



LEARNING RESOURCES

In

Electronics Engineering

Content List

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Kunal IT Services (P) Ltd. is a Pune based Firm specializing in the Design, Development of the Education Contents for the Engineering Degree courses. We have developed CAI/ LRs in Electronics Engineering for the subjects mentioned below, which are useful to both Teachers and Students.

Electronics Engineering Learning Resources

- Communication System
- Digital Techniques
- Electronics Materials and Components
- Electronics Measurements and Instruments
- Optical Fiber Communication

Communication Systems

No.	Chapter Name
1)	Signals & systems
	Signals
	Some Important Signals
	Signal Useful Signal Operations
	Systems
	Fourier Transform
	Properties of Fourier Transform
	Power & Energy Theorems
	Spectral Density Functions
	Correlation of Energy Signals
2)	Probability Theory
	Concept of Probability
	Random Variables
	Cumulative Distribution Function
	Probability Density Function
	Joint CDF
	Joint PDF
	Conditional PDF
	Probability Models
	Central limit Theorem
	Random Process
3)	Noise
	Noise in Communication System
	Types of Noise
	Noise Calculations
	Signal to Noise Ratio
	White Gaussian Noise
	Effects of Linear Filtering on Noise
	Performance of Various Communication Systems
4)	Analog Modulation Techniques
	Sampling Process
	Sampling Theorem For Law of Pass Signals
	Sampling Techniques
	Analog Pulse Modulation Systems
	Pulse Amplitude Modulation

	Time Division Multiplexing
5)	Source coding Techniques
	Linear Pulse Code Modulation
	Linear Delta Modulation
	Adaptive Delta Modulation
	Differential Pulse Code Modulation
	Linear Predictive Coding
	Voice Coders
6)	Digital multiplexing
	Introduction
	Classification of Digital Multiplexers
	Line Coding
	Frame and Bit Synchronization
	Scramblers and Unscramblers
	Intersymbol Interference
	Eye Pattern
7)	Digital modulation techniques
	Introduction
	Binary Phase Shift Keying
	Differential Phase Shift Keying
	Quadrature Phase Shift Keying
	M-Ary Phase Shift Keying
	Quadrature Amplitude Shift Keying
	Binary Frequency Shift Keying
	M-ary FSK System
8)	Spread spectrum communication
	Introduction
	Model of Spread Spectrum (SS) Digital Communication System
	DSS Signals
	FHSS Signals
	Synchronization SS Signals
	Comparison of Spread Spectrum Methods
9)	Cellular and mobile communication
	Signal Propagation
	Multiplexing
	Cellular Systems
	SDMA

	FDMA
	TDMA
	CDMA
	GSM – System Architecture
	IEEE 802.1 System Architecture
	Bluetooth
10)	Satellite communication
	Orbital Aspects
	Geostationary Satellites
	Communication Satellites
	Satellite Transponder
	Satellite Access
	Satellite Earth Station
	Direct Broadcast Satellite
	VSAT Networks

Digital Techniques

No.	Chapter Name
1)	Number Systems & Binary Codes
	Introduction To Digital System
	Number System
	Binary Codes
	Code Converter IC's
2)	Logic Gates
	Basic Logic Gates
	Universal Logic Gates
	Laws & Theorems
	SOP & POS
3)	Logic Families
	CMOS Logic Families
	IC Logic Families
	Types of Study IC's
	Precautions For CMOS IC's
4)	Digital System
	Triggering Methods
	D Flip Flops
	Master Slave JK Flip Flop
	RS Flip Flop Using NAND Gate
	RS Flip Flop Using NOR Gate
	T Flip Flop
	JK Flip Flop
	IC 7474
	IC 7476
5)	Shift Registers
	Introduction
	Definitions
	Types
6)	Counters
	Introduction & Types
	Decade (BCD) Counter IC 7490
	Applications Of Counters & Comparisons
7)	Multiplexer & Demultiplexer
	Necessity Of MUX
	Principle Of Multiplexing & Their Types
	Study of ICs
	Principle Of Demultiplexing & Their Types

	Study Of ICs
8)	Encoder & Decoder
	Encoder Definition
	Decimal To BCD Encoder
	Octal To Binary Encoder
	Hexadecimal To Binary Encoder
	Decoder Definition
	Display Decoders
9)	Arithmetic Logic Unit
	Adders
	Subtractors
	Design 4-bit Adder/Subtractor Using IC 7483
	Study of ALU IC's
10)	Data Converters
	Introduction
	Analog To Digital Converters
	DAC Types
11)	Memories
	Characteristics & Classifications
	Types Of ROMs
	Memory ICs

Electronics Materials & Components

No.	Chapter Name
1)	Electronics Material–I
	Classification of Materials
	Conducting Materials
	Insulators
	Basic Properties of Dielectric Materials
2)	Electronics Material–II
	Semiconductor Materials
	Magnetic Materials
	Soft Magnetic Materials
	Hard Magnetic Materials
	The Hysteresis Loop
	Magnetic Properties
3)	Electronics Passive Components–I
	Classification of Electronic Components
	Fixed Resistor
	Variable Resistor
	Non-Linear Resistor
4)	Electronics Passive Components–II
	Introduction
	Capacitance
	Fixed Capacitor
	Variable Capacitor
5)	Cables & Wires
	Cables
	Wires
	Connectors
6)	Inductor And Transformer
	Inductor
	Choke
	Transformer
	Types of Transformer
	V, I & Z Ratio
	Losses in Transformer
	Shielding of Transformer
7)	Switches, Relays & Displays
	Switches
	Types of Switches
	Push Button Switch

	Relays
	Types of Relays
	Display Devices LED
	Seven Segment Display LED
	DOT Matrix Display
	LCD Basic Operation
	Nixie Tube
8)	Microphones, Speakers & Battery
	Microphones
	Loud Speakers
	Batteries
	Lead Acid Batteries
	Nickel Cadmium Battery
	Maintenance Free Battery
9)	Integrated Circuits & Surface Mounted Devices
	Integrated Circuits
	Classification of ICs
	Monolithic IC Fabrication
	Fabrication of Diodes & Transistors
	Czochralski Technique
	Surface Mount Devices
	Soldering SMDs
	IC Packaging
10)	Printed Circuit Board
	Introduction
	Board Types
	Layout Approach
	Properties of Cu Clad Laminates
	Manufacturing of Cu Clad
	Screen Printing & Etching
	Mechanical Machining Operations
	Solders & Soldering Techniques

Electronics Measurements and Instruments

No.	Chapter Name
1)	Fundamentals
	Introduction
	Static Characteristics
	Types of Error
	Standards of Measurement
	Grounding, Shielding and Isolation Concept
2)	Units of Measurement & Instrument
	Units of Measurement
	Fundamental Units
	Supplementary SI Units
	PMMC
	DC Ammeter
	DC Voltmeters
	Rectifier Type Instruments
	Instruments for Measurement of Power at Higher Frequencies
	Wattmeter
3)	Measurement of Parameters
	Bridge Circuit
	DC Bridges
	Kelvin Bridge
	Kelvin Double Bridge
	Guarded Wheatstone Bridge
	Maxwell Bridge
	Hays Bridge
	Schering Bridge
	Wein Bridge
	Harmonic Distortion Analysis
	Phase Difference by Using Vector Voltmeter
4)	Frequency & Time Measurement
	Digital Frequency Meter
	Universal Counter
	Period Measurement
	Measurement Errors
5)	Oscilloscope
	Introduction
	CRT
	CRO Measurement
	CRT Connection

	Input Attenuator
	Dual Trace CRO
	Oscilloscope Probe
	Time Base
6)	Generators
	Introduction
	Concept of an Oscillator
	Signal Generator
	Function Generator
	AF Sine & Wave Generator
	Pattern Generator
7)	Wave-Analyser
	Introduction
	Spectrum Analyser - Basic Principle
	Time Domain & Frequency Domain Instrument
	Continuous Wave Signal
	Amplitude Modulation
	Frequency Modulation
	Logic Analyser
8)	Digital Instruments
	Introduction
	IC Tester
	Digital Storage Oscilloscope
	LCR Meter
9)	High Frequency Measurement
	Introduction
	Q Meter
	Causes of Error
	Measurement of Inductance
	Measurement of Capacitance
	Measurement of Distributed Parameters
	Primary Constants of Transmission Lines
	Infinite Lines
	Distortion less Lines
	Reflection and Its Coefficient
	SWR
	RF and Power Measurements
10)	Transducer
	Introduction

	Classification of Transducer
	Measurement of Temperature
	Pressure Transducer
	Diaphragm Pressure Gauge
	Electromagnetic Flow meter
	Level Transducer
	Ultrasonic Level Detector
	LVDT
	Pneumatic Flapper Nozzle Assembly

Optical Fiber Communication

No.	Chapter Name
1)	Introduction
	Historical Development
	The General System
	Advantages Of Optical Fiber Communication
2)	Optical Fiber Wave Guides
	Introduction
	Total Internal Reflection
	Acceptance Angle
	Numerical Aperture
	Skew Rays
	Electromagnetic Mode Theory For Optical Propagation
3)	Cylindrical Fibers
	Modes
	Mode Coupling
	Step Index Fiber
	Graded Index Fiber
4)	Single Mode Fiber
	Introduction
	Cut-Off Wavelength
	Mode Field Diameter And Spot Size
	Effective Refractive Index
	Group Delay And Mode Delay Factor
	Equivalent Step Index Method
5)	Transmission Characteristics of Optical Fibers
	Introduction
	Attenuation
	Material absorption losses
	Linear Scattering Losses
	Non Linear Scattering Losses
	Fiber Bend Loss
	Mid Infrared And Far Infrared Transmission
	Dispersion
	Intramodal Dispersion
	Overall fiber dispersion
	Polarization
6)	Optical Fiber Measurement
	Introduction
	Fiber Attenuation Measurement

	Fiber Dispersion Measurement
	Fiber Refractive Index Profile Measurement
	Fiber Numerical Aperture Measurement
	Mode Field Diameter For Single-Mode Fiber
	Reflectance And Optical Return Loss
7)	Optical Sources: The Laser
	Introduction
	Basic Concept
	Optical Emission From Semiconductor
	Semiconductor Injection Laser
	Non-Semiconductor Laser
8)	Optical Sources – The LED
	Introduction
	Advantages
	The Double Heterojunction LED
	LED Structures
	LED Characteristics
	Modulation Bandwidth
	Modulation
9)	Optical Detector
	Introduction
	Optical Detection Principles
	Quantum Efficiency
	Responsivity
	Long Wavelength Cut Off
	Phototransistors
10)	Optical Fiber System
	Introduction
	Optical Transmitter Circuit
	LED Driver Circuit
	Optical Receive Circuits
	Automatic Gain Circuit
	Digital System
	Analog System
	Optical Time Division Multiplexing
	Subcarrier Multiplexing
	Wavelength Division Multiplexing