, 3rd edition.*

Term Work:

As per institute norms.

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Program: B. Tech Integrated (EXTC)				Semester: III	
Course: Engineering Chemistry				Code: BTIET03005	
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)
2	2	0	3	Marks Scaled to 50	Marks Scaled to 50

Objectives

1. To introduce basic principles of chemistry such as functional group identification, properties of solutions, and reaction stoichiometry.
2. To familiarize the concepts and applications of fuels, polymers, and e-waste management.

Course Outcomes:

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

1. Identify different functional groups of compounds and various organic reactions associated with it.
2. Identify the importance of various classes of polymers and applications in daily life.
3. Classify different types of fuels and lubricants based on their properties and applications;
4. Recognize the importance of e-waste management with respect to environment and health hazards and solve numerical problems based on atom economy and distinguish the various formula applied to different types of solutions; interpret reaction stoichiometry and solve numerical problems.

Detailed Syllabus: (per session plan)

Unit	Description	Duration
1.	**Organic Reactions:** Reactions of functional groups: those containing oxygen (-COOH, -OH, -CHO, -C=O); Nucleophilic substitution reaction, Elimination reaction Organic Name Reactions E.g. Aldol & related reactions.	06
2.	**Solutions and Stoichiometry:** Types of solutions and its characteristics, properties of aqueous solutions, different units for expressing concentration of solutions (ppm, ppb, normality, molarity, molality, mole fraction of solute, mass fraction of solute and solvent), empirical and molecular formula from elemental composition, numerical based on empirical formula, normality, molarity, molality molarity.	06
3.	**Fuels & Combustion:**	06

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	Definition, Classification, characteristics. Calorific Value-Theoretical & Experimental (Bomb calorimeter). **Solid Fuels**: Coal, proximate and ultimate analysis, Numerical based on analysis of coal. (Dulong formula) and bomb calorimetry. **Liquid fuels**: Mining of Petroleum, Cracking, Reforming, Knocking in IC engines, anti-knocking agents (TEL and MTBE),	
4.	**Lubricants:** Definition, Mechanism of lubrication, Properties- viscosity, viscosity index, flash & fire, cloud & pour points, oiliness, saponification & acid value (numericals based on saponification and acid value)	04
5.	**Polymers:** Introduction and definition of important terms – monomer, polymer, polymerization, degree of polymerization, tacticity, and melting-glass transition temperature. Some commercially important polymers (PP, PVC). **Plastics**: Thermosetting & Thermoplastics, Compounding of plastics, Preparation, properties and applications of commercial plastics (Rubber, Phenol formaldehyde resin).	05
6.	**Environmental Aspects of Chemistry:** **i) Green Chemistry:** Principles of Green Chemistry with examples (Numerical Problems on Atom economy) **ii) E-waste management:** Definition, classification and management of e-waste.	03
	Total	**30**

Text Books:

1. Abhijit Mallick; Chemistry for Engineers, Viva books, 2nd Edition 2017.
2. Palanna.O.G., Engineering Chemistry, Tata McGraw Hill Education. Pvt. Ltd, 2nd Edition 2017.
3. Samir Sarkar; Fuels & Combustion, Orient Longman Pvt. Ltd 3rd Edition 2009.

Reference Books:

1. R.T. Morrison & R. N. Boyd, Organic Chemistry, Prentice Hall, 8th Edition 2016.
2. Johrie. R.; E-waste, TERI Press, 2009.
3. Paul C. Hiemenz & Timothy P. Lodge; Polymer Chemistry, CRC Press, 2nd Edition 2007.

Any other information:

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

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Details of Term work:
1. Minimum Eight Lab experiments to be taken.
2. Unit wise assignments to be taken.
3. Presentation/Viva-voce/Quiz to be conducted.

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Integrated Electronics & Telecommunication (2019 – 2020)

Program: B. Tech. Integrated (EXTC)				Semester: III
Course: Constitution of India				Code: BTIET03006
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	0	Scaled to 50 marks

Objective:

1. To understand the basic aspects of the constitution of India, the evolution, the directive principle & important provisions.
2. To understand the implications of important constitutional provision on Business and Professionals.

Outcomes:

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

1. Learn basic aspects of constitution of India.
2. Apply Constitutional provision on Business and their Professionals.

Detailed Syllabus

Unit	Description	Duration
1.	The Constitution, its evolution and Preamble to the Constitution.	04
2.	Fundamental rights and duties, exceptions with examples, individual responsibilities and duties, application to business.	10
3.	Directive principles of State Policy, its emphasis and its impact as related to business.	04
4.	Indian Judiciary and LokAdalats.	06
5.	Emergency Provisions under Article 352 – 360.	04
6.	Voting behaviour in India and present political scene. Responsibility of Business in relation to the Constitution.	02
	Total Hours	30

Text Books:

1. Durga Das Basu (2009), "Indian Constitution", *20th Edition.*

Reference Books:

1. N. A. Palkhiwala (2009), "We the People".
2. Justice Hidayatullah (2009), "Indian Constitution".

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Term work consists of the following:
1. Assignments / Case studies.
2. Two class tests.

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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**

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	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

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

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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	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:

As per institute norms.

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Program:	B. Tech Integrated (EXTC)			Semester: V	
Course:	Mathematics III			Code: BTIET05008	
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- 70 in Question Paper)
3	0	1	4	Marks Scaled to 30	Marks Scaled to 70

Pre-requisite:

Knowledge of Integration, 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, $L\{t^n f(t)\}$, $L\left\{\frac{f(t)}{t}\right\}$, $L\{f^n(t)\}$,	13

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	$L\left\{\int_0^t f(u)\,du\right\}$, 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.*

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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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Program: B. Tech Integrated (EXTC)				Semester : V	
Course : Electronic Devices				Code : BTIET05009	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (50 Marks)
3	2	0	4	Scaled to 70 Marks	Scaled to 30 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	08

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	Generation and recombination of carriers; Poisson and continuity equation P-N junction characteristics, I-Vcharacteristics, and small signal switching models;	
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.

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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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Program: B. Tech Integrated (EXTC)				Semester : V	
Course : Digital System Design				Code : BTIET05010	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (50 Marks)
3	2	0	4	Scaled to 70 Marks	Scaled to 30 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:**	06

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	VLSI Design flow: Design entry, Schematic, different modelling styles in VHDL: Dataflow, Behavioural and Structural Modelling. 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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Program: B. Tech Integrated (EXTC)				Semester : V	
Course : Signals and Systems				Code : BTIET05011	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (50 Marks)
3	2	0	4	Scaled to 70 Marks	Scaled to 30 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:**	06

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	Limitations of Fourier Series, Introduction to Fourier transform, 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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SVKM's NMIMS
Mukesh Patel School of Technology Management & Engineering
Integrated Electronics & Telecommunication (2019 – 2020)

Program: B. Tech Integrated (EXTC)				Semester : V	
Course : Circuit and Network Theory				Code : BTIET05012	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (50 Marks)
3	0	0	3	Scaled to 70 Marks	Scaled to 30 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

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4.	**Transient Analysis of Circuits using Classical Technique** First & second Order Differential equations for Evaluation & analysis of Transient and Steady state responses, initial conditions.	05
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

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

Program : B. Tech Integrated (EXTC)				Semester : V
Course : Presentation and Communication Techniques				Code : BTIET05013
Teaching Scheme				Evaluation Scheme
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Internal Continuous Assessment (ICA) (Marks – 50)
2	---	---	2	Marks Scaled to 50

Pre-requisite: NIL

Objectives:

- To impart an understanding of basic tenets of business communication that helps students to effectively engage in organizational communication.
- To develop in students an understanding of interpersonal communication challenges and the ability to effectively overcome these challenges in an organizational context.
- To develop leadership, team building and decision making skills which could be later applied in a professional set up.
- To impart technical writing skills towards designing and structuring persuasive technical communication.
- To build and strengthen presentation skills towards making impressive and persuasive presentations.
- To train the students for participating in group discussions, building Resume and facing personal interviews.

Outcomes:

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

- Understand and apply the postulates of technical writing in a formal set up
- Apply fundamentals of business correspondence to create well-structured Resumes, application letters, Minutes of Meetings and similar business related documents
- Understand and analyse group dynamics and apply leadership skills for effective team building in professional set ups.
- Analyze the context and select appropriate communication techniques for effective interpersonal communication in professional context.

Detailed Syllabus: (per session plan)

Unit	Description	Duration

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1	**Understanding the foundations of Business Communication:** Professional Communication in a Digital, Social, Mobile World	5
2	**Collaboration, Interpersonal Communication and Business Etiquette:** Communicating effectively, collaborating, conducting productive meetings, using meeting technologies, improving listening skills and non-verbal communication, business etiquettes	5
3	**Development of Interpersonal and Group Communication Skills** Theatre techniques: Use of drama (in workshop format) to promote meaningful, active and reflective thinking processes as well as enhancing communication skills development. **Group Communication** • Forms of Group Communication; Use of body language in Group communication • Group Discussion etiquette: Introducing oneself and others; Expressing Opinions and Ideas; expressing disagreement etc. Group Discussion Strategies: Speaking, taking turns, Creating a Cordial and cooperative atmosphere etc.	4
4	**Building Problem-solving teams** • Orientation to Personality Values – Importance of Values • Understanding of Teams- Types of Teams, stages of Team development; Team building leadership skills and leaderless scenarios • Decision Making-Group and Individual Decision Making Techniques • Stress Management-Sources of Stress; consequences; Managing Stress	4
5	**Employment Communication** • Personal Interviews-Objectives, Types, Stages of Interview • Interview Preparation-types of Interview Questions ; Interview Follow ups • Resume- Types and Format; Cover letters • Mock Interviews (simulation)	4
6	**Organizational networks and communication Structures** • Process and Functions of Communication ;Formal Networks in Organizational Communication • Informal networks of organizational communications ;choice of communication channels	2

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7	**Meetings** • Meetings- Purposes ,Importance and Meeting Procedures including Chairperson's and participants' roles Meeting Documentation (Minutes of resolution; Minutes of Narration; Meeting Notice and Agenda)	2
8	**Technical Report Writing** • Importance , objectives and Characteristic of Reports ; Types of Reports • Report formats and Structure -Memo Reports; Letter Reports; Office Orders and Manuscript Reports	2
9	**Presentation Skills** • Planning and structuring Presentations; Visual Aids in Presentations • Applications of MS Power Point Audience analyses; Nuances of Delivery; Modes of delivery; Controlling Nervousness and stage fright	2
	Total	**30**

Text Books:

1. Bovee, C., Thill, J., & Roshan Lal Raina (2013). *Business Communication Today* (14th ed.). Pearson.
2. Meenakshi Raman and Sangeeta Sharma (2015), *Technical Communication* Oxford University Press,3rd Edition

Reference Books:

1. Fred Luthans (2013), 'Organizational Behavior', *McGraw Hill, 12th Edition*

Any other information :

1. Links to websites:

- https://www.mindtools.com/
- https://www.pearsonmylabandmastering.com/northamerica/mybcommlab/

2. Pedagogy:

- Classroom teaching
- classroom exercises and discussion
- case studies
- written assignments
- presentations and role play

Details of Internal Continuous Assessment (ICA)

Test Marks: 20
Term Work Marks: 30

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Details of Term work :

- Group/Individual presentations
- Report writing-Memo Reports and letter reports
- Drafting meeting Agenda and Minutes of Meeting
- Resume and Cover letter writing
- Group Discussion
- Mock Interviews

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Integrated Electronics & Telecommunication (2019 – 2020)

Program: B. Tech Integrated (EXTC)				Semester : VI	
Course : Probability and Stochastic Processes				Code : BTIET06010	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (50 Marks)
3	0	1	4	Scaled to 70 Marks	Scaled to 30 Marks

Pre-requisite: Nil

Objectives:

1. To develop the concepts and techniques associated with the understanding of probability and random processes
2. To be able to analyse the chances of occurrence of error in communication field.

Outcomes:

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

1. Know the concept of probability and random variables.
2. Analyze the different probability density functions and their applications.
3. Learn the basics of random processes and evaluate different random processes and its applications in telecommunication.
4. To learn about the applications of Fourier Transforms like Spectral Density and others

Detailed Syllabus:

Unit	Description	Duration
1.	**Review of Probability** Sample Space, Events, and Probability, Conditional Probability, Mutually exclusive events, Joint probability of related and independent events, Statistical independence, Total Probability theorem, Bayes theorem	06
2.	**Random Variables** Random Variables, Cumulative Distribution function, Probability Density Function, , Discrete Distributions: Bernoulli, Binomial and Poisson, Continuous distributions: Uniform, Exponential, Rayleigh, Gaussian distribution Mean, Variance, Moments of random variables.	12
3.	**Two dimensional Random Variables:** Joint PDF's and CDF's, Conditional PMF and PDF,Marginal PDF, Conditional Mean	08

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	&Variance, Rule for Independence, Covariance and correlation of random variables	
4.	**Introduction to Random Processes: Basic Concepts** Classification of Random Processes, Statistics– first order, Second order, Wide-Sense Stationary Processes, Strict Sense Stationary Processes, Ergodic Random Processes	08
5.	**Linear Systems with Random Inputs** Fourier Transform of Random signals, Power Spectral Density, Cross Spectral Densities, Overview of linear system with deterministic inputs, Linear system with Discrete and continuous random inputs	06
6.	**Estimation Theory** Point Estimate, Interval estimate and confidence Interval, Maximum likelihood estimation, Minimum mean squared error estimation	05
	Total Hours	45

Text Books:

1. Anthanasios Papoulis, S. Unnikrishna Pillai, Probability, Random Variables and Stochastic Processes, Tata McGraw-Hill 2002, 4th edition, 2008.
2. Oliver C. Ibe, Fundamentals of applied probability and random processes, Academic Press, 2nd edition, 2014.

Reference Books:

1. John G. Proakis, MasoudSalehi, Fundamentals of Communication Systems, First Edition, Pearson Education, 2006.
2. T. Veerarajan, Probability, Statistics and Random Processes, Tata McGraw-Hill 2003, 3rd edition, 2008.

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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Program: B. Tech Integrated (EXTC)				Semester : VI	
Course : Analog Circuits				Code : BTIET06011	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (50 Marks)
3	2	0	4	Scaled to 70 Marks	Scaled to 30 Marks

Pre-requisite: Electronics Devices

Objectives:

1. To study the ac small signal models of BJT and JFET.
2. To design and understand single stage and multistage amplifiers using BJT, power amplifiers and oscillator circuits.
3. To understand, analyze and design Differential amplifier, OP-AMP based circuits, DAC and ADC.

Outcomes:

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

1. Analyze different transistor amplifier circuits.
2. Analyze various high frequency transistor models and power amplifier circuits.
3. Design oscillators and Power supply circuits.
4. Analyze various OP-AMP and D/A and A/D converter circuits.

Detailed Syllabus:

Unit	Description	Duration
1.	Amplifier models: Voltage amplifier, current amplifier, trans-conductance amplifier and trans-resistance amplifier. Biasing schemes for BJT and FET amplifiers, bias stability, various configurations (such as CE/CS, CB/CG, CC/CD) and their features, small signal analysis, low frequency transistor models, estimation of voltage gain, input resistance, output resistance etc., design for particular specifications, low frequency analysis of multistage amplifiers.	10
2.	High frequency transistor models, frequency response of single stage and multistage amplifiers, Cascode amplifier. Various classes of power amplifiers (Class A, B, AB, C etc.), their power efficiency and linearity issues. Feedback topologies:Feedback Amplifiers – Principle, Advantages of Negative Feedback, Topologies,	10

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	Voltage series, current series, voltage shunt, current shunt, effect of feedback on gain, bandwidth etc., calculation with practical circuits, concept of stability.	
3.	Oscillator Circuit Analysis and Design: Design of Phase-Shift Oscillator, Wien-bridge Oscillator, Colpitts Oscillator, Hartley Oscillator, Crystal Oscillator.	06
4.	Power Supply Circuit Analysis and Design: Design of Rectifier Circuits and Filters (all types). Study of Linear regulators, Transistorized series regulator, Regulator with error amplifier.	04
5.	OP-AMP applications: review of inverting and non-inverting amplifiers, integrator and differentiator, summing amplifier, precision rectifier, Schmitt trigger and its applications. Active filters: Low pass, high pass, band pass and band stop, design guidelines.	10
6.	Digital-to-analog converters (DAC): Weighted resistor, R-2R ladder, resistor string etc. Analog to-digital converters (ADC): Single slope, dual slope, successive approximation, flash etc. Switched capacitor circuits: Basic concept, practical configurations, application in amplifier, integrator, ADC etc.	05
	Total Hours	45

Text Books:

1. J.V. Wait, L.P. Huelsman and GA Korn, Introduction to Operational Amplifier theory and applications, McGraw Hill, 1992.
2. J. Millman and A. Grabel, Microelectronics, 2nd edition, McGraw Hill, 1988.
3. P. Horowitz and W. Hill, The Art of Electronics, 2nd edition, Cambridge University Press, 1989.
4. A.S. Sedra and K.C. Smith, Microelectronic Circuits, Saunder's College11 Publishing, Edition IV.
5. Paul R. Gray and Robert G.Meyer, Analysis and Design of Analog Integrated Circuits, John Wiley, 3rd Edition.

Reference Books:

1. Donald Schilling & Charles Belove, "Electronic CircuitsDiscrete 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.

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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
   - Design and modelling of BJT amplifier
   - Design and modelling of FET amplifier
   - Power amplifiers
   - Cascade amplifier design (BJT and FET)
   - Oscillator design
   - Power supply design
   - OP-AMP applications
   - Analog to Digital Converter
   - Digital to Analog Converter
3. Lab Experiments/Tutorials/Assignments/Viva-voce/ Quiz/Lab Exam/ Seminar/Presentation

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Integrated Electronics & Telecommunication (2019 – 2020)

Program: B. Tech Integrated (EXTC)				Semester : VI	
Course : Microprocessor and Microcontroller				Code : BTIET06012	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (50 Marks)
3	2	0	4	Scaled to 70 Marks	Scaled to 30 Marks

Pre-requisite: Digital System Design

Objectives:

1. The course objective is to have good understanding of 8086 architecture.
2. It stresses on the programming and interfacing aspects.
3. It also covering the integrated approach of 8 bit 8051 microcontroller and its interfacing with different devices.
4. This would be helpful in understanding the programming with microcontroller.

Outcomes:

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

1. Understand the architectural design of 8086 along with its feature.
2. Create assembly language programs using 8086 microprocessor.
3. Understand the microcontroller architecture (8/32 bit) and its programming.
4. Design microcontroller based system for real time applications.

Detailed Syllabus:

Unit	Description	Duration
1.	**Intel 8086/8088 microprocessor family :-** Introduction Feature of 8086Architecture and programming model of 8086, Microprocessor family Latches 8282, clock generator 8284, Transceiver 8286. Min and Max Mode Timing diagram of 8086, 8288 bus controller. Hardware software and program generated interrupts in 8086, Response to interrupt, Interrupt vector Table, Block diagram of 8259 Priority Interrupt Controller.	08
2.	**Programming of 8086:-**Introduction, Addressing Modes, Instruction sets of 8086, Assembly language programming, Assembler Directive, Passing parameter to Procedure and Macro. Introduction 8255A Programmable peripheral interface and its programming.	07

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3.	**8087 Math Co-processor:-** Study of architecture of 8087, architecture of NIC architecture of 8087. Data type Supported by 8087.	04
4.	**Introduction and Hardware of 8051 Microcontrollers:** Comparison of microprocessor and microcontroller, architecture and pin functions of 8051 chip controller, CPU timing and machine cycles, internal memory organization, program counter and stack, input/output ports, counters and timers, serial data input and output interrupts.	06
5.	**8051 Assemble language programming:** Introduction to 8051 Assembly programming, Data Types and directives, 8051 flag bits and PSW register. Register banks and stack. Jump loop and call instructions, I/O Port programming: Addressing modes and accessing memory using various addressing modes. Arithmetic instructions and programs, Logic instructions and programs, memory and Timer/counters of 8051.	06
6.	**Microcontroller Design and Interfacing:** Serial communication, 8051 connection to RS 232 and its programming, Interfacing of microcontroller to LCD, ADC and DAC, 4*4Keyboard, and stepper motor.	08
7.	**Introduction to advanced Microcontroller:** **PIC 16F877:** PIC 16F877 Introduction and its architecture, RESET options, Memory organization of PIC16F877 **ARM 7 Fundamentals:** Introduction of 32 bit microcontrollers (ARM7), its architecture, Registers model, Current Program and Status program Register, ARM Pipeline and its stages.	06
	Total Hours	45

Text Books:

1. Badri Ram, "Advanced Microprocessors and Interfacing", Tata McGraw Hill publication, 2011.
2. Muhammad Ali Mazidi, "Microcontroller & Embedded system", Second Edition Prentice Hall, 2011.

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Reference Books:

1. Douglas Hall, "Microprocessors Interfacing and Programming", Tata McGraw Hill publication, 2006.
2. Kenneth Ayala(2012),"The 8051 Microcontroller", *CENGAGE Learning,3rd Edition*
3. MykePredko, "Programming and customizing the 8051 Microcontroller", Tata McGraw Hill publication, 2008.
4. Andrew Sloss, Dominic Symes, and Chris Wright, "ARM System Developer's Guide" Morgan Kaufmann Publishers, First 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
   - 8086 based assembly language programs
   - 8051 based assembly language programs
   - Interfacing and application of 8051
   - Analyze and demonstrate PIC18 Microcontroller
   - Analyze and demonstrate ARM7 Microcontroller
   - Implementation of application on microcontrollers
3. Lab Experiments/Tutorials/Assignments/Viva-voce/ Quiz/Lab Exam/ Seminar/Presentation

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Integrated Electronics & Telecommunication (2019 - 2020)

Program: B. Tech Integrated (EXTC)				Semester : VI	
Course : Database Management Systems				Code : BTIET06013	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (50 Marks)
3	2	0	4	Scaled to 70 Marks	Scaled to 30 Marks

Pre-requisite: Basics of Computer systems

Objectives:

1. To impart knowledge about Data compression.
2. To have conceptual understanding, and hands-on experience, of the state-of-the-art compression algorithms and approaches in Text, Image, Audio and Video.

Outcomes:

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

1. Evaluate business information problem and find the requirements of a problem in terms of data. Understand the uses the database schema and need for normalization.
2. Design the database schema with the use of appropriate data types for storage of data in database.
3. Use different types of physical implementation of database
4. Use database for concurrent use and Backup data from database.

Detailed Syllabus:

Unit	Description	Duration
1.	**Introductory concepts of DBMS:** Introduction and applications of DBMS, Purpose of data base, Data, Independence, Database System architecture- levels, Mappings, Database, users and DBA	03
2.	**Relational Model:** Structure of relational databases, Domains, Relations, Relational algebra - fundamental operators and syntax, relational algebra queries, tuple relational calculus	04
3.	**Entity-Relationship model:** Basic concepts, Design process, constraints, Keys, Design issues, E-R diagrams, weak entity sets, extended E-R features - generalization, specialization, aggregation, reduction to E-R database schema.	04

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4.	**Relational Database design:** Functional Dependency – definition, trivial and non-trivial FD, closure of FD set, closure of attributes, irreducible set of FD, Normalization – 1Nf, 2NF, 3NF, Decomposition using FD-dependency preservation, BCNF, Multivalued dependency, 4NF, Join dependency and 5NF.	05
5.	**Query Processing & Query Optimization:** Overview, measures of query cost, selection operation, sorting, join, evaluation of expressions, transformation of relational expressions, estimating statistics of expression results, evaluation plans, materialized views	05
6.	**Transaction Management:** Transaction concepts, properties of transactions, serializability of transactions, testing for serializability, System recovery, Two-Phase Commit protocol, Recovery and Atomicity, Log-based recovery, concurrent executions of transactions and related problems, Locking mechanism, solution to concurrency related problems, deadlock, , two-phase locking protocol, Isolation, Intent locking	09
7.	**Introduction to Data Security:** Introduction, Discretionary access control, Mandatory Access Control.	02
8.	**SQL Concepts:** Basics of SQL, DDL,DML,DCL, structure – creation, alteration, defining constraints – Primary key, foreign key, unique, not null, check, IN operator, Functions - aggregate functions, Built-in functions – numeric, date, string functions, set operations, sub-queries, correlated sub-queries, Use of group by, having, order by, join and its types, Exist, Any, All , view and its types. transaction control commands – Commit, Rollback, Savepoint	10
9.	**PL/SQL Concepts:** Cursors, Stored Procedures, Stored Function, Database Triggers.	03
	Total Hours	45

Text Books:

1. Database System Concepts, Abraham Silberschatz, Henry F. Korth& S. Sudarshan, McGraw Hill.
2. An introduction to Database Systems, C J Date, Addition-Wesley.

Reference Books:

1. Understanding SQL by Martin Gruber, BPB
2. SQL- PL/SQL by Ivan bayross

3. Oracle – The complete reference – TMH /oracle press

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

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Program: B. Tech Integrated (EXTC)				Semester : VI	
Course : Electromagnetic Field Theory				Code : BTIET06014	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (50 Marks)
3	0	0	3	Scaled to 70 Marks	Scaled to 30 Marks

Pre-requisite: Knowledge of Basic Electrical Engineering and Mathematics.

Objectives:

1. To introduce concepts of electric and magnetic fields and propagation of uniform plane waves.
2. To impart knowledge on electrostatics, electrical potential, energy density and their applications.
3. To understand concepts of magneto statics, magnetic flux density and relations between field due to time-varying situations.
4. To introducethe concept of transmission lines.

Outcomes:

After successful completion of this course, students should be able to

1. Apply vector calculus concepts to understand behavior of static electric field.
2. Apply vector calculus concepts to understand behavior of static magnetic field.
3. Analyze Maxwell's equation in different forms (differential and integral) and apply them to uniform plane wave propagation.
4. Understand the concept of voltage, current impedance, and power along two-conductor transmissio lines using the solution of the wave equation and Smith chart.

Unit	Description	Duration
1.	**Review of Vector Calculus:**	

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	Vector Field, Rectangular, Cylindrical and Spherical Coordinate systems.	04
2.	**Coulomb's law and electric field intensity:** Coulomb's law, electric field intensity, calculation of electric field intensity for various charge distributions. **Electric flux density and Gauss's law:** Electric flux density, Gauss's law, vector operator and divergence theorem.	08
3.	**Energy , potential and Capacitance:** Energy expended in moving a point charge in an electric field, line integral, potential and potential difference, calculations of electric field of both point charge and system of charges, potential gradient, dipole, energy density, Capacitance, calculation of capacitance of various configurations. Current and current density continuity of current, conductor properties, dielectric material and properties, method of images.	08
4.	**Steady magnetic field:** Biot – Savart law, Ampere's circuital law, curl of H, Stoke's theorem, magnetic flux and flux density.	04
5.	**Time varying fields and Maxwell's equations:** Faraday's law concept of displacement currents, Maxwell's equations in point form, Maxwell's equations in integral form, boundary conditions and significance of Maxwell's equations.	04
6.	**Uniform Plane waves:** Uniform plane waves in time domain in free space, Sinusoidally time varying uniform plane waves in free space, wave equation in dielectrics and conductors.	04
7.	**Poynting vector and flow of power:** Poynting vector and flow of power: Poynting theorem, power flow for a plane wave, Poynting loss in a plane conductor.	03

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8.	**Introduction to Transmission Lines:** Equations of Voltage and Current on TX line, Propagation constant andcharacteristic impedance, and reflection coefficient and VSWR, Impedance Transformation on Loss-less and Low loss Transmission line, Power transfer on TX line, Smith Chart, Admittance Smith Chart, Applications of transmission lines: Impedance Matching, use transmission linesections as circuit elements.	**10**
	Total	**45**

Text Books:

1. Hayt& Buck, Engineering Electromagnetics, Tata McGraw-Hill, 8h Edition, 2011.
2. Matthew Sadiku, Elements of Electromagnetism, Oxford University Press, 5th Edition, 2010.

Reference Books:

1. Edward C. Jordan, Keith G Balmain, Electromagnetic Waves and radiating systems, Prentice Hall of India, 2nd edition, 2011.
2. NannapaneniNarayana Rao, Elements of Engineering Electromagnetics, Pearson Education, 6th edition, 2006.
3. Edminister J.A, Electromagnetics, Tata McGraw-Hill, 2nd edition, 2006.

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

Program:	B. Tech Integrated (EXTC)			Semester : VI
Course :	Study of Technology Trends			Code : BTIET06015
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)
0	2	0	1	Scaled to 50 Marks

Pre-requisite: Basic knowledge of Hardware and programming

Objectives:

1. To teach the importance of using software tools.
2. To develop/implement algorithms/electronic modules.

Outcomes:

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

1. Select an appropriate topic on an emerging technology.
2. Identify the latest developments in the concerned topic.
3. Summarize the topic into a technical report by discussing with team members.
4. Implement the technology using modern tools and demonstrate the module.

Detailed Syllabus:

A group comprising up to 3 students should identify the problem definition from recent trends in Electronics and Telecommunication Engineering. The students should finalize the topic in consultation with a faculty member / mentor. While choosing the topic for implementation the students should identify modern technology related to subjects of previous or current semesters. A small module or a set of codes which represent a complete system is to be implemented. It can be done using software tools used in the laboratory work of subjects of previous or current semesters which include:

Electronic Devices
Digital System Design
Signals and Systems
Circuit and Network Theory
Probability and Stochastic Processes
Analog Circuits
Microprocessor and Microcontroller
Database Management Systems and Data Security
Electromagnetic Field Theory
Open source software should be preferred.

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Evaluation:
Each group is expected to maintain the log book. The log book needs to be evaluated by the mentor every week as the part of continuous evaluation. Each group must show the presentation and demonstration of the implementation as the part of semester end exam. Also a report needs to be prepared on the selected topic. Report primarily should contain the entire overview of the Project from Literature Survey, Feasibility Study, Design, Analysis, Implementation, and Testing.
Mid-Term Presentation: 10 marks
End-Term Presentation and demonstration: 40 marks

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

new

Program : B. Tech Integrated (EXTC)				Semester : VI	
Course : Principles of Economics and Management				Code: BTIET06016	
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	---	---	3	Marks Scaled to 50	Marks Scaled to 50

Pre-requisite: Nil

Objectives:

This course provides basic orientation towards economic (micro and macroeconomic) principles and help them understand the functions of management

- To combine elements of basic micro and macroeconomics.
- To understand issues dealing with small-scale economic phenomena and concepts such as prices and output of firms, industries and resource owners.
- To examine market impact of technological change.
- To understand broader aspects of the economy and its environment.

Outcomes:

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

- Analyse and evaluate the impact of Economic Policies and its implication on the Business Environment
- Understand basic concepts of economics (demand, supply, elasticity, scarcity) and explain behaviour on individual, households and firm.
- Handle economic data and write economic report
- Orient students towards basic management principles and act as foundation for higher levels of learning
- To be able to handle basic functions of management (planning, organising, coordination, and control)

Detailed Syllabus: (per session plan)

Unit	Description	Duration
1	Introduction: Definition of Economics, Types of economic systems, problem of scarcity of economic resources.	2

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2	Demand and Supply: Demand Curve and Supply Curve, Equilibrium of Demand and Supply, Shift in Demand and Supply. Application of Demand and Supply: Price Elasticity of Demand, Price Elasticity of Supply, Factors which influence Elasticity, Elasticity and Revenue.	3
3	Market Structure /industry analysis types of Competition: monopoly, oligopoly, monopolistic competition, perfect and imperfect competition, government policies towards industries. Circular flow of Economy, Structures, Role of Government, Business Cycles.	3
4	Macroeconomics : National Income – Gross Domestic Product (GDP), Gross National Product (GNP), Inflation – Cost Push and Demand Pull Inflation, Unemployment, Philips Curve	3
5	Functions of Central Bank Money supply, RBI & Monetary Policy.(Current Credit Policy to be critiqued) Stabilization policy : Role of fiscal Policy Demand and Consumer Behavior: Utility and Marginal Utility, Types of Goods	3
6	New economic policy: Liberalization, privatization and globalization	3
7	Theory of Production : Law of Diminishing Returns, Returns to Scale, Productivity	3
8	Analysis of Costs: Types of Costs – Total Cost, Fixed Cost, Variable Cost, Marginal Cost, Impact of Marginal Cost on Average Cost.	3
9	Introduction to Management: Management & Organizations, Management History, Understanding Management thought ,contribution of F.W. Taylor, Henry Fawol, Elton –Mayo Contexts-Constraints & Challenges	5
10	Planning: Managers as Decision makers, Foundations of Planning, Strategic Management	4
11	Organizing: Line and staff relationships ,centralization and decentralization , role of delegation ,Managing Human Resources, Managing Teams	4
12	Leading and Motivation: Basic concepts and practices –Maslows Herzberg McClealand 's theory of Achievement	4
13	Controlling: Introduction to Controlling inventory, quality control.	3
14	Orientation towards Finance, Marketing Human resources and Operation departments	2

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	Total	45

Text Books:

1. Samuelson and Nordhaus, (2010), *Economics - 19th edition*, Tata McGraw Hil Publication.
2. Datt and Sundharam, (2009), *Indian Economy - 67th edition*, S. Chand Publication.
3. Koontz. H. (2012). *Essentials of Management: International and Leadership Perspective*. McGraw Hill Education (India).
4. Collins, J. (2001). *Good to Great: Why Some Companies Makes the Leap and Other's Don't*. Random House Business Books.

Reference Books:

1. Mankiw Gregory, (2008), *Principles of Economics*, Cengage Learning
2. Rakesh Singh, (2007), *Analyzing Macro-Economics*, Shroff Publishers

Any other information :

Details of Internal Continuous Assessment (ICA)

Test Marks: 20
Term Work Marks: 30
Details of Term work : Class Test/ Assignment/Case Studies/Projects/ Presentations

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

Program: B. Tech Integrated (EXTC)				Semester : VII	
Course : Microprocessor Based Systems				Code : BTIET07001	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (50 Marks)
3	2	0	4	Scaled to 70 Marks	Scaled to 30 Marks

Pre-requisite: Knowledge of digital logic, microprocessor 8085

Objectives:

1. To provide knowledge of the 16/32 bit microprocessors and their features.
2. To understand the different processor cores (8086, 80386 and P-I, II, III and IV).
3. To study architecture, programming and interfacing of microprocessors.

Outcomes:

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

1. Explain the different architecture of 8086, 80386 and Pentium processors.
2. Write and test assembly language program using 8086 instruction set.
3. Design 8086 microprocessor based system using 8087 and memory chips.
4. Understand different modes of 80386 and Pentium.
5. Understand super-scalar architecture and MMU in Pentium-I.

Detailed Syllabus:

Unit	Description	Duration
1.	**Intel 8086 microprocessor** Architecture and organization of 8086 microprocessor family. Study of 8086 Instruction set. Assembly language programming, 8086 minimum and maximum mode operation with timing diagram. Detailed study of addressing modes with interrupt structure.	06
2.	**Memory & I/O peripheral interface** Memory system design for 8086 family including interface of dynamic Read/ write memory, Connection of I/O Controllers 8255 programmable peripheral Interface, Programmable Interrupt Controller 8259A, Study of architecture of 8087 floating point co- processor. Interfacing of 8087 with 8086. Microprocessor System Design based on 8086: Introduction, Design Examples	10

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3.	**80386 architecture and operating modes** 32 bit architecture of 80386, basic modes of 80386, Segment Selector and Descriptor, Protection model, Virtual 86 mode of operation. Protected virtual address mode, memory management, address translation, segmentation and segment descriptor tables (GDT and LDT).	07
4.	**80386 timing consideration and multitasking** Multitasking, task state segment and task switch, Task Control Blocks, TCB allocation and its format, 80386 signal interface, burst states, pipeline and non-pipeline bus cycle, Memory and I/O interface, cache memory concept, cache architecture and cache coherency and cache controller, cache architecture, Interface cache controller with 80386.	07
5.	**Architecture of Pentium Processor** Introduction to Pentium processor: system timing, Special Pentium registers, Built-In-Test, EFLAG, Internal structure of Pentium pro processor, Pentium Pro dispatch and execution unit (DEU). Super-Scalar architecture & Pipelining, Bus Operation, Branch prediction logic. Non-pipeline read/write cycle for Pentium processor with wait state. Circuit for memory and IO control. Pentium burst cycle operation.	08
6.	**Pentium memory management unit** Paging unit, memory management unit, virtual and physical address translation. SMM state dump record for offset address, new Pentium instruction and CPUID execution. Introduction to Pentium –II, III and IV processor.	07
	Total Hours	**45**

Text Books:

1. Barry bery and C.R. Sharma, "The Intel Microprocessor", Pearson education, 8th reprint 2014.
2. Kenneth J. Ayala, "The 8086 microprocessor: programming and interfacing PC", Cengage Learning, 8th Indian reprint, 2011.

Reference Books:

1. John Uffenback, "8086 / 8088 Design, Programming and Interfacing", 2nd edition, 9th Indian reprint, Prentice Hall of India, 2006
2. Ray and Bhurchandi, "Advance Microprocessor and Peripheral", Tata McGraw Hill, 3rd edition, 2012.

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3. James Turley, "Advanced 80386 programming techniques", Tata McGraw-Hill, 8th reprint 2012.
4. Intel corporation data manual.

Term Work:

1. At least ten laboratory experiments based on the entire syllabus duly recorded and graded.
2. Presentation/Application based experiment and Quiz/Practical exam/Viva/Any other mode of evaluation.

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Electronics & Telecommunication (2019 – 2020)

Program:	B. Tech Integrated (EXTC)			Semester : VII	
Course :	Radiating Systems and Wave Propagation			Code : BTIET07002	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (50 Marks)
3	2	0	4	Scaled to 70 Marks	Scaled to 30 Marks

Pre-requisite: Knowledge of Electromagnetic Field Theory

Objectives:

1. To study different wave propagation techniques.
2. To introduce students about basic radiating elements, various types of antennas.
3. The designing of various antennas in order to propagate radio waves.

Outcomes:

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

1. Know different media of wave propagation.
2. Know the basic concepts and working of the Antenna.
3. Illustrate hertzian dipole equation for E – H field.
4. Formulate radiation patterns of different antenna array.
5. Demonstrate the functioning and performance of different antenna.

Detailed Syllabus:

Unit	Description	Duration
1.	**Wave Propagation** Radio Wave Propagation: Introduction, Ground Wave Propagation, Sky Wave propagation, surface wave propagation, diffraction. Troposphere Wave Propagation: Scattered Wave Propagation, Ionosphere Propagation, Electrical Properties of the Ionosphere.	05
2.	**Review of Maxwell's equations** Maxwell's equation basics, Vector Potentials, Wave Equation.	03
3.	**Antenna – Basic Concepts** Introduction, Basic Antenna Parameters, Radiation Pattern, Beam width, Radiation Intensity, Directivity and Gain, Antenna	07

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	aperture concept, Beam efficiency, Effective antenna height, Polarization, Input impedance, FRIIS transmission equation, Antenna temperature. Near field and Far field, duality theorem, reciprocity and reaction theorem.	
4.	**Electrical Dipoles** Introduction, Infinitesimal dipole, small dipole, finite length dipole, Half wave dipole, linear elements near or on infinite perfect conductors, ground effects. Folded dipole, sleeve dipole and their applications.	06
5.	**Antenna Arrays: Linear, Planar and Circular** Two element array, N – element array. Pattern multiplication of linear array of n elements. Broad side and End Fire arrays – directivity, beam width, array factor, Planar array and circular array.	07
6.	**Types of Antennas** Introduction, construction, Relative properties and advantages/ disadvantage compare to dipole antenna, Application area, mathematical expressions for electric/ magnetic field intensity, Directivity, power **Loop antenna:** Small loop antenna **Traveling wave and broad band antennas:** V antenna, Rhombic antenna, Yagi – Uda Antenna, Log periodic and Helical Antennas. **Aperture antennas:** Rectangular, circular and horn antennas. **Reflector Antennas:** Plane, Corner and Parabolic reflectors and their applications. **Micro-strip antennas:** Basic characteristics, feeding methods, rectangular, circular and triangular patch antennas.	08
7.	**Antenna Measurements:** Introduction, different methods for indoor and outdoor ranges, Measurement of radiation pattern, different methods of Gain measurement, Measurement of radiation efficiency, Antenna impedance measurement, polarization and phase.	05
8.	**Basic Concepts of Smart Antennas:** Concept and benefits of smart antennas, Fixed weight beam forming, Adaptive beam forming.	04

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	Total Hours	45

Text Books:

1. Constantine A. Balanis, Antenna Theory analysis and design, John Wiley publication, 3rd edition, 2012.
2. John D Kraus, Antennas, Tata McGraw Hill publication, 3rd edition, 2008.

Reference Books:

1. K. D. Prasad, Antenna & Wave Propagation, Khanna Publication, 2nd edition, 2008.
2. Jordan Balmain, Electromagnetics, Prentice Hall of India publication, 2nd edition, 2008.
3. Joseph Carr, George Hippisley, Practical Antenna Handbook, McGraw Hill Professional, 5th edition, 2011
4. G. S. N Raju, antenna and wave propagation, Pearson publication, 3rd print, 2009.

Term Work:

1. At least ten laboratory experiments based on the entire syllabus duly recorded and graded.
2. Presentation/Application based experiment and Quiz/Practical exam/Viva/Any other mode of evaluation.

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

Program: B. Tech Integrated (EXTC)				Semester : VII	
Course : Fundamentals of Microwave Engineering				Code : BTIET07003	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (50 Marks)
3	2	0	4	Scaled to 70 Marks	Scaled to 30 Marks

Pre-requisite: Knowledge of Electromagnetic Field Theory

Objectives:

1. To introduce the students, the basics of microwaves, different microwave components, microwave generators and amplifiers, microwave measurements and microwave network representation.
2. Intended to bring to the students the information necessary to understand the design, operation and capabilities of microwave systems.
3. To introduce the working principles of various microwave communication systems.

Outcomes:

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

1. Know the Frequency Spectrum, Applications, Advantages and Disadvantages of Microwaves.
2. Analyze different modes of propagation for Microwaves.
3. Analysis of different parameters of transmission line using smith chart.
4. Describe the working of different active and passive microwave components.
5. Measure various microwave parameters.

Detailed Syllabus:

Unit	Description	Duration
1	**Introduction to Microwaves:** Definition, frequency spectrum, band and their applications, Characteristics, advantages and disadvantages, applications in various fields. Application of Microwaves Microwave Radiation Hazards, safety and Precautions	03
2	**Microwave Transmission Line Theory:** The Lumped-Element Circuit Model for a Transmission Line: Wave Propagation on a Transmission Line and the Lossless Line Field Analysis of Transmission Lines:	05

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	Transmission Line Parameters, The Telegrapher Equations Derived from Field Analysis of a Coaxial Line, Propagation Constant, Impedance, and Power Flow for the Lossless Coaxial Line The Terminated Lossless Transmission Line: Special Cases of Lossless Terminated Lines The Smith Chart: The Impedance-Admittance Smith Chart, The Slotted Line	
3	**Microwave Waveguides:** General Solutions for TEM, TE, and TM Waves: TEM Waves, TE Waves, TM Waves, Attenuation Due to Dielectric Loss Parallel Plate Waveguide: TEM Modes, TM Modes, TE Modes Rectangular Waveguide: TE Modes, TM Modes, TE_{nn} Modes of a Partially Loaded Waveguide Circular Waveguide: TE Modes and TM Modes Coaxial Line: TEM Modes and Higher Order Modes Surface Waves on a Grounded Dielectric Slab: TM Modes and TE Modes Cavity Resonators	07
4	**Microwave Network Analysis:** Impedance and Equivalent Voltages and Currents: Impedance and Equivalent Voltages and Currents, The Concept of Impedance, Even and Odd Properties of Impedance and reflection coefficient Impedance and Admittance Matrices: Reciprocal Networks and Lossless Networks The Scattering Matrix: A Shift in Reference Planes and Generalized Scattering Parameter	07
5	**Microwave Power Dividers and Couplers:** Introduction to Microwave Junctions and Tee Junctions, Wilkinson Power Dividers Rat Race Junction, Directional Couplers, Ferrite Isolators, Phase Shifters, Gyrators and Circulators	05

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6	**Microwave Generators & Amplifiers:** Limitations of conventional tubes at high frequency Microwave Vacuum Tube Devices: Introduction, two cavity and multi-cavity klystron, reflex klystron, travelling wave tube, and magnetron.	07
7	**Microwave Solid State Devices and Circuits:** Introduction, diodes, transferred electron device –Gunn diodes, Avalanche transit-time devices (ATTD), tunnel diodes, varactor diodes, parametric amplifiers, microwave transistors	06
8	**Microwave Measurements:** Power, insertion loss, attenuation, VSWR, impedance, frequency, wavelength, Q-factor, and dielectric constant, Network Analyzer.	05
	Total Hours	45

Text Books:

1. David M Pozar, Microwave Engineering, John Wiley, 4th edition, 2012.
2. Sushrut Das, Microwave Engineering, Oxford University Press, 2014
3. Samuel Y. Liao, Microwave Devices and circuits, PHI, 3rd edition, 7 print 2011.

Reference Books:

1. Robert E. Collin, Foundations of Microwave Engineering, John Wiley, 2nd edition, 2007.
2. Peter A. Rizzi, Engineering: Passive Circuits, PHI, 1st edition, 2009.
3. Anapurna Das, Microwave Engineering, Tata McGraw Hills, 2nd edition, 2009.

Term Work:

1. At least ten laboratory experiments based on the entire syllabus duly recorded and graded.
2. Presentation/ Application based experiment and Quiz/ Practical exam/ Viva/ Any other mode of evaluation.

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Electronics & Telecommunication (2019 – 2020)

Program: B. Tech Integrated (EXTC)				Semester : VII	
Course : Discrete Time Signal Processing				Code : BTIET07004	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (50 Marks)
3	2	0	4	Scaled to 70 Marks	Scaled to 30 Marks

Pre-requisite: Knowledge of Signals and systems

Objectives:

1. To introduce different types of linear discrete time systems.
2. To analyze techniques to transform time domain discrete time signal representation to frequency domain representation.
3. To design discrete time filters.

Outcomes:

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

1. Analyze Finite Impulse Response and Infinite Impulse Response systems.
2. Apply various transforms on Discrete Time signals.
3. Design Finite Impulse Response and Infinite Impulse response filters.
4. Implement the structures of discrete time filters and their quantization effects.

Detailed Syllabus:

Unit	Description	Duration
1	**Analysis of LTI systems:** Frequency response of LTI systems, pole zero plots, phase and delay distortion, All pass systems, minimum, maximum mixed phase systems, symmetric, anti-symmetric filters.	04
2	**Transforms for Discrete Time Signals:** Discrete Fourier transform: DFT and its properties, multiplication of two DFTs- the circular convolution, additional DFT properties, use of DFT in linear filtering, overlap-save and overlap-add method	07
3	**Fast Fourier transform** Radix 2, radix 4, application of FFT algorithm, Decimation in	06

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	Time FFT, Decimation-in-Frequency FFT, Inverse FFT , Comparison between DFT and FFT	
4	**Design of FIR filters:** Linear phase filters, causal generalized linear phase system, Review of low pass, high pass, band pass filters, digital resonator, comb filters, notch filters & digital sinusoidal oscillators. FIR Filter Design: Frequency sampling method, Windowing method of FIR design, Types of windows.	08
5	**Design of IIR filters:** Butterworth filter, Introduction to Chebyshev filters. Design IIR filter using Bilinear transformation Frequency transformation low pass to high pass, band pass, band reject filters	07
6	**Structures for discrete time systems:** FIR structures (direct form, cascade form, frequency sampling and lattice); structures for linear phase filters. Structures for IIR systems, direct form-I, Direct form-II, Transposed structures. Basic structure of phase shifters, All-pass filters. Analysis of cascaded and parallel IIR structures and FIR structures.	09
7	**Amplitude quantization:** Effect of coefficient quantization in IIR and FIR systems, effect of round off noise in digital filters, quantization errors, limit-cycle oscillations.	04
	Total Hours	**45**

Text Books:

1. John Proakis, Digital signal processing, Prentice Hall of India Publication, 4th edition, 2010.
2. Tarun Kumar Rawat, Digital Signal Processing, Oxford University Press, December-2015

Reference Books:

1. Monson H. Hays, Schaums Outline of Digital Signal Processing, McGraw-

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Hill, 2nd edition, 2011.
2. Maurice Bellanger, Digital Processing of signals, John Wiley Publication, 3rd edition, 2000.

Term Work:

1. At least ten laboratory experiments based on the entire syllabus duly recorded and graded.
2. Presentation/Application based experiment and Quiz/Practical exam/Viva/Any other mode of evaluation.

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Electronics & Telecommunication (2019 - 2020)

Program: B. Tech Integrated (EXTC)				Semester :VII	
Course : Digital System Design				Code : BTIET07005	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (50 Marks)
3	2	0	4	Scaled to 70 Marks	Scaled to 30 Marks

Pre-requisite: Digital Design.

Objectives:

1. To provide basic knowledge of digital design flow and hardware description languages.
2. To provide knowledge of simulation, synthesis and implementation of digital circuit using VHDL.
3. To describe finite state machine and their design concept.
4. To explain various types of programmable devices.
5. To describe basic technique for testing combinational and sequential logic circuits.

Outcomes:

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

1. Describe digital design flow and concept of VHDL used for digital circuit designing.
2. Design and implement different types of digital logic circuits using VHDL.
3. Design finite state machine using VHDL
4. Program CPLD and FPGA using VHDL.
5. Test and diagnose digital logic circuits.

Detailed Syllabus:

Unit	Description	Duration
1.	**Digital Design flows:** Introduction, Design flow for circuit design, EDA design tools, Importance of HDLs	02
2.	**Introduction to VHDL:** Fundamental and Features of VHDL, Code structure, Basic Style of Modelling- Behavioural, Data flow structural and mixed style , Delay models - Inertial Delay, Transport Delay and Delta delay, Language elements-Identifiers, Data objects, Data types and operators, Behaviour Modelling-Sequential vs concurrent	12

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	statements, Process Statement, Signal Assignment, Variable Assignment, sequential statements, Data flow modelling- Conditional assignment statements, Block statement, Concurrent Assert statement, Subprograms and Overloading-functions ,Procedures and Overloading, Configurations and Packages. Test benches.	
3.	**VHDL Synthesis:** Design of combinational circuits: modelling of Multiplexer, de-multiplexer, encoder, decoders, Arithmetic comparison circuits, code convertors. Design sequential circuits: modelling of Flipflops, shift registers and counters.	10
4.	**Finite State machines:** Design of finite state machines- State diagram, state tables, state graphs , Derivations of State Graphs , State Tables Reduction methods ,State Assignment, One Hot Encoding , Mealy State Model, Moore State Model , FSM Design example in VHDL- serial bit sequence detector, Vending Machine controller .	08
5.	**Designing with FPGA and CPLDs:** Internal structure of typical Field Programmable Gate Arrays, XILINX series FPGA, Designing steps of digital logic with FPGA, Complex Programmable Logic Devices architecture.	08
6.	**Testing and Diagnosis of digital system:** Testing: Need for testing, Fault models -single and multiple stuck faults, faults oriented test pattern generation faults simulation in VHDL. Design for Testability: Ad-hoc design for testability techniques - Structured design for test, Built-in-self-test, Boundary scan standards.	05
	Total Hours	45

Text Books:

1. J. Bhasker, VHDL-Primer, Pearson Education, Third edition, 2015.
2. Gaganpreet Kaur, VHDL Basic to Programming, Pearson Education, 2011.
3. Comer, Digital Logic and State machine design, Oxford, 3rd edition, 2013.
4. Oldfield, Dorf, FPGA's, Prentice Hall, 1997.

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Reference Books:

1. Voleni A. Pedroni, Digital Electronics and Design with VHDL, Morgan Kaufmann, second Edition, 2008.
2. Mark Zwolinski, Digital System Design with VHDL, Prentice Hall, second edition, 2003.
3. Charles H Roth, Lizy Kurien John, Digital Design using VHDL, Cengage Publishers, India Second Edition, 2012.
4. Douglas L Perry, VHDL: Programming by example, Mc Graw Hill, Fourth Edition, 2002.

Term Work:

1. At least ten laboratory experiments based on the entire syllabus duly recorded and graded.
2. Presentation/Application based experiment and Quiz/Practical exam/Viva/Any other mode of evaluation.

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

Program:	B. Tech Integrated (EXTC)			Semester : VII
Course :	Implementation of Technology - II			Code : BTIET07006
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)
0	2	0	1	Scaled to 50 Marks

Pre-requisite: programming skill

Objectives:

1. To teach the importance of using software tools.
2. To develop/implement algorithms/electronic modules.

Outcomes:

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

1. Select an appropriate topic on an emerging technology.
2. Identify the latest developments in the concerned topic.
3. Implement the technology using modern tools.
4. Summarize the topic into a technical report by discussing with team members.
5. Demonstrate the module.

Detailed Syllabus:

A group comprising up to 3 students should identify the problem, definition the scope of the implementation in consultation with a faculty member / mentor. While choosing the topic for implementation the students should identify modern technology related to subjects of previous or current semesters. A small module or a set of codes which represent a complete system is to be implemented. It can be done using software tools used in the laboratory work of subjects of previous or current semesters which include:

Digital Logic Design
Electronic Circuit Analysis and Design
Signals and Systems
Numerical Techniques
Analog Integrated Circuits and Analysis
Microprocessor based system
Antenna and Wave Propagation
Fundamentals of Microwave Engineering
Digital Signal Processing

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Basic Control Systems
RF Circuit Design
Open source software should be preferred.
Evaluation:
Each group is expected to maintain the log book. The log book needs to be evaluated by the mentor every week as the part of continuous evaluation. Each group must be able to show the demonstration of the implementation as the part of trimester end exam. The end trimester exam would be conducted by two examiners.

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Program: B. Tech Integrated (EXTC)				Semester : VII
Course : Programming for Analytics				Code : BTIET07007
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)
3	0	0	3	Scaled to 50 Marks

Pre-requisite: Basic Computer Knowledge

Objectives:

1. To learn basic programming skills required for Analytics including techniques for processing, controlling, and manipulating data sets

Outcomes:

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

1. Access and read dataset.
2. Read raw data file.
3. Manipulate datasets.
4. Transform data values.

Detailed Syllabus:

Unit	Description	Duration
1.	**Introduction :** Overview of Foundation, Course logistics, Course data files, Basics of Programs : Introduction to programs, Submitting a program, program syntax	01
2.	**Accessing Data :** Examining data sets, Accessing libraries Producing Detail Reports : Sub-setting report data, sorting and grouping report data enhancing reports	02
3.	**Formatting Data Values :**Using formats, Creating user-defined formats	02
4.	**Reading Data Sets :** Reading a data set, Customizing a data set	02
5.	**Reading Spreadsheet and Database Data:** Reading spreadsheet data, Reading database data	02
6.	**Reading Raw Data Files :** Introduction to reading raw data files, reading standard delimited data, reading nonstandard delimited data, handling missing data	03

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7.	**Manipulating Data :** Using functions, conditional processing	04
8.	**Combining Data Sets :** concatenating data sets, merging data sets one-to-one, merging data sets one-to-many, merging data sets with no matches	03
9.	**Creating Summary Reports :** using the FREQ procedure, using the MEANS and UNIVARIATE procedures, using the Output **Delivery System Learning More :** resources, next steps & Introduction	02
10.	**Controlling Input and Output :** outputting multiple observations ,writing to multiple data sets ,selecting variables and observations	02
11.	**Summarizing Data :** Creating an accumulating total variable ,Accumulating totals for a group of data	02
12.	**Reading and Writing Different Types of Data:** Reading delimited raw data files ,controlling when a record loads	02
13.	**Data Transformations :** manipulating character variables ,manipulating numeric variables ,manipulating numeric variables based on dates ,converting variable type	09
14.	**Debugging Techniques :** Using the PUTLOG statement	01
15.	**Processing Data Iteratively :**Performing DO loop processing & Performing array processing	03
16.	**Combining Data Sets :** Match-merging two or more data sets & performing simple joins using the SQL procedure (self-study)	01
17.	**Creating and Maintaining Permanent Formats :** Creating permanent formats	02
18.	**Other Languages :** An overview of languages, using the SQL procedure, the macro language	02
	Total Hours	45

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Text Books: 1. Business Analytics: Data Analysis & Decision Making 5/E (Pb) Paperback (English) 5th Edition, Albright S.C. (2013)
Reference Books: 1. Programming 1 & 2 (Standard Course Material) 2. Lora D. Delwiche and Susan J Slaughter, 'The Little Book: A Primer', 5th Edition, 2012, SAS Institute Inc. 3. Certification Prep Guide: Base Programming for 9, 3rd Edition, SAS Institute Inc, 2012 4. Learning by Example: A Programmer's Guide, SAS Institute Inc, 2007
Term Work: 1. Presentation/Application based experiment and Quiz/Practical exam/Viva/Any other mode of evaluation.

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Program: B.Tech Integrated (EXTC)				Semester : VIII	
Course : Programming in JAVA				Code : BTIET08001	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (50 Marks)
3	2	0	4	Scaled to 70 Marks	Scaled to 30 Marks

Pre-requisite: Basic programming knowledge

Objectives:

1. To learn basic concepts of Java programming
2. To apply these concepts to real life programs
3. To be able to create small projects

Outcomes:

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

1. Know the basic elements of programming.
2. Implement object oriented programming in Java.
3. Know different packages like java.io, java. Swing.
4. Apply Java to develop small projects.

Detailed Syllabus:

Unit	Description	Duration
1	**Data types Variables and Arrays and Operators :** Primitive data types, Literals, variables static and dynamic initialisation, Scope and life time of variables, Type conversion and casting, type promotion, Single dimension and multidimensional arrays , declaring initialising and application Operators : understanding and using all arithmetic operators, Bitwise operators, Bitwise logical Operators, Boolean logical Operator, Operator Precedence, using parentheses	05
2	**Control Statements:** If statement , nested if , if-else-if ladder, Switch statement nested switch statements, Iteration statements for, while and do while , declaring loop control variables inside the loop, nested loops , using single dimensional arrays and multidimensional arrays inside loops, using *for each* using *break, continue* and *return* statements	04
3	**Classes :**	

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	Classes and Object fundamentals , creating classes and objects , understanding *new* keyword, assigning objects to reference variables, Understanding methods, creating and using methods, Understanding and using methods with parameters, Understanding constructor creating and using constructors, parameterised constructors, understanding and using the *this* keyword. Instance variable hiding, understanding Garbage collection , using *finalise()* method	06
4	**Method and Classes:** Overloading methods and constructors, Using Objects as parameters, Returning Objects, Understanding and applying recursion. Understanding and using access control and access specifiers : public , private, protected and default , Understanding and using static, final keywords, understanding creating and using nested and inner classes, Understanding and using command line arguments , using variable length arguments.	06
5	**Inheritance:** Inheritance basic concepts, Member access and inheritance, Using super class variables, using keyword super, using super to call super class constructors, Multilevel inheritance, Method overloading, Using abstract classes, using keyword final to prevent overloading, Understanding and using object class	05
6	Overview of Packages and interfaces, Basic concepts of exception handling and multithreaded programming , overview of applets	03
7	**Event Handling:** Concepts of event handling, using and understanding Interfaces , simple programs using interfaces , Introducing swings , learn to create simple user interface programs using swing components like jbuttons, Jmenu, Jpanel, Jradiobutton, JTextfield , Graphics etc	05
8	**Input/Output Files and databases:** Understanding java I/0 classes and interfaces basic input/output streams Reader , Writer, Buffered Reader and BufferedwWiter classes, writing simple program using files and keyboard , Understanding and using basic functions for Connectivity storing retrieving and querying of databases	05

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9	**Minor Project :** Design and coding of a Minor Project using swings, files , database, arrays and other techniques as covered in this syllabus	06
	Total Hours	45

Text Books:

1. Herbert Schildt, The complete Reference JAVA, Tata McGraw Hill, 7th Edition, 2006.
2. E. Balaguruswamy, Programming with Java, Tata McGraw Hill, 4th Edition, 2009.

Reference Books:

1. Joe Wigglesworth and Paula Mcmillan, Java Programming Advance topics, CENGAGE Learning, 3rd Edition, 2001.
2. Kathy Sierra & Bert Bates, "Head First JAVA", O' Reilly, 2nd Edition, 2005.
3. David Flanagan, "Java in a Nutshell", O' Reilly, 5th Edition, 2005.

Term Work:

1. At least ten laboratory experiments based on the entire syllabus duly recorded and graded.
2. Presentation/Application based experiment and Quiz/Practical exam/Viva/Any other mode of evaluation.

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Program: B. Tech Integrated (EXTC)				Semester : VIII	
Course : Computer Communication Networks				Code : BTIET08002	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (50 Marks)
3	2	0	4	Scaled to 70 Marks	Scaled to 30 Marks

Pre-requisite: Principles of communication.

Objectives:

1. To introduce the concepts of various types of Communication networks and their topologies.
2. To understand the layered computer network architecture and the protocols in different layers.
3. To know the different types of addressing and routing algorithms.
4. To be able to understand the TCP/IP architecture of internet.

Outcomes:

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

1. Analyze various topologies of computer networks.
2. Interpret the layered architecture and the transfer of information using protocols in various layers.
3. Describe the function of each layer and interpret the flow of information from one layer to other layer.
4. Recognize the concepts of internet and the protocols in the TCP/IP protocol suite and use it for various types of information flow and applications.
5. Use the concept of packet switching and routing algorithms for network design.

Detailed Syllabus:

Unit	Description	Duration
1.	**Communication networks and services:** Network functions and network topology, basics of switching techniques. Reference network Model (ISO-OSI, TCP/IP)	04
2.	The Physical Layer: Function of physical layer, introduction to transmission media.	02

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3.	**Peer to peer protocols and data link layer:** Peer to peer protocols and service models, end to end versus hop by hop. ARQ protocols, stop and wait ARQ, Goback-N ARO, selective repeat ARO, transmission efficiency of ARQ protocols, sliding windows flow control, timing recovery for synchronous services, error detection and correction, framing. Data link protocols: - HDLC data link control, point to point protocol, statistical multiplexing.	07
4.	**The Medium Access Sub layer:** The channel allocation problem, multiple access protocols, IEEE standard 802 for LANS and MANS, high-speed LANs, Network devices-repeaters, hubs, switches and bridges.	06
5.	**Network Layer:** Functions of Network layer, The Internet Protocol (IP), IP packet, IPv4 addressing, subnet mask, classless interdomain routing (CIDR), address resolution, reverse address resolution, IP fragmentation and reassembly, ICMP,IGMP Dynamic Host Configuration Protocol (DHCP), mobile IP, IPv6.	07
6.	**Packet switching networks and routing protocols:** Network services and internal network operation, packet network topology, connectionless packet switching, virtual circuit packet switching, routing in packet networks, routing algorithm classification:- hierarchical routing, link state versus distance vector routing, shortest path algorithms:- the Bellman-ford algorithm, Dijkstra's algorithm, other routing approaches. Internet routing protocols, open shortest path first protocol, border gateway protocol, multicast routing.	10
7.	**Transport Layer:** User Data gram Protocol (UDP), Transmission Control Protocol (TCP), TCP Reliable stream service, TCP operation: - three way handshake, congestion control algorithms, mobile TCP.	06
8.	**Application Layer:** Application layer function and protocols: DNS, HTTP, FTP, SNMP, SMTP.	03
	Total Hours	**45**

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Text Books:

1. S. Tanenbaum, Computer Networks, 3rd edition, PHI, 2007.
2. Forouzan, Data Communication and Networks, Tata McGraw Hill publication, 4th edition, 2006.

Reference Books:

1. William Stallings," Data and Computer Communication", 8th edition, Pearson Education publication, 2008.
2. Leon Garcia and Indra Widjaja, Communication Networks, Tata McGraw Hill publication, 2nd edition, 2004.

Term Work:

1. At least ten laboratory experiments based on the entire syllabus duly recorded and graded.
2. Presentation/Application based experiment and Quiz/Practical exam/Viva/Any other mode of evaluation.

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Program: B. Tech Integrated (EXTC)				Semester : VIII	
Course : Microcontrollers and Embedded Systems				Code : BTIET08003	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (50 Marks)
3	2	0	4	Scaled to 70 Marks	Scaled to 30 Marks

Pre-requisite: Basic knowledge Digital Electronics and Microprocessors.

Objectives:

1. To introduce to the students 8 bit Microcontrollers.
2. To understand the assembly and "C" language and write code for applications.

Outcomes:

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

1. Explain the difference between microprocessors and microcontrollers and learn 8051 microcontroller.
2. Design microcontroller based systems for different applications.
3. Know the basics of PIC18xx controller.
4. Discuss different embedded systems and their use.
5. Explain the concept of RTOS and its selection criteria.

Detailed Syllabus:

Unit	Description	Duration
1.	**Basics of 8051:** Comparison of microprocessor and microcontroller, Architecture and pin functions of 8051 chip controller, CPU timing and machine cycles, Internal memory organization, Program counter and stack, Input/output ports, · Counters and timers, Serial data input and output · Interrupts, Power saving modes.	07
2.	**Programming with 8051:** Instruction set, addressing modes, immediate, registers, direct and indirect data movement and exchange instructions, push and pop op-codes, arithmetic and logic instructions, bit level operations,	08

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	jump and call instructions, input/ output port programming, Programming timers, asynchronous serial data communications, and hardware interrupt service routines. Interfacing of LCD display, hex keyboard, ADC0808, DAC0808 and Stepper motor with 8051 Current trends in microprocessors and practical implementation	
3.	**PIC Controllers: PIC18** PIC18 memory organization, CPU registers, Pipelining, instruction format, Addressing modes, Sample of PIC18 Instructions. Overview of the 8-bit MCU Market	07
4.	**PIC18 Assembly language Programming** Assembler directives, Writing programme to perform arithmetic computations, program loops, Reading and writing data in programmed memory, Logic Instructions, Using programmed loop to create time delays, Rotate instructions, Using rotate instructions to perform Multiplications &divisions. I/O Addressing, Interfacing with simple input/output devices.	08
5.	**Introduction to Embedded systems** Architecture of Embedded Systems, Design Metrics, Examples of embedded systems, hardware/software co-design, Embedded micro controller cores (ARM, RISC, CISC, and SOC), embedded memories, sensors and interfacing techniques,	07
6.	**Real-time operating system(RTOS)** RTOS concepts, real-time operating systems, Required RTOS services/capabilities (in contrast with traditional OS). Benefits of using RTOS, Concepts of Tasks/Threads/Process, Multitasking, Task Scheduling, Task management, Inter-task communication and Synchronization, Device Drivers, How to choose an RTOS	08
	Total Hours	**45**

Text Books:

1. Muhammad A Mazidi, "The 8051 microcontroller and embedded system", Pearson Education Asia, 2nd edition, 2008.
2. Han Way Huang, "PIC Microcontroller", Cengage learning, 2009
3. Rajkamal, "Embedded Systems - Architecture, Programming and Design", Tata McGraw Hill, 2nd edition, 2009.

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Reference Books:

1. Kenneth J Ayala, " The 8051 microcontrollers", Thomson, 3rd edition, 2006
2. John B. Peatman, "Design with PIC Microcontrollers", Pearson Education, 2nd edition 2010
3. David E. Simon , "An Embedded Software Primer", Pearson Education, 1999.

Term Work:

1. At least ten laboratory experiments based on the entire syllabus duly recorded and graded.
2. Presentation/Application based experiment and Quiz/Practical exam/Viva/Any other mode of evaluation.

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Program: B. Tech Integrated (EXTC)				Semester : VIII	
Course : Digital Television Systems				Code : BTIET08004	
Teaching Scheme				Evaluation Scheme	
Lecture	Practical	Tutorial	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms
3	2	0	4	Scaled to 70 Marks	Scaled to 30 Marks

Pre-requisite: Knowledge of Basic electronics, Analog and Digital communication.

Objectives:

1. To provide knowledge and principle of Colour TV and Advanced TV systems.
2. To teach fundamentals of colour signal transmission and their standards.
3. To introduce principles of display technologies like LCD TV and LED TV.
4. To give an insight of the concepts of digital signal transmission and principle of Digital TV, HDTV, IPTV and 3D TV.

Outcomes:

After successful completion of this course, students should be able to

1. Analyse and comprehend the working of various colour TV systems.
2. Recognise the principle of various advanced TV technologies.
3. Compare various display technologies.
4. Analyse the fundamentals of digital signal transmission.

Detailed Syllabus:

Unit	Description	Duration
1.	**Fundamentals of Colour Television:** Compatibility and reverse compatibility, colour perception, Three colour theory, luminance, hue and saturation, colour TV camera, generation of luminance and colour difference signals, unsuitability of (G-Y) signal for transmission. **Colour signal transmission:** Frequency interleaving, bandwidth, Quadrature AM, colour burst signal, weighting factors, formation of chrominance signal, colour signal Phasor diagram.	06
2.	**Colour TV Systems:** **NTSC colour TV system:** Phasor diagram of I and Q signals, colour subcarrier frequency, coder and decoder, limitations. **PAL colour TV system:** features, PAL burst, cancellation of phase errors, PAL-D demodulation, choice of colour subcarrier	08

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	frequency, PAL coder and decoder, merits and demerits, **SECAM III colour TV system:** Coder and decoder, merits and demerits.	
3.	**LCD :** Liquid crystal display (LCD) technology, Liquid crystals, operation of Liquid crystal display, Twisted Nematic (TN) transmissive LCD, passive and active- matrix LCD's, TFT-LCD panel drive, Backlight assembly. **LED TV:** LED technology, materials used for LED's, working of LED TV, Parameters of a LED module, advantages of LED screens, comparison of LCD, edge lit LED and back lit LED TV.	06
4.	**Digital Television Transmission Standards:** ATSC terrestrial transmission standard, vestigial sideband modulation, DVB-T transmission standard, ISDB-T transmission standard, channel allocations, antenna height and power.	07
5.	**Digital TV:** Principles of digital video broadcasting: digitization, compression and channel encoding, Standard definition (SDTV) sampling rate, video sampling, MPEG encoding: components of DTV, Video-MPEG-2 coding, MPEG video compression, Digital TV receiver, Merits of Digital TV receivers, Direct to home (DTH) Television system. Cable Television (CATV)	08
6.	**High definition TV (HDTV):** Advantages of HDTV, HDTV parameters, comparison of SDTV and HDTV aspect ratio, HDTV common interface format, Introduction to Ultra HDTV.	04
7.	**IPTV:** Internet protocol TV technology, On-line convergence, Asymmetrical digital subscriber line (ADSL) bandwidth allocation, Bit rates, Closed IPTV network, Video on demand, comparison of IPTV and cable technology. **3 D TV:** Introduction to 3 D TV technology, three dimensional video displays.	06
	Total Hours	45

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Text Books:

1. Gulati R.R, Monochrome and Colour Television, New Age International, 3rd edition, 2014.
2. K.F. Ibrahim, Newnes guide to Television and Video technology, 4th edition, 2007.

Reference Books:

1. Gerald w. Collins, Fundamentals of Digital Television Transmission, John Wiley & Sons, 2001.
2. Gulati R. R., Modern Television Practice: Transmission, Reception and Applications, New Age International, 5th edition, 2015.
3. Dhake A.M, Television and video engineering, Tata Mc Graw Hill Education, 2nd edition, 1999.

Term Work:

1. At least ten laboratory experiments based on the entire syllabus duly recorded and graded.
2. Presentation/ Application based experiment and Quiz/ Practical exam/ Viva/ Any other mode of evaluation.

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Program: B. Tech Integrated (EXTC)				Semester : VIII	
Course : Industrial Economics and Management				Code : BTIET08005	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (50 Marks)
3	0	0	3	Scaled to 70 Marks	Scaled to 30 Marks

Pre-requisite: Nil

Objectives:

1. To teach elements of basic micro and macro economics.
2. To teach issues dealing with small-scale economic phenomena and such things as prices and output of firms, industries and resource owners.

Outcomes:

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

1. Recognize the concept of Demand & Supply Analysis.
2. Explain the concepts of basic micro and macro economics.
3. Identify issues dealing with small-scale economic phenomena.

Detailed Syllabus:

Unit	Description	Duration
1.	**Introduction:** Industrial Economics, Problem of scarcity of economic resources, the economic systems.	02
2.	**Demand & Supply Analysis:** Concept of demand and elasticity of demand, Consumer Behavior, Production and Cost behavior, Scale Economics, Technological change and effects.	05
3.	**Structure of Market / Industry Analysis:** Types of Competition - monopoly, oligopoly, monopolistic competition, perfect and imperfect competition, Government Policy towards industry.	04
4.	**Macro Economics Indicators :** GDP, Inflation & Employment	04

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5.	**Government & Central Banking:** Function of central banking, monitory policy and fiscal policy, taxation, balance of trade and payments, external sector policies of India.	05
6.	**New Economic Policy:** Liberalisation, privatization, globalization.	03
7.	**Introduction to Management :** Development of management thought, contribution of F.W. Taylor, Henri Fayol, Elton - Mayo, Nature of Planning, decision making process, Managing by Objectives (MBO)	05
8.	**Organizational Structure:** Line and staff relationships, centralization & decentralization, role of delegation of authority.	04
9.	**Theory of Motivation :** Maslow, Herzberg & McGregor theory of motivation, McClelland's achievement theories	04
10	**Introduction to Production & Marketing Management :** production, planning and control, inventory control, qualition control, sales, advertising, market research	05
11	**Introduction to Finance & Human Resource Functions:** break-even analysis, budgeting, staffing, training.	04
	Total Hours	45

Text Books:

1. Paul and Samuelson and Nordhaus, Economics, TMH, 18th edition, 2008.
2. Ruddar Datt, K.P.M. Sundharam Indian Economy, 5th edition, 2006.
3. Koontz, O'Donnell, Weihrich, Essentials of Management, TMH, 5th edition,2003, 2007.
4. L.M.Prasad, Principles and Practice of Management, S Chand & Sons, 7th edition, 2007.

Reference Books:

1. V.S. Ramaswamy, Marketing Management, Maomillan, 3rd edition, 2006.
2. Khan & Jain, Financial Management, TMH, 5th edition, 2007.

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3. Dr. B.S. Goyal, Production Operations Management, Pragati Prakasher, 3rd edition, 1996.

Term Work:

1. Presentation/ Application based experiment and Quiz/ Practical exam/ Viva/ Any other mode of evaluation.

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Program: B. Tech Integrated (EXTC)				Semester : VIII	
Course : RF Circuit Design				Code : BTIET08006	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (50 Marks)
3	2	0	4	Scaled to 70 Marks	Scaled to 30 Marks

Pre-requisite: Knowledge of Basic Electronics and Electromagnetic Wave Theory.

Objectives:

1. To introduce to the students the fundamentals of active & passive components and circuits used at Radio Frequencies.
2. To teach the basic concepts of Transmission lines, Microstrip lines.
3. To use smith chart to various design problems in RF.
4. To be able to design RF filters

Outcomes:

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

1. Know active and passive components and its properties for circuits at Radio Frequencies.
2. Design different Impedance Matching networks and analyze using smith chart.
3. Analysis of multiport network at RF.
4. Designing of filters at Radio Frequency.
5. Derive power gain equations for RF circuits.
6. Analyze active RF components and designing various active RF component models.

Detailed Syllabus:

Unit	Description	Duration
1	**Introduction:** Importance of radiofrequency design, Dimensions and units, frequency spectrum. RF behavior of passive components: High frequency resistors, capacitors & inductors. Chip components and Circuit board considerations: Chip resistors, chip capacitors, surface mounted inductors.	04
2	**Impedance Matching and Tuning at Radio Frequency:** Special terminated conditions: Input impedance of terminated lossless line, Short circuit transmission line, Open circuit transmission line, Quarter wave transmission line.	09

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	Sourced and Loaded Transmission Line: Phasor representation of source, Power considerations for a transmission line, input impedance matching, return loss and insertion loss. Matching with Lumped Elements, Single-Stub Tuning, Double-Stub Turning, The Quarter-Wave Transformer	
3	**Single and Multiport Network:** Basic Definition, Interconnection Networks, Network Properties and applications, Scattering Parameters. **Signal Flow Graph and its applications:** Definition and Manipulation of signal flow graph, Signal flow graph representation of source, Signal flow graph representation of passive single port device, Power gain equations	10
4	**RF Filter Design:** Filter types and parameters, Low pass filter, High pass filter, Band pass and Band stop filter Periodic Structures, Filter Design by the Image Parameter Method, Filter Design by the Insertion Loss Method, Filter Transformations. **Filter Implementation:** Unit Elements, Kuroda's Identities and Examples of Microstrip Filter Design.	12
5	**Active RF Components and Modelling:** Semiconductor Basics, Construction, Functionality, Frequency response of Bipolar-Junction Transistors, RF Field Effect Transistors and High Electron Mobility Transistors: Transistor Models: Large-signal BJT Models, Small-signal BJT Models, Large-signal FET Models, Small-signal FET Models. Measurement of Active Devices: DC Characterization of Bipolar Transistors, Measurements of AC parameters of Bipolar Transistors, Measurement of Field Effect Bipolar Transistors Transistor Parameters. Scattering Parameter Device Characterization.	10
	Total Hours	45

Text Books:

1. Reinhold Ludwig, RF Circuit Design- Theory and applications, Pearson Education, 2nd edition, 2009.
2. Matthew M. Radmanesh, Advanced RF & Microwave Circuit Design: The Ultimate Guide to Superior Design, author house publication, 2008.

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3. Devendra K Mishra, Radio Frequency and Microwave communication circuits analysis and design, John Willey & Sons. Inc., 1st edition, 2004.

Reference Books:

1. George D Vendelin, Anthony M Pavio, Ulrich L Rohde, Microwave circuit design using linear and nonlinear techniques, 2nd Edition, 2005
2. W. Alan Davis , K K Agarwal, Radio Frequency circuit Design, Wiley India, 1st edition, 2009.
3. Joseph J. Carr, Secrets of RF Circuit Design, Tata McGraw-Hill, 3rd edition, 2004.

Term Work:

1. At least ten laboratory experiments based on the entire syllabus duly recorded and graded.
2. Presentation/ Application based experiment and Quiz/ Practical exam/ Viva/ Any other mode of evaluation.

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

Program: B. Tech Integrated (EXTC)				Semester : VIII
Course : Minor Project				Code : BTIET08007
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)
0	4	0	2	Scaled to 50 Marks

Pre-requisite: Basic knowledge subjects studied till semester V

Objectives:

1. To be able to implement the project.
2. Circuit building/Simulation of the project.
3. Testing of the results, validation.

Outcomes:

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

1. Select an appropriate design based topic.
2. Know about the different methods for implementation of design.
3. Formulate the feasible design model.
4. Summarize the topic into a technical report and demonstrate the model.

Activities to be done in Minor Project:

1. The Project group to be formed consisting of not more than 3 students.
2. The Project area and topic is to be selected in consultation with Project Mentors, alternatively students can propose the topics.
3. The Names of the students and the topic of the Project to be submitted in the first week of the semester along with Name of the Mentor.
4. The minor project will involve development implementation and testing of the module/circuit.
5. Student is required to submit a 1-2 pages weekly report on the work done to the mentor. There would continuous evaluation based on the weekly report submitted.
6. Report primarily containing the entire overview of the Project from Literature Survey, Feasibility Study, Design, Analysis, Implementation, and Testing is to be submitted at the end of the Trimester. (Hard Bound Report (Golden Embossing))
7. Presentation (about 30 minutes) of the work done during the trimester to be evaluated by Internal Examiner and External Examiner.

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

Program: B. Tech Integrated (EXTC)				Semester : VIII
Course : Business Visualization				Code : BTIET08008
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: Basic Computer Knowledge

Objectives:

1. To explore data and build reports using Visual Analytics

Outcomes:

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

1. Create and prepare data sources.
2. Explore business data.
3. Build Reports for business visualization.

Detailed Syllabus:

Unit	Description	Duration
1.	**Getting Started with Visual Analytics :** exploring Visual Analytics concepts, using the Visual Analytics ,discussing the course environment and scenario	02
2.	**Administering the Environment and Managing Data :** Data building and exploration, Data Administration	06
3.	**Using the Visual Analytics Explorer :** examining the Visual Analytics Explorations, selecting data and defining data item properties, creating visualizations, enhancing visualizations with advanced analytics	08
4.	**Designing Reports with Visual Analytics :** examining the Visual Analytics Designer , creating a simple report, working with graphs, working with filters and report sections, establishing interactions, working with gauges, working with tables, working with other objects	08
5.	**Viewing Visual Analytics Reports :** viewing reports on the Web, viewing reports on a mobile device	02

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6.	**Case Study:** Creating Analyses and Reports with Visual Analytics	**04**
	Total Hours	**30**

Text Books:

1. The research and development agenda for visual analytics by James J. Thomas, Kristen A. Cook -2013.

Reference Books:

1. Visual Analytics : User Guide, The Little Book: A Primer, Fourth Edition,

Term Work:

1. Presentation/Application based experiment and Quiz/Practical exam/Viva/Any other mode of evaluation.

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

Program: B. Tech Integrated (EXTC)				Semester : VIII	
Course : Digital Communication				Code : BTIET08009	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (50 Marks)
3	2	0	4	Scaled to 70 Marks	Scaled to 30 Marks

Pre-requisite: Knowledge of Analog Communication systems, Probability and Random Processes.

Objectives:

1. To teach various types of digital modulation & demodulation techniques.
2. To recognise concept of baseband shaping for data transmission.
3. Understand various coding and decoding techniques.
4. To learn basic concepts spread spectrum techniques and their applications.

Outcomes:

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

1. Discuss and compare different digital modulation techniques.
2. Make use of different algorithms for source and error control coding.
3. Apply different base band shaping techniques for data transmission.
4. Analyze different detection techniques for base band signals.
5. Relate concepts and applications of spread spectrum techniques.

Detailed Syllabus:

Unit	Description	Duration
1	**Waveform coding techniques:** Sampling theorem, Quantization and Encoding, Pulse Code Modulation (PCM) transmitter and receiver, Differential PCM (DPCM) transmitter and receiver, Delta Modulation (DM) transmitter and receiver, quantization noise and slope overload distortion, Adaptive delta modulation (ADM) transmitter and receiver, Discrete PAM signals: Line coding techniques :Unipolar, Polar and bipolar, Basic concepts of M-ary signals.	04
2	**Entropy and source coding:** Uncertainty, Information and Entropy, Properties of Entropy, Source coding Theorem, Prefix coding, Huffman coding, Fano Algorithm.	03

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3	**Base Band Shaping for data Transmission :** Model of digital communication system, GRAM-SCHMIDT orthogonalization procedure , Geometric Interpretation of signal, Power Spectra of discrete PAM , Inter symbol Interference (ISI), Nyquist criteria for distortion less Base Band Binary Transmission: Ideal and practical solution , Eye pattern, Regenerative Repeater, Adaptive equalizer and Decision feedback equalizer.	08
4	**Digital Modulation Techniques:** Digital Modulation formats, Coherent Binary modulation techniques: FSK and PSK , Coherent Quadrature modulation techniques: Quadriphase-shift Keying, Minimum Shift Keying , Non coherent Binary Modulation Techniques: Non coherent Orthogonal Modulation , Non coherent Binary FSK, Differential phase shift keying, Comparison of Binary and Quaternary Modulation Techniques, Power spectra of: Binary PSK and FSK Signals, QPSK and MSK Signals.	10
5	**Baseband Detection:** Detection of binary signals, Maximum likely hood detector, Probability of error, Correlation receiver, Matched filter receiver.	04
6	**Error Control Coding:** Rationale for coding and type of codes, Channel Coding Theorem, Linear Block codes, Hamming codes, Syndrome decoding, Minimum distance consideration, Cyclic codes, Generator Polynomial, Parity Check Polynomial, Encoder For Cyclic codes, Syndrome calculator for cyclic codes, Convolution codes, Code Tree , Trellis and State diagram , Viterbi Algorithm, Free distance.	12
7	**Spread Spectrum Modulation :** Pseudo noise sequences, A Notion of Spread spectrum, Direct sequence spread coherent binary phase shift keying, Frequency hop spread spectrum: Slow Frequency hopping and fast frequency hopping, applications.	04
	Total Hours	45

Text Books:

1. Simon Haykin, Digital Communications, Wiley student edition, Reprint 2010.
2. Simon Haykin, Digital Communication systems, first edition, Wiley

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publication, 2013.
Reference Books: 1. Bernard Sklar, Digital Communications Fundamentals and applications, Prentice Hall, 2nd Edition, 2014. 2. John G. Proakis, Digital Communications, 5th Edition, Tata McGraw Hill, 2008. 3. Herbert Taub and Donald Schilling, Principles of Communication systems, Tata McGraw Hill, 2nd edition, 2006.
Term Work: 1. At least ten laboratory experiments based on the entire syllabus duly recorded and graded. 2. Presentation/Application based experiment and Quiz/Practical exam/Viva/Any other mode of evaluation.

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

Program: B. Tech Integrated (EXTC)				Semester : IX	
Course : Optical Fiber Communication				Code : BTIET09001	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (50 Marks)
3	2	0	4	Scaled to 70 Marks	Scaled to 30 Marks

Pre-requisite: Knowledge of Analog and digital communication, Electromagnetic wave theory.

Objectives:

1. To provide knowledge of the basic elements of optical fiber transmission.
2. To understand the structure and characteristics of Optical sources and detectors.
3. To understand the different types of losses and signal degradation in optical wave guides.
4. To understand concepts of optical budgeting, WDM and optical networks.

Outcomes:

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

1. Explain the different elements of optical fiber communication system, propagation of optical signals, losses and signal degradation in optical system.
2. Analyze and assess between different technologies of transmission, reception and communication link.
3. Apply knowledge for evaluating the performance of the system and design the system for specified parameters.
4. Determine concept of optical networks, soliton based communication and WDM.

Detailed Syllabus:

Unit	Description	Duration
1.	**Introduction** Electromagnetic spectrum, optical fiber communication system, digital optical fiber link, advantages of optical fiber communication, optical fiber waveguide, Ray theory transmission, Electromagnetic mode theory for optical propagation, mode coupling, Step index fibers, Graded index fibers, Single mode and multimode fibers, Fiber materials.	08

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2.	**Transmission characteristics of optical fibers:** Attenuation, Absorption losses, Linear and Nonlinear scattering losses, Fiber bend loss, Dispersion: Intramodal and Intermodal, Dispersion shifted fibers, Dispersion flattened fibers. **Optical fiber connection:** Fiber alignment and joint loss, Fibers splices, Fiber connectors, Fiber couplers, Wavelength division multiplexing.	08
3.	**Optical sources** Types of Optical sources, requirements of optical fiber emitter, absorption and emission of radiation, population inversion, Laser structure, semiconductor injection Laser, Surface and Edge emitter LEDs structures, LED characteristics, output spectrum.	05
4.	**Optical detectors** Requirements of Optical detectors, direct and indirect absorption, quantum efficiency, responsivity, p-i-n photodiode, Avalanche photodiode, Receiver noise, Receiver structure.	05
5.	**Optical Amplification** Semiconductor Optical Amplifiers (SOA), Fiber amplifiers and their applications, Erbium doped silica fiber laser, Raman and Brillouin fiber amplifiers.	04
6.	**Optical Fiber Systems and measurements** Link power budget, rise time budget, Wavelength division multiplexing, lines codes and clock recovery **Optical Fiber measurements:** Measurement of attenuation, dispersion, refractive index profile, numerical aperture, fiber diameter, Optical time domain reflectometry (OTDR).	07
7.	**Optical Networks Architectures** Introduction to Optical Networks, SONET / SDH, Metropolitan-Area Networks, Layered Architecture, Broadcast and Select Networks Topologies, Media-Access Control Protocols and Test beds, Wavelength Routing Architecture, Next generation optical Internets. **Soliton systems:** Nonlinear effects. Soliton - based communication. High speed and WDM soliton systems.	08
	Total Hours	45

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Text Books:

1. John M. Senior, Optical Fiber Communications Principles and Practice, Pearson, 3rd Edition, 2009.
2. Rajiv Ramaswami and Kumar N. Sivarajan, "Optical Networks: A Practical perspective, Elsevier, 3rd edition, 2010.

Reference Books:

1. G. Keiser, Optical Fiber Communications, Tata Mc -Graw Hill Publication, 4th edition, 2008.
2. G. Agrawal, Nonlinear fiber optics, Academic Press, 5th edition, 2012.
3. G. Agrawal, Fiber Optic Communication Systems, John Wiley and Sons, New York, 3rd edition, 2002.
4. C. Siva ram Murthy and Mohan Gurusamy, WDM optical networks: concepts, design and algorithms, Prentice Hall of India, 2002.

Term Work:

1. At least ten laboratory experiments based on the entire syllabus duly recorded and graded.
2. Presentation/Application based experiment and Quiz/Practical exam/Viva/Any other mode of evaluation.

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

Program: B. Tech Integrated (EXTC)				Semester : IX	
Course : Wireless Communication Technology				Code : BTIET09002	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (50 Marks)
3	2	0	4	Scaled to 70 Marks	Scaled to 30 Marks

Pre-requisite: Principles of Communications Engineering and digital communication

Objectives:

1. To provide the knowledge of mobile communication systems in various aspects and trends.
2. To understand the mobile radio propagation mechanism.
3. To understand 2G (GSM, GPRS,EDGE), 3G cellular mobile systems.
4. To understand LTE and 4G: emerging technologies for wireless communication.

Outcomes:

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

1. Recognize the significance of cellular concept and the capacity of wireless communication.
2. Explain the mobile radio propagation mechanism.
3. Describe the working and application of GSM, CDMA and 3G (UMTS, IMT 2000) mobile systems.
4. Describe the techniques and technological advancement in LTE and 4G networks.

Detailed Syllabus:

Unit	Description	Duration
1.	**The cellular concept:** Introduction to cellular system, Frequency reuse, handoff, interference, methods of improving the capacity of cellular systems, Packet radio	05
2.	**Mobile radio propagation:** Large scale path loss, reflection, ground reflection model (2 ray model), diffraction, practical link budget design using path loss models, small scale fading and multi-path, small-scale multipath	08

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	propagation, parameter of multi-path channels, types of small scale fading, Rayleigh and Ricean distribution.	
3.	**2G Technologies:** **Global System for Mobile Communication (GSM)** GSM-services, features, radio specifications, system architecture, channel types, frame structure, security aspects, network operations **GSM evolution:** GPRS and EDGE; Architecture and services offered **Code Division Multiple Access (CDMA) digital cellular standard :** Soft hand off and power control, Radio Specifications, forward and reverse CDMA channel.	12
4.	**3G Technologies:** **Universal Mobile Terrestrial system (UMTS):** System architecture, air interface specification, forward and reverse channels in Wideband CDMA (WCDMA) and CDMA 2000.	06
5.	**3GPP LTE and 4G** Introduction and system overview, Frequency bands and spectrum, network structure, and protocol structure, Frame slots and symbols, Logical and Physical Channels: Mapping of data on to logical sub-channels physical layer procedures, establishing a connection, retransmission and reliability, power control. 4G : Introduction, features and architecture Multi antenna Technologies: MIMO	10
6.	**Emerging Technologies:** **5G** Characteristics envisioned for 5G, specifications and architecture **SDN(Software Defined Network)** Objective and architecture	04
	Total Hours	45

Text Books:

1. Theodore S. Rappaport, Wireless Communications, Prentice Hall of India, PTR publication, 2nd edition, 2011.

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2. Andreas F. Molisch , Wireless Communications, Wiley, 2nd edition, 2010

Reference Books:

1. Jochen H. Schiller, Mobile Communication, Pearson, 2nd edition, 2010.
2. Gary J. Mullet, Introduction to wireless telecommunications systems and networks, Cengage learning, 1st edition, 2011.

Term Work:

1. At least ten laboratory experiments based on the entire syllabus duly recorded and graded.
2. Presentation/Application based experiment and Quiz/Practical exam/Viva/Any other mode of evaluation.

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Program: B. Tech Integrated (EXTC)				Semester : IX
Course : Project Phase I				Code : BTIET09003
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 (100 Marks)
0	8	0	4	Scaled to 100 Marks

Pre-requisite: Core EXTC subjects till 3rd year

Objectives:

1. To do literature survey in the topic selected for major project.
2. To explore the feasibility of the project.
3. To design and formulate the work to be carried out in next phase.

Outcomes:

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

1. Select an appropriate problem statement.
2. Analyze different designing parameters.
3. Formulate the feasible design model.

Activities to be done in phase I:

1. The Project group to be formed consisting of not more than 3 students.
2. The Project area and topic is to be selected in consultation with Project Mentors, alternatively students can propose the topics.
3. The Names of the students and the topic of the Project to be submitted in the first week of the Trimester along with Name of the Mentor.
4. The first phase of the project will involve Literature Survey, feasibility study, Design and Part Implementation.
5. Student is required to submit a 1-2 pages weekly report on the work done to the mentor. Attendance will be given on the report. There would continuous evaluation based on the weekly report submitted for 50 marks.
6. Report primarily containing Literature Survey, feasibility study, Design and Part Implementation is to be submitted at the end of the Semester. (Spiral Bound Report)
7. Presentation (about 30 minutes) of the work done during the Semester to be evaluated by External Examiner and Project Mentor.

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Electronics & Telecommunication (2019 - 2020)

Program:	B. Tech Integrated (EXTC)			Semester : IX	
Course :	Image and Video Processing (Elective - I)			Code : BTIET09004	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (50 Marks)
3	2	0	4	Scaled to 70 Marks	Scaled to 30 Marks

Pre-requisite: Knowledge of Digital Signal Processing

Objectives:

1. To understand Image basics and resolutions
2. To comprehend Image processing techniques in spatial and frequency domain
3. To design techniques for filtering images and feature extraction.
4. To develop image and video processing applications in practice.

Outcomes:

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

1. Apply spatial domain techniques for grey and color image enhancement.
2. Apply various transforms to convert and process image in frequency domain.
3. Understand various morphological operations and segmentation techniques for images.
4. Apply motion estimation techniques to video signals

Detailed Syllabus:

Unit	Description	Duration
1	**Image Fundamentals:** Basics of sampling and quantization, Representing Digital Image, Spatial and Gray level resolution, Basic relationships between pixels, RGB ,HSI, CMY and CMYK colour models	04
2	**Image Enhancement** **Spatial Domain:** **Point Processing-** Digital negative, contrast stretching, thresholding, gray level slicing, bit plane slicing, log transformation, power law transformation. **Neighbourhood Processing:** Smoothing spatial filters, Sharpening spatial filters. **Color image enhancement:** intensity transformation and spatial	10

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	filters **Frequency Domain:** 2-D DFT and its properties, Ideal, Butterworth and Gaussian Smoothing and Sharpening filters, Homomorphic filtering **Histogram processing:** Histogram equalization, histogram specification.	
3	**Image Transforms:** Walsh transform, Hadamard transform, Discrete cosine transform, Slant transform, Discrete Wavelet Transform	08
4	**Morphological Image Processing:** Dilation, erosion, opening, closing, Hit -or-Miss transformation **Basic Morphological Algorithms**: Boundary extraction on binary images, Region filling , Skeletonization, Thinning, Thickening	06
4	**Image Segmentation:** **Detection of discontinuities:** Point, Line and Edge detection **Edge linking and boundary detection:** Local processing, global processing via Hough's transform, Global processing via Graph Theoretic techniques. **Thresholding** **Region based segmentation**: Region growing, region splitting and merging	08
6	**Fundamentals of Digital Video** **Video Formation , Perception and Representation:** Digital video sampling, temporal correlation, video frame classifications, I, P and B frames, Digital video quality measure. **Sampling of video signals:** Sampling rates, sampling in 2D and 3D, progressive and interlaced scans.	04
7	**Digital Video Processing Techniques** Fundamentals of motion estimation and compensation General methodologies in motion estimation: Motion representation, Motion Estimation Algorithms: Exhaustive Search Block Matching, Hierarchical Block Matching Algorithm	05
	Total Hours	45

Text Books:

1. R.C Gonzalez and Richard Woods, Digital Image Processing, Pearson Publication, 7th Indian reprint, 3rd Edition, 2009.
2. Oge Marques, Practical Image and Video Processing using Matlab, IEEE Press, John Wiley & Sons Publication, 2011.

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Reference Books:

1. Zi Nian, Li and Mark S. Drew, "Fundamentals of Multimedia", Pearson Education International,
2. Scotte Umbaugh, Digital Image Processing and Analysis-Human and Computer Vision Application with CVIP Tools, 2nd Ed, CRC Press, 2011.
3. Murat Tekalp, 'Digital Video Processing', Pearson, 2010.

Term Work:

1. At least ten laboratory experiments based on the entire syllabus duly recorded and graded.
2. Presentation/Application based experiment and Quiz/Practical exam/Viva/Any other mode of evaluation.

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Electronics & Telecommunication (2019 - 2020)

Program: B. Tech Integrated (EXTC)					Semester : IX
Course : Advanced Microcontrollers (Elective - I)					Code : BTIET09005
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (50 Marks)
3	2	0	4	Scaled to 70 Marks	Scaled to 30 Marks

Pre-requisite: knowledge of 8/16 bit Microcontroller, Microprocessor, computer organization.

Objectives:

1. To understand the core of ARM7 processor.
2. To configure external memory to ARM7.
3. To integrate and implement systems using ARM7.

Outcomes:

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

1. Explain ARM 7 architecture and programming model.
2. Implement device driver routine for LCD, RTC, TIMER, ISP.
3. Design or implement CAN, I2C bus protocols, serial and network protocols.
4. Perform the integration of user code into IDE for application.

Detailed Syllabus:

Unit	Description	Duration
1	**Introduction to ARM:** Comparison between 8/16/32 bit microcontrollers Design Approaches, CISC ii. RISC, ARM Processor architecture Block Diagram, Introduction to ARM 7 / ARM 9 and ARM extensions. Instruction set, Assembly language programming. Mixed C, ARM C program address space memory model Start up program. Exception types in ARM External interrupt, software interrupts handling Abort handling, Introduction to Thumb instruction set: Introduction to ARM thumb, Thumb programmers model, ARM / Thumb inter working, ARM optimizing techniques	07
2	LPC2294 Architecture overview, Memory system, map, Memory remapping, boot block, External memory controller, Pin description, pin connect block.	08

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3	**LPC2294 Peripherals** GPIO, UART0, UART1, features, pin description, register description, architecture, programming	**10**
4	Interface of I2C, SPI, Timer 0, 1 , ADC, real time clock and Watchdog, architecture, register map, register description, programming.	**12**
5	Embedded ICE logic, Embedded Trace microcell, features, application, pin description, register description.	**08**
	Total Hours	**45**

Text Books:

1. Steve Furber, ARM Book System On Chip, Person Education, 2nd edition, 2009.
2. Andrew Sloss, Dominic Symes, and Chris Wright, ARM System Developer's Guide , Margon Kaufmann Publication, 3rd edition, 2009.

Reference Books:

1. David Seal, ARM Architecture Reference Manual, 7th edition, 2007.

Term Work:

1. At least ten laboratory experiments based on the entire syllabus duly recorded and graded.
2. Presentation/ Application based experiment and Quiz/ Practical exam/Viva/ Any other mode of evaluation.

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

Program: B. Tech Integrated (EXTC)				Semester : IX	
Course : Robotics (Elective - I)				Code: BTIET09006	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (50 Marks)
3	2	0	4	Scaled to 70 Marks	Scaled to 30 Marks

Pre-requisite: Basic knowledge of Linear Algebra and Matrix.

Objectives:

1. To provide knowledge to students with the concepts and techniques in robot manipulator control.
2. To expose students to evaluate, choose and incorporate robots in engineering systems and programming of robots.
3. To understand and analyze the various applications of robots.

Outcomes:

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

1. Know the basics of Robots.
2. Apply the knowledge of vectorial mathematics and geometry for kinematics (Direct and Inverse) motion.
3. Perform trajectory planning and work space analysis for robots.
4. Use image representation for robotic movement.
5. Perform chaotic analysis for non-linear dynamics.

Detailed Syllabus:

Unit	Description	Duration
1.	**Robotics manipulation:** Automation and Robots, Classification, Application, Specification, Notations, Robotics and Industrial Safety.	07
2.	**Direct Kinematics:** Dot and cross products, Co-ordinate frames, Rotations, Homogeneous Co-ordinate, D-H Algorithm, Arm equation for Two axis planar articulated robot arm, Three axis robot, Four axis robot, Five-axis robot.	08

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3.	**Inverse Kinematics:** General properties of solution, tool configuration vector for Two axis planar articulated robot arm, Three axis robot, Four axis robot, Five-axis robot. Inverse kinematics analysis of Two axes planar articulated robot arm, Three axis robot, and Four axis robot.	08
4.	**Workspace analysis and trajectory planning of Robots:** Robot work space envelops and examples, Detailed Work space analysis of two axis planar articulated robot arm, Four axis robot. Different type of motions such as Pick and place motions, Continuous path motion, interpolated motion, Straight-line motion, workspace fixtures.	08
5.	**Robot Vision:** Image representation and analysis, Template matching, polyhedral objects, shape analysis, Segmentation (Thresholding, region labelling) Iterative processing, Perspective transformation, Structuring Illumination, Camera calibration.	08
6.	**Task Planning:** Task Planner, Task level programming, Uncertainly, Configuration, Space, Gross motion, Planning, Grasp planning, Fine-motion, Simulation of Planer Motion.	06
	Total Hours	45

Text Books:

1. Fu, Gonzales and Lee, Robotics- Control, Sensing, Vision and Intelligence, McGraw Hill, 1st edition, 2008.
2. Robert Schilling, Fundamentals of Robotics-Analysis and control, Prentice Hall of India, 1990.

Reference Books:

1. J. J. Craig, Introduction to Robotics, Pearson Education, 3rd edition, 2004.
2. Mittal and Nagrath, Robotics and Control, Tata McGraw Hill, 3rd edition,2003.

Term Work:

1. At least ten laboratory experiments based on the entire syllabus duly recorded and graded.

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2. Presentation/ Application based experiment and Quiz/ Practical exam/ Viva/ Any other mode of evaluation.

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

Program:	B. Tech Integrated (EXTC)			Semester : IX	
Course :	Machine Learning (Elective - II)			Code : BTIET09007	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (50 Marks)
3	2	0	4	Scaled to 70 Marks	Scaled to 30 Marks

Pre-requisite: Knowledge of calculus and basic probability and statistics

Objectives:

1. To provide knowledge of the basic concepts of machine leaning.
2. To introduce basic theory and algorithms of machine learning to solve real world problems.

Outcomes:

After successful completion of this course, students should be able to

1. Analyze and Design simple applications of machine learning.
2. Develop optimized algorithms for supervised learning systems.
3. Develop optimized algorithms for unsupervised learning systems.
4. Apply machine learning techniques to solve classification and pattern recognition problems.

Detailed Syllabus:

Unit	Description	Duration
1	**Introduction to Machine Learning:** Introduction to cognitive skills, Role of machine learning in AI Introduction to different statistical tests- z-test, t-test, Pearson's correlation coefficient, Statistical Decision Theory. Components of Learning, Types of Learning Supervised, Unsupervised and Reinforcement Learning, Simple Learning Model, Understanding Data, Feature Extraction, Feature Scaling, Normalization, Hypothesis Function, Noise and Error, Learning Feasibility. Introduction to Prediction Models: Linear Models, Least Square Model, Nearest Neighbour Methods, Bayesian decision theory, Bias and Variance	08
2	**Linear and Logistic Regression:** Linear Regression Algorithm, Model representation, Cost Function,	09

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	Gradient Descent algorithm, Linear regression with One variable, Linear regression with Multiple variable. Logistic Regression Algorithm, Hypothesis Representation, Decision Boundary, Cost function, Gradient Descent, Quadratic approximations, Regularized Logistic Regression, Multiclass Classification: One vs All	
3	**Multilayer (Neuron/Perceptron) Network and Support Vector Machine:** Model Representation, Network Training: Feed Forward Algorithm, Error Back Propagation algorithm, Model Selection, Bias -Variance Trade off, Catalysts for Overfitting, Algorithm Optimization SVM: Maximum Margin Classification, Lagrange Duality, Kernels, Penalization method, Function Estimation	12
4	**Unsupervised Learning:** Introduction, hyperplane design, K-mean Clustering, K-Nearest Neighbour Classifier, Dimension Reduction: Principal Component Analysis, Maximum Variance Formulation, Application of PCA	09
5	**Application of Learning:** Applications in Speech Recognition, Computer Vision, Image Segmentation, Biomedical signal and image processing, Robotics, Biometrics etc.	07
	Total Hours	45

Text Books:

1. Alpaydin Ethem, "Introduction to Machine Learning", MIT Press, Edition- 3, 2014
2. Mehryar Mohri, Afshin Rostamizadeh and Ameet Talwalkar Foundations of Machine Leaning

Reference Books:

1. Bell, Jason, Machine Learning", Wiley, Edition - 1, 2014
2. Christopher M. Bishop, "Pattern Recognition and Machine Learning" Springer publication

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Term Work:

1. At least ten laboratory experiments based on the entire syllabus duly recorded and graded.
2. Presentation/Application based experiment and Quiz/Practical exam/Viva/Any other mode of evaluation.

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

Program:	B. Tech Integrated (EXTC)			Semester : IX	
Course :	Introduction to Automation (Elective – II)			Code : BTIET09008	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (50 Marks)
3	2	0	4	Scaled to 70 Marks	Scaled to 30 Marks

Pre-requisite: Knowledge of basic electronics and control theory.

Objectives:

1. To provide knowledge to learn essential concepts behind control system elements and operations.
2. To expose students to the topics of process control, measurement, and instrumentation to allow applications-oriented design.

Outcomes:

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

1. Learn and apply essential concepts behind control system elements and operations in hydraulics and pneumatics automation.
2. Identify systems approach of the process control in industry and State-of-the-art coverage of computer integrated manufacturing using PLCs and flexible manufacturing systems as applicable in Industrial applications.
3. Develop skills in handling computer-based controllers.
4. Explain fundamentals of sensorics technology and modular mechatronics along with Robot technology.

Detailed Syllabus:

Unit	Description	Duration
1.	**Introduction to Automation** Automation in Production System, Principles and Strategies of Automation, Basic Elements of an Automated System, Advanced Automation Functions, Levels of Automations.	04
2.	**Introduction to Fluid Power Generating/Utilizing Elements** Hydraulic pumps and motor gears, vane, piston pumps-motors-selection and specification-Drive characteristics - Linear actuator -. Reservoir capacity, heat dissipation, accumulators - standard circuit symbols, circuit (flow) analysis.	04

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3.	**Control and Regulation Elements** Direction flow and pressure control valves-Methods of actuation, types, sizing of ports-pressure and temperature compensation, overlapped and under lapped spool valves-operating characteristics- Electro Hydraulic System, Electro Hydraulic servo valves-Different types characteristics and performance.	06
4.	**Hydraulics** Introduction to Hydraulics, Physical Fundamentals and principles, Hydraulic components (Pump, Valves, etc.), Basic hydraulics circuits and Electro Hydraulics, Practical examples based on simple automation tasks, types of proportional control devices- Pressure relief, Flow control, Direction control, Hydraulic symbols, Spool configurations, Selection & sizing with reference to manufacturer's data, Electrical operation, Basic electrical circuits and operation, Solenoid design, Comparison between conventional and proportional valves.	06
5.	**Pneumatics** Introduction to Pneumatics, Physical Fundamentals and principles of Pneumatics, Pneumatic Components (Compressor, Valves, Compressed Air), Basic hydraulics circuits and Electro Pneumatics, Practical examples based on simple automation tasks	06
6.	**Control schemes & controllers** On/OFF control, P, PI, PID control, related terminologies, parameter adjustments and implications Electronic P, PI & PID controller. Data acquisition, set point control, direct digital control Review of Z-transform theory and its application in digital control Digital PID algorithms	06
7.	**PLC** Introduction to Automation Technology and Programming Languages (Ladder Diagram), Interface I/O modules with PLC, Working principle of relays and contactors, Area of application, Programming with Relay and PLC	07
8.	**Sensorics, Robotics and Mechatronics** Introduction to Sensorics Technology, Basics and Fundamentals, Functions of Inductive, Capacitive, Magnetic, Ultrasonic and Optical types of sensors, Introduction to Robot Technology Basics of Mechatronics and Modular Mechatronics.	06

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	Total Hours	45

Text Books:

1. Johnson Curtis, Process Control Instrumentation Technology, Prentice hall of India, 8th edition, 2007.
2. Mikell P. Groover, Automation, Production Systems and Computer-Integrated Manufacturing, Pearson Education, 3rd edition, 2007.

Reference Books:

1. Dale R. Patrick and Stephen Fardo, Industrial Process Control Systems, **Thomson Delmar Learning,** 2nd edition, **2009.**
2. D. Patranabis, Principles of Process Control, , TMGH, 2nd edition, 1996.
3. Study Material from Bosch-Rexroth Automation Company.

Term Work:

1. At least ten laboratory experiments based on the entire syllabus duly recorded and graded.
2. Presentation/Application based experiment and Quiz/Practical exam/Viva/Any other mode of evaluation.

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

Program:	B. Tech Integrated (EXTC)			Semester : IX	
Course :	Multimedia Signal Compression (Elective – II)			Code : BTIET09009	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (50 Marks)
3	2	0	4	Scaled to 70 Marks	Scaled to 30 Marks

Pre-requisite: Information Theory

Objectives:

1. To impart knowledge about Data, Image, Video and Audio compression.
2. To have conceptual understanding, and hands-on experience, of the state-of-the-art compression algorithms and approaches in Text, Image, Audio and Video.

Outcomes:

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

1. Analyse performance parameters for Data Compression.
2. Apply Text compression techniques.
3. Analyse methods of Audio compression.
4. Implement Image compression and video compression.

Detailed Syllabus:

Unit	Description	Duration
1.	**Introduction to Data Compression** **Compression Techniques:** Loss less Compression, Lossy compression. Measure of Performance, Modelling and Coding.	04
2.	**Text Compression** VLC Coding, Minimum variance Huffman Coding, Extended Huffman coding, Adaptive Huffman Coding, Arithmetic Coding, Golomb Code, Dictionary Coding Techniques, LZ77,LZ78, LZW, Run Length Encoding, Uniquely decodable Codes and Prefix Codes	10
3.	**Audio Compression** Digital Audio, Frequency and Temporal Masking, Psychoacoustic Model, A law and μ law companding. **Lossy and Lossless Predictive Coding:** DPCM, ADPCM	10

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	MPEG Audio Coding: Layer I, Layer II and Layer III (mp3) coding	
4.	**Image Compression** **Fundamentals:** Coding Redundancy, Interpixel Redundancy, Psychovisual Redundancy, Fidelity Criteria **Transform Based Coding:** Discrete Cosine Transform and Karhunen Loeve Transform **Wavelet Based Coding:** Discrete Wavelet Trasnform **Binary Image Compression Standards :** JBIG **Continuous Tone Still Image Compression Standards:** JPEG Baseline, JPEG-LS, JPEG 2000	**12**
5.	**Video Compression** **Video compression based on Motion Compensation,** **Search for motion Vectors:** Sequential Search, 2D Logarithmic Search, Hierarchical Search algorithms. ITU-T H.261, H.263 standards, overview of MPEG 1, MPEG 2, MPEG 4 standards	**09**
	Total Hours	**45**

Text Books:

1. Khalid Sayood, "Introduction to Data Compression", 3rd ed, Morgan Kaufmann, 2012.
2. Zi Nian, Li and Mark S. Drew, "Fundamentals of Multimedia", Pearson Education International, 2014.

Reference Books:

1. David Salomon, "Data Compression The Complete Reference", 4th ed. Springer, 2007
2. Yun Q. Shi, Huifang Sun, "Image and Video Compression for Multimedia Engineering", CRC Press, 2008

Term Work:

1. At least ten laboratory experiments based on the entire syllabus duly recorded and graded.
2. Presentation/Application based experiment and Quiz/Practical exam/Viva/Any other mode of evaluation.

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

Program: B. Tech Integrated (EXTC)				Semester : IX	
Course : VLSI Design and Technology (Elective - II)				Code : BTIET09010	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (50 Marks)
3	2	0	4	Scaled to 70 Marks	Scaled to 30 Marks

Pre-requisite: Basic knowledge of solid state electronics.

Objectives:

1. To provide the foundation for state-of-the-art CMOS design.
2. To provide the basics of design and layout of CMOS VLSI circuits.
3. To study the essential physics required for understanding of VLSI circuits and VLSI design rules.
4. To expose students to simulations tools in study of CMOS logic design from transistor level schematic to layout.
5. To implement the full VLSI design flow for IC design and chip level issues.

Outcomes:

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

1. Know the IC fabrication process.
2. Know advanced VLSI CMOS design flow used in the semiconductor industry using EDA tools.
3. Determine the performance of VLSI circuits like inverters, super buffers and sequential circuits.
4. Use CAD tools to design CMOS Logic from transistor level schematic to layout using design rules.
   Explain the fundamentals of packaging and testing ICs.

Detailed Syllabus:

Unit	Description	Duration
1.	**Fabrication of ICs:** Crystal growth, Diffusion of impurities, Ion implantation, Oxidation, CVD, Lithography, Epitaxy, Metallization and Packaging. Fabrication of NPN, PNP and lateral Transistors. Parasitic Transistor, Fabrication of IC Diodes, Resistor and capacitors, Isolation. **Field Effect Transistor:**	07

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	General physical consideration, MOSFET Threshold voltage, flat band condition, threshold adjustment, linear and saturated operation, FET capacitance mobility saturation and thermal variations, Short channel effect and hot electron effects electro migration, Aluminium spikes and contact resistance.	
2.	**Processing Scaling and Reliability:** Silicon gate NMOS CMOS process, silicon patterning, mask generation, active area definition, transistor formation contacts, metallization, chip packaging process limitations scaling factor of MOS circuits, scaling, functional limitations of scaling, scaling of wires and interconnections, latch up in scaled CMOS circuits, device reliability, soft errors, noise margins, lead inductance, gate oxide reliability, Polysilicon resistance and input protection.	03
3.	**Design rules and Layout :** The purpose of design rules, NMOS rules, CMOS design rules, passive load NMOS inverter , active load NMOS inverter, NMOS NAND & NOR gates, CMOS inverter, CMOS NAND & NOR gates, interlayer contacts, butting and buried contacts.	06
4.	**MOS inverters :** MOSFET aspect and inverter ratio, enhancement & depletion mode pull ups, enhancement Vs depletion mode pull ups, standard CMOS inverter, NMOS threshold voltage and inverter ratio transit and switching speed of NMOS & CMOS inverter	07
5.	**Super Buffer :** CMOS & steering logic, RC delay lines, NMOS & CMOS super buffer, NMOS tri-state super buffer and PAD drivers. CMOS gates, dynamic ratio-less inverter with large capacitive buffer load, designing pass transistor logic. Dynamic CMOS design.	08
6.	**CMOS Digital Gates/Sequential Circuits:** NMOS and CMOS Super Buffer, Tri-State buffer and PAD Drivers, CMOS Gates, Dynamic CMOS Design, Charge Sharing, Pseudo-NMOS PMOS, Flip-Flops, Setup and Hold Time, Race Around Condition, Sequential Digital Circuits, Power Analysis and Estimation, Different Process Corners, Slow and Fast Transistors, High and Low Threshold Voltage Transistors.	06

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7.	**CAD Tools and Methodology** Introduction to VLSI CAD tools, ASIC, Full-Custom flow, RTL-to-GDSII flow	05
8.	**Packaging and Testing:** Packaging of ICs. Different types of packages. Design for Testability - requirement & cost of testing, test pattern generation, fault models, test generation and methodology	03
	Total Hours	45

Text Books:

1. Neil H. E. Weste, and KAMRAN ESHRAGHIAN, Principles of CMOS VLSI Design a System Perspective, , Addison Wesley, 3rd edition, 2003.
2. E. D Fabricius, Introduction to VLSI Design, , McGraw-Hill, 3rd edition, 1990.

Reference Books:

1. Carver Mead and Lynn Conway, Introduction to VLSI Systems, Addison-Wesley,1980
2. D. A. Pucknell, Kamran Eshraghian, Basic VLSI Design, Prentice Hall, 3rd edition. 2010.
3. Andrew Bros, VLSI Circuits & System in Silicon, 3rd edition, McGraw Hill International Edition, 3rd edition, 1991.
4. Cadence Design Manual, Cadence Design Systems, CA, USA Publication year July 2005.

Term Work:

1. At least ten laboratory experiments based on the entire syllabus duly recorded and graded.
2. Presentation/Application based experiment and Quiz/Practical exam/Viva/Any other mode of evaluation.

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

Program:	B. Tech Integrated (EXTC)			Semester : X	
Course :	Digital Voice and Broadband Communication			Code : BTIET10001	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (50 Marks)
3	2	0	4	Scaled to 70 Marks	Scaled to 30 Marks

Pre-requisite Knowledge of Digital Communication and Computer networks

Objectives:

1. To provide knowledge of basic Telephony and characterise the traffic in telephone network.
2. To study various types of digital switching and signalling techniques.
3. To have an insight into the ISDN and B-ISDN.
4. To understand the need and process of transition from traditional communication networks to broadband communication networks.
5. To explore Voice over IP.
6. To explain the functionality of different building blocks of broadband technology.

Outcomes:

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

1. Explain the basic concepts of telephony.
2. Analyse and characterize the traffic in telephone network.
3. Explain the B-ISDN and signalling in telephony.
4. Discuss the Broadband Access Technologies.
5. Describe and compare the different broadband network access techniques of cable modem service, optical fiber based access, and broadband wireless access techniques of Wi-Fi and Wi-MAX networks.
6. Describes the voice coding techniques and different protocols used for VoIP.

Detailed Syllabus:

Unit	Description	Duration
1.	**Telephony Background:** Analogue networks, subscriber loop design, calculating resistance Limit, calculating loss limit,	03

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	Transmission Impairments in Subscriber loop.	
2.	**Telephone traffic theory:** Traffic characterization, arrival and holding time, Erlang formula and Tables, loss systems, lost calls, network blocking probabilities, delay systems, measurement of traffic congestion, lost calls and grade of service.	04
3.	**Digital switching and Synchronisation:** Voice digitization Multi channel PCM, Frame/multiframe/signalling formats, Higher order multiplexing, Line codes, Space division switching, time division switching, time space time (TST) switch, space time space (STS) switch, comparison of TST and STS switches, Blocking and Non-blocking switches. **Network Synchronization:** Need for synchronization, Methods for synchronization Timing recovery (PLL), Clock Instability, Elastic stores, Timing inaccuracies, Slips, Pulse Stuffing. **Signalling:** Types of Signalling, Channel Associated signalling, Common Channel Signalling, SS7.	08
4.	**Integrated service digital network (ISDN):** ISDN overview, ISDN interfaces and functions, transmission structure, **Broadband ISDN (B - ISDN):** (B - ISDNS) standards, architecture protocol reference model, B-ISDN lower layers.	04
5.	**The Basics of Broadband Technology:** Digital Subscriber Line (ADSL, HDSL, RADSL, VDSL, G.lite), Access network architecture (DSLAM), Modulation technologies (DMT), CAP	05
6.	**Voice over IP:** Voice coding, properties of speech, waveform coding, vocoding, hybrid coding, VoIP architecture, VoIP Protocols: Resource reservation protocol (RSVP), Multi Protocol Label Switching (MPLS), real time protocol (RTP), session initiation protocol (SIP). H.323 standard media gateway control protocol.	06
7.	**Broadband ATM Switching & Transmission:** Broadband IP Switching over ATM, Broadband Transmission Network for LAN & WAN, SONET/ SDH	05
6.	**Broadband Access Technologies:** Cable Modem Service: Head end and regional network architecture, Cable Modem	10

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	Termination System, CMTS, Hybrid Fiber Coax networks HFC, Cable Labs initiatives (DOCSIS. PacketCable, CableHome) Optical Fiber-based Networks: Passive Optical Network (PON) architecture (Optical line termination, optical network terminals), Standards (BPON, GPON, EPON) Fixed and Mobile WiMAX : Architecture, Standards (IEEE 802.11, 802.15, 802.16), Services Comparison of broadband access techniques	
	Total Hours	**45**

Text Books:

1. Digital Telephony - John C. Bellamy, Wiley India, 3rd edition, 2011.
2. ISDN and Broadband ISDN with Frame Relay and ATM – William Stalling., Pearson education Asia publication, 4th Edition, 2002.
3. Leonhard Korowajczuk, LTE, WiMAX and WLAN Network Design, Optimization and Performance Analysis, John Willey Publication, 1st edition, 2011.
4. Communication Networks – Alberto Leon-Garcia, Tata McGraw Hill Publication, Second edition, 2004.

Reference Books:

1. Fundamentals of Telecommunication – Roger L. Freeman, John Wiley and Sons, Inc., Publication, first edition, 1999
2. Andy Valder, Understanding telecommunication network, IET, 1st Edition 2006.
3. Telecommunications and Data Communications Handbook – Ray Horak, A John Wiley and Sons, Inc., Publication, first edition, 2007

Term Work:

1. At least ten laboratory experiments based on the entire syllabus duly recorded and graded.
2. Presentation/Application based experiment and Quiz/Practical exam/Viva/Any other mode of evaluation.

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

Program: B. Tech Integrated (EXTC)				Semester : X	
Course : Satellite Communication and Radar				Code : BTIET10002	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (50 Marks)
3	2	0	4	Scaled to 70 Marks	Scaled to 30 Marks

Pre-requisite: Knowledge of Analog and digital communication systems, Television fundamentals, Electromagnetic wave theory.

Objectives:

1. Understand and provide knowledge of principle of Satellite communication and Radar communication.
2. To study various types and application of Radar systems for navigation and remote sensing.
3. Study of different types of satellite orbits, Orbital parameters and launching techniques, spacecraft subsystems, Multiple Access technologies and satellite systems.
4. To provide knowledge of wave propagation and satellite link design.

Outcomes:

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

1. Explain principle, frequency band, various subsystems, and multiple access techniques in Satellite communication.
2. Describe the concept of orbital parameters and launching scheme of geostationary satellites and non-geostationary satellites.
3. Discuss the parameters of wave propagation and calculate link budget.
4. Compare the functioning and applications of various Satellite and Radar systems.

Detailed Syllabus:

Unit	Description	Duration
1	**Satellite Communication:** General background, basic satellite system, frequency allocations for satellite services, types of satellite, system design considerations, and applications.	02
2	**Satellite Orbits:** Types of Orbits and their applications, Orbital Mechanics:	

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	Developing the equations of the orbit, Kepler's three laws of planetary motion, describing the orbit of a satellite, locating the satellite in the orbit, locating the satellite with respect to the Earth, orbital elements, look angle determination, orbital perturbations, launching techniques and launch vehicle, orbital effects in communications systems performance.	04
3	**Wave Propagation And Link Design:** Introduction , atmospheric losses, ionospheric effects, rain attenuation, other impairments, antenna polarization , polarization of satellite signals, cross polarization discrimination, ionospheric depolarization, rain depolarization, ice depolarization. Transmission losses, link power budget equation, system noise temperature, carrier to noise ratio for uplink and down link, combined uplink and downlink carrier to noise ratio, inter modulation noise.	11
4	**Satellite Subsystems:** Attitude and orbit control system, Telemetry, tracking command and monitoring system, power system, communication system: Single and double conversion transponder, satellite antennas, Equipment reliability and space qualification.	06
5	**Multiple Access Techniques:** Introduction to FDMA and TDMA, TDMA frame structure, on board processing, demand access multiple access, random access, packet radio systems and protocols, CDMA.	05
6	**Satellite Systems:** **Very small aperture terminal (VSAT) systems:** Network architectures, Access control protocols. **Direct broadcast satellite (DBS) TV:** DBS-TV receiving antennas, DBS-TV receiver, Installation of DBS-TV antennas, Low noise block converter (LNBC). **Global positioning systems (GPS):** GPS position location principles, GPS segments, GPS receiver, GPS signal structure, Indian Regional Navigation Satellite System (IRNSS) architecture and frequencies.	06

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7	**Radar System:** Introduction, Radar set, radar frequencies and Advanced radar applications. Range performance, minimum detectable signal, receiver noise, transmitter power, pulse repetition frequency, pulse duration, Radar display, Radar antenna scanning & Tracking system, Radar system losses, Radar clutters, Radar cross-section of targets: Simple Targets : Sphere, Long thin wire or Rod, flat plate and corner reflector, Cone –sphere, Effect of target shape, complex targets.	06
8	**Classification Of Radar Systems:** Principles, operation, performance, limitations and applications : CW radars, FMCW radar, MTI radar, Pulse Doppler radar.	05
	Total Hours	45

Text Books:

1. Timothy Pratt, Satellite Communication, Wiley Publication, 2nd edition, 2007.
2. M. I. Skolnik, Introduction to Radar System, Mc-Graw Hill publication, 3rd edition, 2009.

Reference Books:

1. Dennis Roddy, Satellite Communication, McGraw Hill, 4th edition, 2006.
2. M Richharia, Mobile Satellite Communication – Principles and trends, Pearson, 2004.
3. Tri. T. Ha, Satellite Communication Modern, McGraw Hill Publication, 2nd edition, 2010.
4. D K Barton, Radar system analysis, Artech House, Illustrated, edition 2007.
5. G. Kennedy, B. Davis, S.R.M. Prasanna, Electronics communication systems, 5th edition, McGraw Hill Education private ltd., 2015.
6. http://irnss.isro.gov.in/

Term Work:

1. At least ten laboratory experiments based on the entire syllabus duly recorded and graded.
2. Presentation/Application based experiment and Quiz/Practical exam/Viva/Any other mode of evaluation.

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

Program: B. Tech Integrated (EXTC)				Semester : X
Course : Project Phase II				Code : BTIET10003
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 (100 Marks)
0	8	0	4	Scaled to 100 Marks

Pre-requisite: Project Phase I

Objectives:

1. To be able to build/simulate circuit.
2. To be able to Test and validate the results.

Outcomes:

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

1. Implementation of the model.
2. Validate and troubleshoot the model.
3. Summarize the topic into a technical report and demonstrate the model.

Activities to be done in phase II:

1. The second phase of the project will involve development implementation and testing of the project.
2. Student is required to submit a 1-2 pages weekly report on the work done to the mentor. There would continuous evaluation based on the weekly report submitted.
3. Report primarily containing the entire overview of the Project from Literature Survey, Feasibility Study, Design, Analysis, Implementation, and Testing is to be submitted at the end of the Trimester. (Hard Bound Report (Golden Embossing))
4. Presentation (about 30 minutes) of the work done during the trimester to be evaluated by Internal Examiner and External Examiner.

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

Program: B. Tech Integrated (EXTC)				Semester : X	
Course : Embedded Systems (Elective – III)				Code : BTIET10004	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (50 Marks)
3	2	0	4	Scaled to 70 Marks	Scaled to 30 Marks

Pre-requisite: Knowledge of microprocessor, microcontrollers and basic embedded system

Objectives:

1. To provide knowledge of the basic embedded systems.
2. To understand the different inter-process communication objects used in embedded systems.
3. To understand the design concept of embedded firmware.
4. To understand basic concepts of real time operating system (RTOS).

Outcomes:

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

1. Explain the different components of embedded systems, characteristics and different application area.
2. Analyze and understand embedded firmware design and its requirements.
3. Understand the basic concept of RTOS, its requirement and design parameters.
4. Understand different embedded RTOS with the help of case studies.

Detailed Syllabus:

Unit	Description	Duration
1.	**Introduction to Embedded Systems** Definition of Embedded System, Embedded Systems Vs General Computing Systems, History of Embedded Systems, Embedded system classifications (hardware and software requirements) , Major Application Areas, Purpose of Embedded Systems, Characteristics and Quality Attributes of Embedded Systems, Memory selection for Embedded Systems (All types of memories) , Sensors and Actuators, Communication Interface (serial as well as parallel): Onboard and External Communication Interfaces (wire and wireless).	09

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2.	**Objects, Services , I/O and test tools** Pipes, Event Registers, Signals, Other Building Blocks, Component Configuration, Basic I/O Concepts, I/O Subsystem, Reset Circuit, Brown-out Protection Circuit, Oscillator Unit, Real Time Clock, Watchdog Timer, Embedded Firmware Design using C /C++ or Cross C, their approaches and development tools with IDE. Embedded test tools, EMC and ICE.	09
3.	**Exceptions, Interrupts and Timers used in embedded systems** Exceptions, Interrupts, Applications, Processing of Exceptions and Spurious Interrupts, Real Time Clocks (RTC), Programmable Timers, Timer Interrupt Service Routines (ISR), Soft Timers, Operations. Interrupt latency, context switching, interrupt deadlines. Critical section, Inter-process communication objects: Defining Semaphores, Operations and Use, Defining Message Queue, States, Content, Storage, Operations and Use, Device drivers used in embedded system: I2C bus driver code, LCD driver code, RTC driver code, and file handling.	09
4.	**Real Time Operating Systems** Brief History of OS, Defining RTOS, RTOS services, kernel objects, kernel services, The Scheduler, Objects, Services, Characteristics of RTOS, Defining a Task/Process/Threads, tasks/process/thread States and TCB/PCB, Task/Process Operations, Structure, Synchronization, Communication and Concurrency. RTOS scheduling types, priority inversion problem, their comparison, rate monotonic and earlier deadline first scheduling.	09
5.	**Case Studies of RTOS** RT Linux, MicroC/OS-II, Vx Works, Embedded Linux, Tiny OS, and Basic Concepts of Android OS. Implementation of android/TinyOS based applications.	09
	Total Hours	**45**

Text Books:

1. Introduction to Embedded Systems - Shibu K.V, Mc Graw Hill, 2012

Reference Books:

1. Embedded Systems - Raj Kamal, TMH., 2009
2. Embedded System Design - Frank Vahid, Tony Givargis, and John Wiley, 2010

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3. Embedded Systems – Lyla, Pearson, 2013
4. An Embedded Software Primer - David E. Simon, Pearson Education, 2014

Term Work:

1. At least ten laboratory experiments based on the entire syllabus duly recorded and graded.
2. Presentation/Application based experiment and Quiz/Practical exam/Viva/Any other mode of evaluation.

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

Program:	B. Tech Integrated (EXTC)			Semester : X	
Course :	Network Design and Planning (Elective – III)			Code: BTIET10005	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (50 Marks)
3	2	0	4	Scaled to 70 Marks	Scaled to 30 Marks

Pre-requisite: Basic knowledge of RF, Optical Fiber and Networking.

Objectives:

1. To teach basics of RF Planning.
2. To expose students to Network Design, Management & Optimization of telecom networks.

Outcomes:

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

1. Describe the process of network planning and design.
2. Discuss the network design approach for different types of networks.
3. Design and planning of IP networks.
4. Explain the concepts of network performance and optimization.
5. Discuss the Next generation network design concepts.

Detailed Syllabus:

Unit	Description	Duration
1.	**Introduction to Network Planning & Optimization** Planning, Design, Deployment, Capacity Planning, Management requirements, Growth Planning, Wireless Planning Commission (WPC) guidelines specific to India along with FCC regulations	05
2.	**Making the business case for the Network :** Evaluating requirements, Profit Driven Network, Performance standards ITU/ IEEE, cost factors, revenue and ROI.	04
3.	**Network Design model :** Network objectives, Design Methodology: top-down design approach, collect design information, create design proposal,	06

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	propose configuration, design review, selection and implementation, Application considerations: bandwidth requirements, performance requirements, Documenting Your Network Design.	
4.	**Planning and Design of RF based Networks :** Radio Frequency Spectrum Planning, Site Engineering, Network Management - Congestion Handling, QoS norms, Network Optimization. **Wireless Personal Area Networks: Low Rate and High Rate** ZigBee Technology: Components and Network Topologies IEEE 802.15.4 Low Rate-WPAN Device Architecture : Physical layer, Data link layer, Network layer, applications IEEE 802.15.3a Ultra WideBand : FCC Guide lines and Technical requirements, UWB approach Radio Frequency Identification: Principle, RFID component and characteristics	12
5.	**IP Routing and Design:** IP addressing, subnetting in classful and classless addresses, IPV6 addressing. Delivery and routing of IP packets: Direct and indirect delivery, routing methods (next hop routing, network specific routing, host specific routing, default routing), static and dynamic routing.	08
6.	**Designing for the WAN: ATM** Traffic Descriptor and parameters, Traffic Congestion control, Traffic contract and QoS. Application: Introduction to SD-WAN Emphasis has to be given on planning and design issues.	06
7.	**New Generation Network (NGN) design:** Current industry practices Principles and definition of an NGN, The NGN architecture, Outline of technology choices, Network and implementation issues with NG	04
	Total Hours	**45**

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Text Books:

1. Sharon Evans, Telecommunication Network Modeling, Planning & Design, IET, 1st edition, reprint 2008.
2. Behrouz A. Forouzan, Data Communication and networking, McGraw Hill publications, 5th edition, 2013
3. Vijay K. Garg, Data Communication and networking, Elsevier, 2010.
4. Monique J. Morrow, "Next Generation Networks", CISCO Press, 2007.

Reference Books:

1. Andy Valder, Understanding telecommunication networks, IET 1st edition, 2006.
2. Roger L Freeman, Telecommunications system Engineering, John Wiley, 3rd Edition, 2004.
3. Ajay R. Mishra, Fundamentals of cellular network planning & optimization, John Wiley, 1st Edition, 2004.
4. CCDA: Cisco Certified Design Associate Study Guide, 2nd Edition, 2003.
5. CCNP1: Advanced Routing Companion guide, 2nd Edition, reprint 2005.

Term Work:

1. At least ten laboratory experiments based on the entire syllabus duly recorded and graded.
2. Presentation/Application based experiment and Quiz/Practical exam/Viva/Any other mode of evaluation.

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Electronics & Telecommunication (2019 – 2020)

Program:	B. Tech Integrated (EXTC)			Semester : X	
Course :	Data Encryption and Network Security (Elective - III)			Code : BTIET10006	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (50 Marks)
3	2	0	4	Scaled to 70 Marks	Scaled to 30 Marks

Pre-requisite: Computer and communication networks

Objectives:

1. To understand requirement the data and encryption and learning the basic terms associated with encryption.
2. To teach the aspects of data security and authentication.
3. To know the internet and wireless network security.

Outcomes:

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

1. Identify the aspects of data security.
2. Use the different standards of private key encryption.
3. Apply the knowledge of number theory for public key encryption.
4. Know various techniques for message authentication.
5. Recognize various network security protocols.

Detailed Syllabus:

Unit	Description	Duration
1	**Data Encryption:** Need for Data encryption, Security of information, security attacks, confidentiality, integrity, authentication, classical techniques, Substitution ciphers, Transposition ciphers, block and stream cipher principles, Symmetric and asymmetric encryption.	03
2	Data Encryption Standard (DES): Data encryption standard, structure and analysis, key generation for DES, triple DES with two three keys key distribution.	06
3	**Advanced Encryption Standard (AES)** Algebraic structures, GF(2^n) fields, Modular arithmetic, Fermat's and Euler's theorems Introduction, structure, round functions, key expansion	06

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4	**Public encryption:** Primality testing, factorization, Chinese remainder theorem, discrete logarithm Principles of public key cryptosystems, RSA algorithm, key management, Diffie-Hellman key exchange, elliptic curve cryptography.	07
5	**Message Integrity and message Authentication** Message integrity, random Oracle model, message authentication codes (MAC), hash functions, MD hash family, SHA-512, digital signatures	08
6	**Entity Authentication and key management** Passwords, Challenge response, zero-knowledge, biometrics Symmetric key distribution, Kerberos, Symmetric key agreement, Public key distribution, Hijacking	05
7	**Security at transport, network and application layers:** Need for Security of Computer Networks Transport layer security: Secure Socket Layer(SSL) IP Security: AH, ESP and SA, transport and tunnel modes. Internet Key Exchange E-mail Security: PGP and S/MIME.	05
8	**System Security** Users, Trust and Trusted systems, Buffer overflow and malicious software, malicious programs, worms, viruses, Intrusion detection systems, Firewalls: construction and working principals Introduction to SIEM (Security Information and Event Management) technology.	05
	Total Hours	45

Text Books:

1. William Stallings, Cryptography and Network Security, Pearson Education Asia Publication, 5th edition, 2013.
2. Behrouz A. Forouzan and Debdeep Mukhopadhyay, Cryptography and Network Security, Mc Graw Hill, 2nd edition, 2013.

Reference Books:

1. Wade Trappe and Lawrence C Washington, Cryptography and Coding

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Theory, Pearson Education, 2nd Edition, 2012.

2. Wanbo Mao, Modern Cryptography: Theory and Practice, Pearson Education, 4th Edition, 2011.

Term Work:

1. At least ten laboratory experiments based on the entire syllabus duly recorded and graded.
2. Presentation/Application based experiment and Quiz/Practical exam/Viva/Any other mode of evaluation.

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Electronics & Telecommunication (2019 – 2020)

Program: B. Tech Integrated (EXTC)				Semester : X	
Course : Speech Processing (Elective – IV)				Code : BTIET10007	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (50 Marks)
3	2	0	4	Scaled to 70 Marks	Scaled to 30 Marks

Pre-requisite: Knowledge of Digital signal Processing

Objectives:

1. To introduce the characteristics of Speech signals and the related time and frequency domain methods for speech and audio analysis
2. To develop time and frequency domain techniques for estimating speech parameters
3. To apply feature extraction techniques and classify speech signals.

Outcomes:

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

1. Comprehend the speech generation process and its model.
2. Apply various linear predictive coding techniques in time domain for speech processing.
3. Employ frequency domain methods for processing the speech signal.
4. Use of filtering techniques to enhance speech.
5. Apply algorithms for automatic speech and speaker recognition.

Detailed Syllabus:

Unit	Description	Duration
1.	**Fundamental of Speech Signals** Anatomy and physiology of Speech Organs, Speech Production Mechanism, Acoustic Phonetics, Digital Models fr speech Waveform, Representation of Speech waveform, Quasi-periodic and Quasi-stationary nature of speech signal, Need and technique of Framing and Windowing of speech signal, Different types of speech signal, Hearing organs and Mechanism of Speech Signal	08
2.	**Time domain methods for speech processing** Time domain parameters of Speech signal and Extracting Methods: Short Time Energy, Average Magnitude, Zero Crossing Rate, Average magnitude difference function. Speech type	08

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	Discrimination using ZCR and energy, Short time Autocorrelation function, Pitch period estimation using Auto-Correlation Function	
3.	**Frequency domain method for speech processing** Review of Fourier transform, Short Time Fourier Transform, Spectrogram, Concept of True vs Convolved spectra , Pitch and formant extraction, Spectral analysis of speech using window function	06
4.	**Speech Enhancement** Different sources of speech degradation, Scope and approach of speech enhancement, Speech enhancement techniques: Spectral subtraction method, Re-synthesis method, Comb filter, wiener filter	08
5.	**Feature Extraction techniques of Speech** Linear Predictive coding: Durbins's recursive Algorithm, Cholesky algorithm, Application of LPC in pitch and formant extraction Cepstrum: Homomorphic Speech Processing, Real and Complex cepstrum, Mel scale, Mel frequency cepstral coefficients (MFCC)	08
6.	**Automatic speech and speaker recognition** Introduction to classifiers, Vector Quantization (VQ), Hidden Markov Model (HMM), Automatic Speech Recognition , Automatic Speaker identification and verification, Music classification	07
	Total Hours	**45**

Text Books:

1. R Rabiner and S.W. Schafer, "Digital processing of speech signals", Pearson Education, 1st edition, 2006
2. Ben gold and Nelson Morgan, "Speech and Audio signal processing", Wiley, 1st edition, 2006

Reference Books:

1. Thomas F. Quateri, "Discrete Time Speech Signal Processing: Principles and Practice", 1st edition, 2002.
2. R Rabiner and Biing, Hwang and Juan, "Digital processing of speech signals", Prentice Hall, 1st edition, 1993

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Term Work:

1. At least ten laboratory experiments based on the entire syllabus duly recorded and graded.
2. Presentation/Application based experiment and Quiz/Practical exam/Viva/Any other mode of evaluation.

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

Program: B. Tech Integrated (EXTC)				Semester : X	
Course : Fuzzy Logic and Neural Networks (Elective - IV)				Code : BTIET10008	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (50 Marks)
3	2	0	4	Scaled to 70 Marks	Scaled to 30 Marks

Pre-requisite: Knowledge of calculus and basic probability and statistics

Objectives:

1. To study the basic concepts of artificial neural networks, fuzzy logic systems and their applications.
2. To introduce basic theory, algorithm formulation and ways to apply these techniques to solve real world problems.

Outcomes:

After successful completion of this course, students should be able to

1. Explain the basic concepts of artificial neural networks
2. Explain the basic theory of neural networks.
3. Formulate algorithms and apply techniques to solve various problems.

Detailed Syllabus:

Unit	Description	Duration
1	**Introduction to Fuzzy logic** Introduction, Fuzzy Sets, Fuzzy relations, Operations on Fuzzy Relations, Membership Functions, Fuzzification and Defuzzification, Logic and Fuzzy System, Fuzzy Arithmetic, The Extension Principle, Fuzzy Associative Memories.	06
2	**Fuzzy System and Applications** Decision making with Fuzzy Information, Fuzzy Classification and Pattern Recognition, Fuzzy Control System, Fuzzy Optimization.	08
3	**Introduction to Neural Network** Fundamental Concepts and Models, Learning Process, Learning Rules, Single Layer Perceptron Classifier, Multilayer Feedforward Network, Single-Layer Feedback Networks.	07

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4	**Associative Memories** Basic Concept, Linear Associator, Basic Concepts of Recurrent Autoassociative Memory, Performance Analysis of Recurrent Autoassociative Memory, Bidirectional Autoassociative Memory, Associative Memory of Spatio-temporal Patterns.	07
5	**Matching and Self-Organizing Networks** Hamming Net and MAXNET, Unsupervised Learning of Clusters, Counterpropagation Network, Feature Mapping, Self-Organizing Feature Maps. Cluster Discovery Network.	07
6	**Application of Neural Algorithms and Systems** Linear Programming and Modeling Network, Character recognition Networks, Neural Network Control Applications, Networks for Robot Kinematics, Connectionist Expert System for Medical Diagnosis, Self-Organizing Semantic Maps, Speech Recognition, Signature Verification, Human Face Recognition using Neural Networks, Neural Fuzzy Systems, and Genetic Optimization of Neural and Fuzzy Systems.	10
	Total Hours	45

Text Books:

1. Timothy J. Ross, Fuzzy Logic with Engineering Application, Wiley, 3rd edition, 2011.
2. Simon Haykin, Neural Networks, PHI, 3rd edition, 2010.

Reference Books:

1. D. Driankov, H. Helendoorn, M. Reinfrank, An Introduction to Fuzzy Control , Narosa, 1st edition, 2001.
2. S. Rajasekaran, G. A. Vijaylakshmi Pai, Neural Network, Fuzzy Logic & Genetic Algorithms Synthesis & Application, PHI, 1st edition, 2009.

Term Work:

1. At least ten laboratory experiments based on the entire syllabus duly recorded and graded.
2. Presentation/Application based experiment and Quiz/Practical exam/Viva/Any other mode of evaluation.

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

Program: B. Tech Integrated (EXTC)				Semester : X	
Course : Mobile Computing (Elective – IV)				Code : BTIET10009	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (50 Marks)
3	2	0	4	Scaled to 70 Marks	Scaled to 30 Marks

Pre-requisite: Computer Communication Networks and Wireless Communication Technology

Objectives:

1. To educate students with wide knowledge base in Mobile Computing.

Outcomes:

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

1. Understand the mobile computing architecture and its applications.
2. Know various protocols for mobile computing.
3. Compare different routing algorithms for mobile ad-hoc network.
4. Know different mobile wireless networks.

Detailed Syllabus:

Unit	Description	Duration
1.	**Overview of Mobile communication, devices and systems:** mobile communication, mobile computing and architecture, mobile devices, mobile system networks, mobile smartphones, smart mobiles, and systems, handheld devices	04
2.	**Wireless Medium Access Control:** specialized MAC, Hidden & Exposed Terminal, Near & Far Terminal, Collision avoidance, MACA, Polling, Inhibit sense multiple access, SAMA, Power control	08
3.	**Mobile IP Network Layer:** IP network layer, packet delivery and handover management, location management, registration, tunnelling and encapsulation, route optimization, Dynamic Host Configuration Protocol, VoIP, IPsec, micro mobility support	10
4.	**Mobile Transport Layer:** Conventional TCP/IP, Transport layer protocol, Indirect TCP, snooping TCP, methods of Mobile TCP, Mobile TCP-layer	08

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	transmission, TCP over 2.5G/3G mobile networks	
5.	**Mobile ad-hoc network and Wireless Sensor Network:** MANET, routing and routing algorithms, Security in ad-hoc network, wireless sensor networks	07
6.	**Mobile Wireless Short Range Network:** Wireless LAN, Wireless Application Protocol, WAP 2.0, Bluetooth enabled devices network, IrDA protocols, Zigbee, RFID, WiMax	08
	Total Hours	45

Text Books:

1. Jochen Schiller, "Mobile Communications", 2nd Edition, 2008, Pearson Education.
2. Raj Kamal," Mobile Computing",2007, Oxford University Press

Reference Books:

1. C. Sivaram Murthy and B.S.Manoj, "Adhoc Wireless Networks Architectures and Protocols", 2004, Pearson Education .
2. Kum Kum Garg,"Mobile Computing Theory and Practice", 2010, Pearson Education.
3. Asoke K Talukder and Roopa R Yavagal, "Mobile Computing Technology, Application and Service Creation", 2nd Ed., 2010, TMH.

Term Work:

1. At least ten laboratory experiments based on the entire syllabus duly recorded and graded.
2. Presentation/Application based experiment and Quiz/Practical exam/Viva/Any other mode of evaluation.

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Electronics & Telecommunication (2019 – 2020)

Program: B. Tech Integrated (EXTC)				Semester : X	
Course : Internet of Things (Elective - IV)				Code : BTIET10010	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (50 Marks)
3	2	0	4	Scaled to 70 Marks	Scaled to 30 Marks

Pre-requisite: Knowledge of embedded systems and data communication.

Objectives:

1. To provide basic knowledge of Internet of Things.
2. To understand the different communication protocols used in IoT for data communication.
3. To understand the design concept of integration framework for smart objects and IoT security.
4. To understand basic concepts of cloud services management and open IoT.

Outcomes:

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

1. Explain the different components and IoT global standardization.
2. Analyze and understand communication protocols used in IoT for web based applications.
3. Analyze the basic concept of IoT6, its design, services and applications.
4. Understand key parameters required for cloud services and open IoT.

Detailed Syllabus:

Unit	Description	Duration
1.	**The Internet of Things: An Overview** The concept of "Internet" of "Things", The Flavour of the Internet of Things, The Technology of the Internet of Things , IoT Objects, Internet of Things applications. **IoT Global standardization – State of Play** IoT related standardization for example, CEN/ISO, ETSI, IEEE, IETF, ITU-TOASIS, OGC, oneM2M, GS1, and IERC.	07
2.	**Internet of Things applications:** Internet of Things strategic research and innovation directions, IoT smart X application : smart cities, smart energy and smart grid, smart mobility and transport, smart home building and	08

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	infrastructure, smart factory and manufacturing, smart health, smart logistics and retail. **IoT related Internet Technology:** cloud computing, IoT semantic technology, Network and communication process, data management, security privacy and trust, Device level energy issues.	
3.	**IoT protocol convergence:** Message queue telemetry transport (MQTT), Constrained Application Protocol (CoAP), Advanced Message Queuing protocol (AMQP), Java Message Service API (JMS), Data Distribution Service (DDS), Representational State Transfer (REST), Extensible Messaging and Presence Protocol (XMPP)	08
4.	**IoT Security and privacy framework:** Main concept and motivation of framework, Identity framework management, size and heterogeneity of the system, A policy based framework for security and privacy in IoT: Deployment scenario, policies and context switching, framework architecture, enforcement and protocols, Constrained Application Protocols.	08
5.	**Integration framework for heterogeneous smart objects:** Introduction, IPv6 potential, IoT6, IPv6 for IoT, IoT6 architecture, IoT6 integration with cloud and EPICS, Enabling heterogeneous integration, Scalability perspective. IoT applications: OpenIoT and iCORE: project design and implementation, execution and implementation issues, acceptance and sustainability. Smartsantander, Fitman, and OSMOSE for smart cities and manufacturing.	08
6	**Cloud Service Management and IoT:** Introduction, federated cloud service management, Federated management service life Cycle, Self-management life cycle, Self-organized cloud architecture, Cloud services for internet connected objects (ICO's), Management of IoT services infrastructure and open IoT architecture. Data centers: Distributed, clustering.	06
	Total Hours	**45**
Text Books:		

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1. Ovidiu Vermesam and Peter Friess, Internet of Things - from research and innovation to market deployment: River Publisher, 2014
2. Olivier Hersent, David Boswarthick, Omar Elloumi,The Internet of Things: Key Applications and Protocols, Wiley Publication, 2nd editions, 2012.

Reference Books:

1. Adrian McEwen, Hakim Cassimally, Designing the Internet of Things- Wiley Publication, 2014
2. Peter Waher, Learning Internet of Things, Packet Publishing, January 2015.
3. Jayavardhana Gubbia, Rajkumar Buyyab, Slaven Marusic, Marimuthu Palaniswami, Research Article: Internet of Things (IoT): A vision, architectural elements, and future directions, Future Generation Computer Systems, Elsevier, 29 (2013), 1645-1660.

Term Work:

1. At least ten laboratory experiments based on the entire syllabus duly recorded and graded.
2. Presentation/Application based experiment and Quiz/Practical exam/Viva/Any other mode of evaluation.

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Program: B. Tech Integrated (EXTC)					Semester: XI
Course : In-plant Training Phase I					Code : BTIET11001
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Theory (3 Hrs, 60 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms
0	40	0	15	-	Scaled to 300 marks

Pre-requisite: Domain Knowledge of relevant stream

Objectives:

1. To make the student conversant with industrial activities, organizational behavior and ethics.
2. To understand various industrial aspects viz. manufacturing processes, industrial design, productivity improvement, value engineering, quality control.
3. To identify, analyze and solve engineering problems from relevant industry.

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

1. Understand industrial practices and work culture to integrate theory with practice with the help of industrial practitioner.
2. Enhance communication skills and maintain discipline, safety norms and environmental awareness.
3. Interpret and solve routine technical problems through the application of engineering principles.
4. Learn leadership and managerial skills.

Guidelines:

In-plant Training, Trainee's Code of Conduct:

Trainee is required to:

- Join on the stated date and complete the training as specified by the Industry
- Fill the Joining Report, get it endorsed by the concerned Industry Official and email the scanned copy within One week of joining to the Placement Department and Faculty Mentor.
- Adhere to all the rules and regulations, safety norms of the Industry and thereby ensure professional conduct
- Take instructions from the Industry Mentor on a daily basis and complete the same with due diligence and quality
- Fill the Weekly log book, get it endorsed by the concerned Industry Official and then email the scanned copy within a week to the Faculty Mentor

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Electronics & Telecommunication (2019 – 2020)

Mentoring process:

- Every In plant trainee shall be allocated two Mentors: an Industry Mentor and a Faculty from the Department (appointed by Head of the Department).
- Faculty Mentor shall connect with the Industry Mentor and the Trainee on a periodic basis.

Training Report :

- Students should take guidance from faculty and industry mentor and prepare a report on their work done in In-plant training and one copy should be submitted to the Institute.
- The report should be prepared in a format prescribed by the University.

Interim Presentation

It should give overview about the training to be done.

Report : Interim Report (IR)

(One copy to be submitted each to Internal mentor & Company Mentor)

This report must cover the following aspects:

a. *Synopsis*: A statement of about 100-words describing what the training is about.
b. *Goals*: Stating what the training will accomplish
c. Schedule: A time frame indicating steps that will be required and the expected date when they will be completed.
d. *Reference*: Bibliography and internet materials referred.

Final Presentation

The Final Presentation will evaluate the students in terms of the following

a. Knowledge of basic concepts
b. Ability to identify and analyze the problem
c. Ability to apply the knowledge to solve the problem
d. Logical development of the subject
e. Effective oral communication

Training Report

(One copy to be submitted each to Institute & Company Mentor)

The Report (Interim Report and Final Report), which is the written component of evaluation, is judged for the following points.

1. Comprehensive study of the problem & objective
2. Methodology and implementation
3. Ability to analyze the problem

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4. Logical sequencing, organizing and data handling
5. Findings, observations, concluding remarks in terms of the objectives set earlier and the future scope of the problem.

The Training Report is to be prepared based on the guidelines given by Institute.

In-plant Training Evaluation Scheme

Evaluation Phases	Evaluation	Marks	Duration	Remarks
Weekly Log book	Weekly progress report	100	15 Weeks	Evaluated by Industry Mentor
Interim	Weekly log book (30 Marks Internal Mentor), Interim Presentation and Report (70 Marks)	100	Between 8th to 10th week	Panel of at least two faculty mentors
Final	Final Presentation and Report	100	End of the term	Panel: Industry and Internal
Total Marks		300		

Details of Internal Continuous Assessment (ICA)
Test Marks : NA
Term Work Marks : 300

Signature
(Prepared by Concerned Faculty/HOD)

Signature
(Approved by Dean)

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SVKM's NMIMS
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Program: B. Tech Integrated (EXTC)					Semester : XII
Course : In-plant Training Phase II					Code : BTIET12001
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Theory (3 Hrs, 60 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms
0	40	0	15	-	Scaled to 300 marks

Pre-requisite: Domain Knowledge of relevant stream

Objectives:

1. To make the student conversant with industrial activities, organizational behavior and ethics.
2. To understand various industrial aspects viz. manufacturing processes, industrial design, productivity improvement, value engineering, quality control.
3. To identify, analyze and solve engineering problems from relevant industry.

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

1. Understand industrial practices and work culture to integrate theory with practice with the help of industrial practitioner.
2. Enhance communication skills and maintain discipline, safety norms and environmental awareness.
3. Interpret and solve routine technical problems through the application of engineering principles.
4. Learn leadership and managerial skills.

Guidelines:

In-plant Training, Trainee's Code of Conduct:

Trainee is required to:

- Join on the stated date and complete the training as specified by the Industry
- Fill the Joining Report, get it endorsed by the concerned Industry Official and email the scanned copy within One week of joining to the Placement Department and Faculty Mentor.
- Adhere to all the rules and regulations, safety norms of the Industry and thereby ensure professional conduct
- Take instructions from the Industry Mentor on a daily basis and complete the same with due diligence and quality
- Fill the Weekly log book, get it endorsed by the concerned Industry Official and then email the scanned copy within a week to the Faculty Mentor

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