



SRI RAAJA RAAJAN COLLEGE OF ENGINEERING AND TECHNOLOGY

(Approved by AICTE, New Delhi & Affiliated to Anna University)

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING DIGITAL CIRCUIT DESIGN USING VHDL COURSE SYLLABUS

COURSE OBJECTIVES:

The objectives of the course are to

1. Recollect the fundamental concepts in digital electronics & microcontroller based systems
2. Make the students to know about the PIC microcontroller based system and also to provide the practical experience
3. Introduce the basic concepts in Hardware Description language
4. Illustrate the procedures for implementing the combinational and sequential circuits in FPGA

COURSE OUTCOMES:

At the end of the course the students will able to

1. Design Interfacing applications based on internal peripheral units of PIC microcontroller and programming them
2. Design and write HDL code for sequential and combinational circuits and implement them in FPGA

COURSE SYLLABUS:

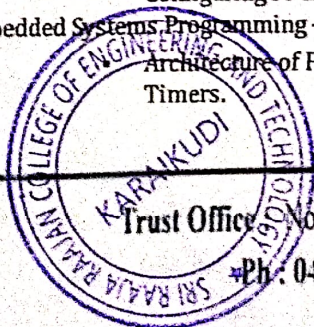
1. Introduction to Digital Logics and Its Application in Control.

2. Embedded Systems Programming - FPGA

- Introduction to Digital Logic Circuits
- Introduction to Programmable Logic Device
- Introduction to FPGA
- Introduction to Hardware Description Language (HDL) - VHDL
 - Basic language elements
 - VHDL program using Structural Modelling
 - VHDL program using Data Flow Modelling
 - VHDL program using Behavioural Modelling
 - VHDL program using Mixed Modelling & State Machine Modelling
- Introduction to Xilinx ISE & ModelSim
 - Implementation of Basic design using Xilinx ISE
 - Simulation of design using ModelSim
 - Configuring FPGA

3. Embedded Systems Programming - PIC microcontroller

Architecture of PIC microcontroller and Details of units such as ADC, DAC, Interrupts, Timers.



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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

A PRACTICAL COURSE ON EMBEDDED SYSTEMS

COURSE SYLLABUS

COURSE OBJECTIVES:

- To expose students to the field of Embedded Systems
- To enable students to implement their creative concepts to work

COURSE OUTCOMES:

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

- Apply engineering fundamentals and an engineering specialization to the conceptualization of embedded engineering design models.
- Identify, formulate, research literature and solve complex embedded system engineering problems.
- Design solutions for by developing and debugging embedded system hardware and firmware

UNIT I INTRODUCTION TO EMBEDDED SYSTEMS

Overview of Microprocessors & Microcontrollers – Embedded Systems Design Issues – Challenges and Trends in Embedded Systems, Memory (RAM, ROM, EPROM, EEPROM, FLASH) – I/O Interfacing, Programming Environment – Review of C Programming, Host & Target Development environment, Embedded C Programming, Simulation and Debugging, Downloading into target system.

UNIT II BASIC MICROCONTROLLER BASED EMBEDDED SYSTEM DESIGN

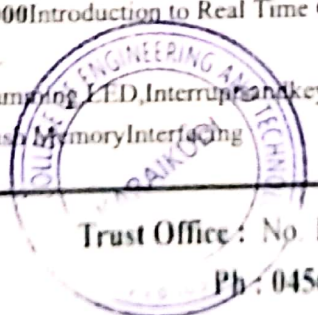
8051 Microcontroller – Architecture, Peripheral interfacing and Programming. AVR Microcontroller – Architecture, Peripheral Interfacing and Programming. PIC Microcontroller – Architecture, Peripheral Interfacing and Programming.

UNIT III ADVANCED MICROCONTROLLER BASED EMBEDDED SYSTEM DESIGN

Stream 1: TIVA ARM Processor - Architecture, ARM Peripheral interfacing and Programming - Introduction to TIVA C Series Architecture. TIVA Programming, I/O Port Programming, LED, PWM and Switch Interfacing. Analog to Digital Converter Programming, UART, DMA Controller Programming, Timer Interfacing, EEPROM Interfacing, JTAG and Interrupt Handling

Stream 2: C2000 Introduction to Real Time Controllers - C2000 Series Architecture - C2000 Libraries. C2000 Programming.

I/O Port Programming, LED, Interrupt and Keyboard Interfacing, Sensors Interfacing, Motor Control, Switch Interfacing, ePWM Programming, Flash Memory Interfacing



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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING ADD ON COURSE ON BASICS OF LAPTOP MAINTANANCE AND OS INSTALLATION

About the Course:

Important for aspiring computer techs to understand everything from computer components, installation of OS, configuration, fixing laptop hardware and troubleshooting etc..

Course Objective:

After completion of the course students will be able

1. To Describe the social and professional impact and importance of technology.
2. Identify career opportunities related to technology

Course content

Module 1: The essentials of a computer and its components Laptop Expansion Options.

Module 2: Various motherboard technologies and identify important motherboard parts. Configuration changes to a computer.

Module 3: Plan for a memory installation or upgrade-configuring windows Operating Systems.

Module 4: Wi-Fi and Windows Networks Hardware parts that connect to different parts of a computer and laptop.

Module 5: Basic troubleshooting-Install, configure, and troubleshoot Windows, android, and OS operating system.



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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING BASICS OF IMAGE PROCESSING USING MATLAB COURSE CONTENT

OBJECTIVE OF THE COURSE:

Digital images are everywhere – in thousands of scientific (e.g., astronomical, bio-medical), consumer, industrial, and artistic applications. Moreover they come in a wide range of the electromagnetic spectrum - from visible light and infrared to gamma rays and beyond. The ability to process image signals is therefore an incredibly important skill to master for engineering/science students, software developers, and practicing scientists. Digital image processing continues to enable the multimedia technology revolution we are experiencing today. Some important examples of image and video processing include the removal of degradations images suffer during acquisition (e.g., removing blur from a picture of a fast moving car), and the compression and transmission of images and videos (if you watch videos online, or share photos via a social media website, you use this everyday), for economical storage and efficient transmission.

LEARNING OUTCOME:

After the completion of the course, the students will be work and process with various source of images.

DURATION OF THE COURSE:

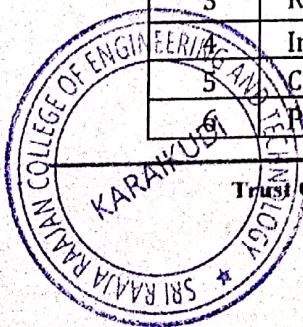
❖ 4 Days

MINIMUM ELIGIBILITY CRITERIA:

❖ Academic and un-academic students with basic Matlab knowledge.

COURSE OUTLINE

Sl.No	Modules to be Covered
1	Introduction and fundamental of image processing using Matlab
2	Transformation and filtering
3	Restoration, reconstruction, segmentation and compression
4	Image representation
5	Color and morphological image processing
6	Project and assignment



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DETAILED COURSE SYLLABUS:

1. Introduction

- Applications of digital image processing
- Elements of digital image processing system

2. Digital Image Fundamentals

- Image perception
- Sampling and quantization
- Basic relationships between pixels

3. Intensity Transformation and Spatial Filtering

- Point processing
- Spatial filtering

4. Filtering in the frequency domain

- Noise removal
- Mean and adaptive filters

5. Image Restoration and Reconstruction

- Degradation models
- Minimum mean square error (Wiener) filtering
- Image reconstruction from projection

Inverse filtering
Constrained least squares filtering

6. Wavelets and multi-resolution processing

- Multi-resolution expansion
- Wavelet transforms in two dimensions

Wavelet transforms in one dimension

7. Image Compression

- Elements of information theory
- Lossy compression

Lossless compression

8. Image Segmentation

- Detection of discontinuities
- Region based segmentation

Segmentation by thresholding

9. Image representation and description

- Chain codes
- Fourier descriptors
- Moments

10. Color image processing

- Color models
- Color transformation

Pseudocolor image processing

11. Morphological image processing

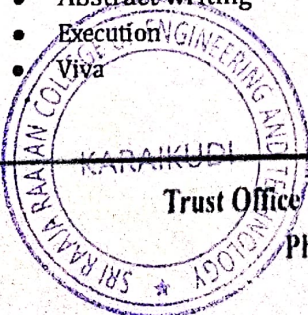
- Dilation and erosion
- Hit or miss transformation

Opening and closing

12. Project

- Abstract writing
- Execution
- Viva

Software implementation
Presentation
Result



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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

RFCD USING ADS Course Content

Objective of the Course:

An expert in the field of RF module and system design, provides powerful techniques for analyzing real RF systems, with emphasis on some that are currently not well understood. Combining theoretical results

Radio frequency components and circuits form the backbone of today's mobile and satellite communications networks. Consequently, practicing need to be able to solve ever more complex problems of RF design.

Learning outcomes:

After the completion of the course, the students will be able design some RF based System using ADS.

Duration of the course:

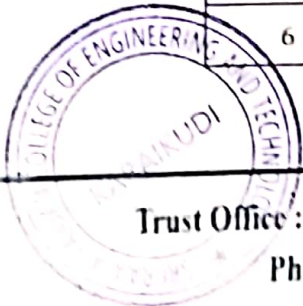
- ◆ 6 Days (45 Hours)

Minimum Eligibility Criteria:

- ◆ Pursuing BE Students

Course outline

Sl.No.	Module stobe Covered
1	Introduction to RF
2	Wireless Systems
3	Amplifiers
4	Mixers
5	Oscillators
6	Synthesizers




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DETAILED COURSE SYLLABUS

1. Introduction to RF Systems

- ❖ Introduction to Wireless Systems Introduction to Design Labs
- ❖ Introduction to Simulation with ADS
- ❖ Introduction to Octave as a processing tool for ADS
- ❖ Introduction to Time Domain Measurements
- ❖ Introduction to RF Network Measurements

2. Wireless Systems

- ❖ Path Loss Design Challenges
- ❖ Sensitivity Selectivity and Distortion
- ❖ Solution - Wireless System Analysis
- ❖ Solution - RF Transceiver Design (calculation and validation)

3. Amplifiers

- ❖ Amplifiers Design Amplifiers Topologies
- ❖ Amplifiers Matching (LNA) Power Amplifiers
- ❖ PA Matching PA Design
- ❖ PA Class A Example Classification of Power Amplifiers
- ❖ Solution - Single-ended Common Source Amplifier

4. Mixers

- ❖ Introduction to Mixers Double Balanced Mixers
- ❖ Image & Harmonics Active and Passive Mixers
- ❖ Solution - Double Balanced Mixer

5. Oscillators

- ❖ Introduction to Oscillators Tunable Oscillators
- ❖ Oscillator Phase Noise Breakdown Voltage and Buffering for Oscillators
- ❖ Solution - Oscillators

6. Synthesizers

- ❖ Introduction to Synthesizers PLL Frequency Synthesizer Types I and II
- ❖ Solution - Synthesizers

7. Project



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ADD ON COURSE ON ANDROID APPS DEVELOPMENT

SYLLABUS:

1. Introduction to Android
2. Android Architecture Overview
3. Setup of Android development Environment
4. Android Application fundamentals
5. Front end Development
6. User Interface
7. Main Building Block
8. Data Storage
9. Working on Browser
10. Services
11. Working with Different Adapter Views and Widgets
12. Clipboard

Outcomes of the course:

1. Install and configure Android application development tools.
2. Design and develop user Interfaces for the Android platform.
3. Design & develop A Basic calculator splash Screen app SMS sending App
4. Able to complete Login and Registration System Using MySQL.
5. Able to make Short Note Making Application using SQLITE
6. Able to work with firebase



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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING NETWORK SIMULATOR-NS2 COURSE CONTENT

OBJECTIVE OF THE COURSE:

Network Simulator (NS2) is a powerful open source network simulation tool. In this course, NS2 is discussed with hands on and plenty of examples. Many tools and techniques are covered with the support of shared resources.

Network Simulator is the software package that models the behaviour of any network. Evidently, it makes sense on any network by testing the newest ideas. So students can evaluate and compare the novel ideas in any network; in this way, the evolution happens in all networks.

LEARNING OUTCOME:

After the completion of the course, the students will be able simulate Network simulations using NS2.

DURATION OF THE COURSE:

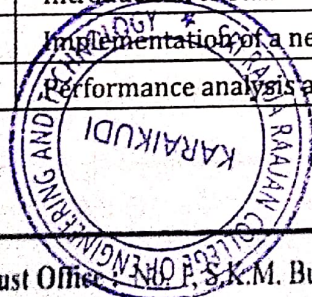
❖ 4 Days

MINIMUM ELIGIBILITY CRITERIA:

❖ Pursuing BE Students

COURSE OUTLINE

Sl.No.	Modules to be Covered
1	Introduction to NS2
2	TCL/OTCL Programming
3	Tools and fundamentals of simulations
4	Introduction to standard protocols
5	Implementation of a new protocol and trust management
6	Performance analysis and best practices



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DETAILED COURSE SYLLABUS:

1. Introduction to NS2

- ❖ Course overview
- ❖ Ubuntu OS installation on VirtualBox
- ❖ Development environment setup

Introduction to NS2
NS2 installation on ubuntu OS

2. Wireless Systems

- ❖ Introduction to TCL-I
- ❖ Introduction to TCL-II
- ❖ Introduction to Otcl

3. Tools and fundamentals of simulation


- ❖ Introduction to wired Tcl script
- ❖ Introduction to wireless Tcl script
- ❖ Introduction to Network Scenario Generator (NSG)
- ❖ Introduction to setdest utility
- ❖ Introduction to cbngen utility
- ❖ Introduction to Bonnmotion utility

4. Introduction to standard protocols

- ❖ Introduction to AODV routing protocol
- ❖ Introduction to DSR
- ❖ Overview of AODV protocol source code.

5. Implementation of a new protocol and trust management

- ❖ Cloning of existing protocol part-I
- ❖ Cloning of existing protocol part-II
- ❖ Add promiscuous mode in new protocol
- ❖ Add a malicious node in new protocol
- ❖ Trust management in new protocol part-I
- ❖ Trust management in new protocol part-II


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6. Performance analysis and best practices

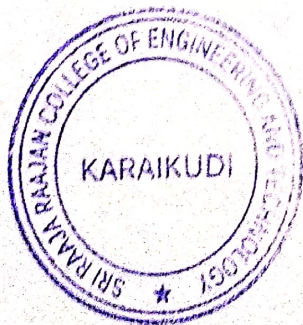
- ❖ Performance analysis parameters
- ❖ Trace formats is NS2
- ❖ Introduction to AWK scripting with analysis script
- ❖ Varying simulation parameters in TCL script
- ❖ Dos and Don'ts of simulation

7. Automation of performance analysis

- ❖ Automation of performance analysis
- ❖ Introduction to Bash scripting
- ❖ Automation script
- ❖ Graph plotting using GNUPLOT

8. Project

- ❖ Abstract writing
- ❖ Software implementation
- ❖ Execution
- ❖ Presentation
- ❖ Viva
- ❖ Result



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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

BASICS OF MATLAB Course Content

OBJECTIVE OF THE COURSE:

MATLAB is a high-performance language for technical computing. It integrates computation, visualization, and programming in an easy-to-use environment where problems and solutions are expressed in familiar mathematical notation.

LEARNING OUTCOME:

After the completion of the course, the students will be able to design some Matlab programming.

DURATION OF THE COURSE:

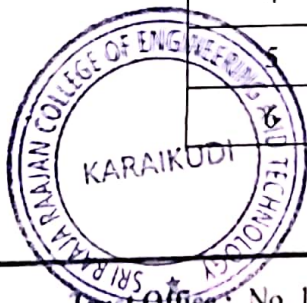
- ❖ 6 Days (45 Hours)

MINIMUM ELIGIBILITY CRITERIA:

- ❖ Pursuing BE Students /Passed out students

COURSE OUTLINE

Sl.No.	Module to be Covered
1	Introduction to Matlab
2	Matrix generation
3	Array operations
4	MATLAB programming
5	Control flow and operators
	Project



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DETAILED COURSE SYLLABUS:

1. Introduction to Matlab

- ❖ Basic features Starting MATLAB
- ❖ Using MATLAB as a calculator Quitting MATLAB
- ❖ Creating MATLAB variables Overwriting variable
- ❖ Controlling the hierarchy of operations
- ❖ Controlling the appearance of floating point number Entering multiple statements per line

2. Matrix generation

- ❖ Entering a vector Entering a matrix
- ❖ Matrix indexing Creating a sub-matrix
- ❖ Transposing a matrix Concatenating matrices
- ❖ Matrix generators Special matrices

3. Array operations

- ❖ Matrix arithmetic operations Array arithmetic operations
- ❖ Matrix inverse Matrix functions
- ❖ Linear spacing Deleting row or column
- ❖ Colon operator in a matrix

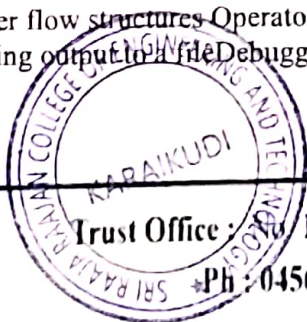
4. MATLAB programming

- ❖ M-File Scripts and Examples Script side-effects
- ❖ M-File functions Input and output arguments
- ❖ Input to a script file Output commands
- ❖ Solving linear equations

5. Control flow and operators

- ❖ Introduction of control flow Control flow operators
- ❖ The "if end" structure Relational and logical operators
- ❖ The "for end" loop The "while end" loop
- ❖ Other flow structures Operator precedence
- ❖ Saving output to a file Debugging process

6. Project



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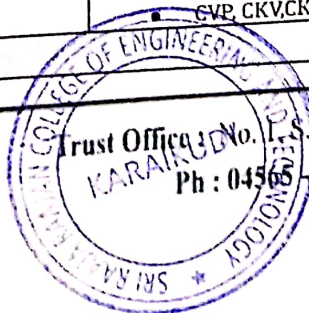
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Course in TV Service & Maintenance Training TV REPAIR TECHNICIAN Course Contents - SYLLABUS

Course Code	Course Title	Theory / Practical
JSD/EC/001/01	ADVANCED TV SERVICE & MAINTENANCE (LED VIDEO WALL)	Theory
Unit No	Modules (Theory)	T (Hrs.)
I	UNIT :Basic Electronics: <ul style="list-style-type: none"> • Use of Multimeter, Frequency Tester, Oscilloscope • AC and DC supply testing with precautions • Using SMD Rework Station , Solder Iron and other tools,Replacement of Components 	8
II	Power Board-EMI Protection & Power Factor Correction: <ul style="list-style-type: none"> • Investigation of Circuit, Active PFC testing • EMI Filter and Hazard Protection Circuit testing Power Board-Primary Rectification & PWM Oscillator: <ul style="list-style-type: none"> • Testing of Primary Rectifier circuit layout • Start-up & Run PWM circuit testing,Testing of PWM controller IC 	8
III	Power Board-Secondary Rectification & FB: <ul style="list-style-type: none"> • Investigation of Circuit • Testing of Secondary Rectifier circuit , Sampling circuit • Testing of Error Detection Circuit, Regulator Service Manual & LCD Test Tool: <ul style="list-style-type: none"> • Disassembly of LED TV unit • Use of LCD Screen panel testing tool 	9
IV	Backlight Circuit <ul style="list-style-type: none"> • Testing Backlight Drive IC • Testing Backlight Boost circuit Logic Board - Power Regulators: <ul style="list-style-type: none"> • Identification and testing of step-down Regulators on main logic board 	10
V	Logic Board - Dead unit, No Display & Connectivity Solution: <ul style="list-style-type: none"> • Power Logic Sequence- For Dead LED TV • Display Sequence -For Display Problem in LED TV • Testing of RTS Crystals LCD Screen panel Repairs: <ul style="list-style-type: none"> • LCD panel solution for Solarisation, panel line, negative picture T-Con board repairs & software: <ul style="list-style-type: none"> • Testing of T-Con board for Double image, half picture • Mini-LVDS signal waveform testing using oscilloscope • GVP, CKV,CKVB, STV, STVP waveform testing using oscilloscope 	10
Total		45



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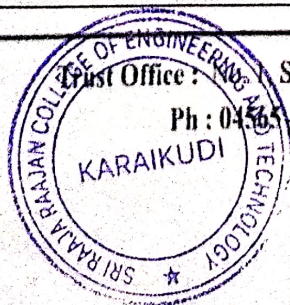
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Certificate in CCTV Installation & GPS Tracking Training CCTV Installer

Course Code	Course Title	Theory / Practical
JSD/EC/002/01	CCTV INSTALLATION & GPS TRACKING THEORY	Theory
Unit No	Modules (Theory)	T (Hrs.)
I	Unit Title: Hardware Basics: List types of cameras used by CCTV systems, Describe security camera types, mounts, and lighting, Describe bullet-type surveillance cameras, Explain infrared camera technology, Security cameras, Bullet, Infrared, Dome Pan-Tilt-Zoom, Hidden & IP, Miniature,	10
II	Unit Title Recorders & Mounts, Enclosures & housing Different DVR systems, types, Function and operation of DVR, Configuration of DVR system, Accessing, setting and troubleshooting basic DVR problems, Explain premises restoration purpose and methods, Compare different types of camera mounts, Explain optimum camera beam angles, Use of Housing	5
III	Unit Title: Video & Audio, Cabling Systems: Compare types of video monitors and displays used in CCTV, Explain video amplifier usage in security systems Describe and name common cable connectors and which cable types they apply to, Explain the use of cabling standards	5
IV	Unit Title: Computer Network systems: Explain how to draw a block diagram of a residential computer network and explain the basic uses, Explain the differences between LANS (local area networks) and, Explain the importance of the residential cabling & wiring standards, Describe the purpose of a computer bus and how it is used with CCTV,	5
V	Unit Title: Software, Wireless Basics & Distribution Systems: Introduction to Operating System, Explain different storage methods for CCTV images and evidence, Playback, Backup and restore, Different DVR file players, Explain how wireless receivers operate within the CCTV system	5
VI	Unit Title :Environmental Control, System Design, Troubleshooting, Test Equipment-Legal Issues, Wireless & IP Camera: Explain the needs or options for CCTV equipment lighting, Explain the relevance of event recording and evidence storage. List the steps in planning a CCTV original or retrofit installation, Explain the usage and precautions for multi meters, Explain the various types of liability CCTV, alarm and security firms may experience,	10
Total		40



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DETAILED COURSE SYLLABUS:

1. Basics of VHDL

- ❖ Introduction to Hardware Description Languages for FPGA Design
- ❖ Why Learn VHDL?
- ❖ FPGA Design Flow
- ❖ Intro to VHDL: Finite State Machine
- ❖ How to speak VHDL, first phrases
- ❖ VHDL Assignments, Operators, Types
- ❖ VHDL Rules and Syntax, Interface Ports
- ❖ VHDL in ModelSim: Download and Install
- ❖ VHDL in ModelSim: Adding to your Toolkit

2. VHDL Logic Design Techniques

- ❖ Introduction to VHDL
- ❖ Combinatorial Circuits
- ❖ Synchronous Logic: Latches and Flip Flops
- ❖ Synchronous Logic: Counters and Registers
- ❖ Buses and Tristate Buffers
- ❖ Modular Designs: Components, Generate and Loops in VHDL
- ❖ Test Benches in VHDL: Combinatorial
- ❖ Test Benches in VHDL: Synchronous
- ❖ Memory in VHDL
- ❖ Finite State Machines in VHDL

3. Basics of Verilog

- ❖ Verilog for fun and profit (Intro)
- ❖ Your First Verilog phrase
- ❖ Verilog Rules and Syntax; Keywords and Identifiers; Sigasi/Quartus editing
- ❖ Verilog Statements and Operators
- ❖ Verilog Modules, Port Modes and Data Types
- ❖ Verilog Structure
- ❖ Testing with ModelSim
- ❖ Verilog Evaluation

4. Verilog and System Verilog Design Techniques

- ❖ Combinatorial Circuits
- ❖ Synchronous Logic: Counters and Registers
- ❖ Modular Design in Verilog
- ❖ Testbenches in Verilog
- ❖ Testbenches in Verilog II
- ❖ Memory with Verilog
- ❖ Verilog Finite State Machines

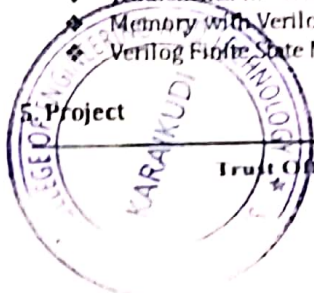
Synchronous Logic: Latches and Flip Flops
Buses and Tristate Buffers


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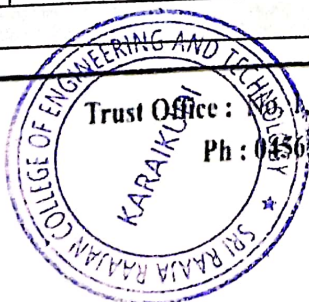
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Certificate in Mobile Servicing (Android & I-phone) Training

Service Technician

Course Contents - Syllabus

Course Code	Course Title	Theory / Practical
ECE/003/01	MOBILE SERVICING (ANDROID & I-PHONE) TRAINING	Theory
Unit No	Modules (Theory)	T (Hrs.)
I	Unit Title: Basics Tools and Equipment: <ul style="list-style-type: none">Study of various Tools and Equipment used in mobile phoneRepair using a multimeterIdentify component and their function.	10
II	Unit Title: Hardware Repair: <ul style="list-style-type: none">Study of PCB (printed circuit board) designSoldering and desoldering of componentReplacing the Display , Speaker, MIC , SIM Slate	5
III	Unit Title: Software Repair: <ul style="list-style-type: none">Detailed study of various faults arising due to corrupt softwareIntroduction of various flasher boxes and softwareFlashing of various brands of handsetsRemoving virus from infected phones,Unlocking of handsets through codes and/or softwareUse of various secret codes.	10
IV	Unit Title: Advanced Troubleshooting: <ul style="list-style-type: none">Fault finding, troubleshooting and repairing of various faultsWater damaged repair techniques, Circuit tracing, jumper techniques and solutionsUse of internet for troubleshooting faults, Advanced troubleshooting techniques.	10
V	Unit Title: Additional Learning: <ul style="list-style-type: none">Reading & writing skills, Communication skills, Time management skills, Team skills, Safety & Security.Guidance to start and manage your own mobile repair center,Dealing with customers and distributors, Marketing your mobile phone repair business.	10
Total		45



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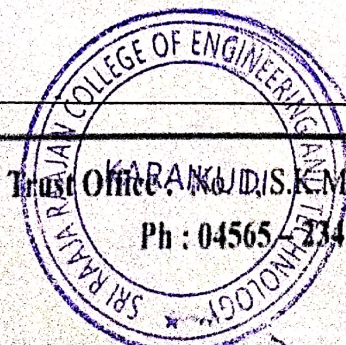
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PCB Design Engineer

Qualification:	: PCB Design Engineer
Sector:	:PCB Assembly
SUB-SECTOR OCCUPATION:	PCB Design
Role Description:	Assisting R&D to research on new products, working with systems designer to create initial designs, library management for component building, testing and finalizing design.
Minimum Educational :Qualifications Maximum Educational Qualifications:	Diploma BE
Duration:	30 Hrs

Outcome	Course Content	Hrs.
Acquire the basic level knowledge required to understand PCBs, history of PWBs/PCBs, types of PCBs, basic electronics and components values, polarities, packages of Electronic components, SMD type components and process of PCB design and product development flow	Printed circuit Board Design: History of Printed Circuit Boards. Various types of Printed Circuit Boards-Single Sided Boards, Double Sided Plated through Hole Boards, multilayer Boards. Study of Packages of Electronic Components. Study of SMD Components. Process of PCB design and product development flow	15
Understanding the flow of computer aided design packages. Understand the rules before PCB Designing.	Schematic Design: Study of PCB Design packages such as Or CAD, eagle, PADs, PCB123 software for schematic capture, PCB design and layout tools (any two). <ul style="list-style-type: none"> • Starting a project • Working with schematic design tools • Schematic drawing from circuit • Rules for PCB Design • Standards for PCB Design • Placing, editing, and connecting parts and electrical symbols • About libraries and parts • Creating a net list • Exporting and importing schematic data • Basic Circuit simulation using EDA tool 	15
Understand the methods of soldering of PCBs, material used in soldering process. Understand the methods of soldering.	Soldering Techniques : Materials used in Soldering Process. Types of soldering techniques. Soldering Methods -Manual and Mass soldering Techniques. Tools for soldering and de-soldering. Study of soldering defect and rectification. Testing for quality Control.	15



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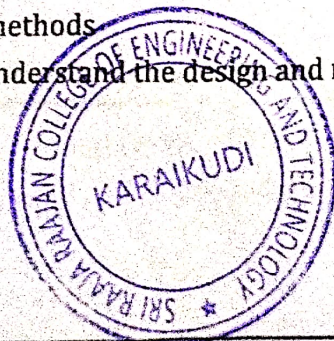
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Understand the basic concept of SMD Soldering and understand repair and rework methods	Introduction to SMD soldering methods, placing methods of SMDs, study of material for SMD soldering. Rework and Repairing methods.	15
Practical/Tutorial	Based on theory- practical and Assignment in Design, Manufacturing and Assembly	15

Learning Outcome:

- Students will acquire the basic level knowledge and will understand the packages of Electronic components, types of PCBs and history of PCBs.
- Students will understand the rules before PCB Designing, the flow of computer aided design packages and will Acquire the importance of manufacturing documents (output file generation)
- Understand the basic concept of how to design PCB for Manufacturing and assembly point of view.
- Acquire the basic level knowledge required to understand Film Master Generation method, material used for manufacturing, cleaning methods of base material.
- Understand the methods for manufacturing of PCBS. Type of material used for manufacturing.
- Understand the mechanical method in manufacturing.
- Understand the basic concept of fault finding /repair and rework methods
- Acquire the basic level knowledge required to understand assembly techniques for leaded and SMDs.
- Acquire the basic level knowledge of use of various tools during assembly.
- Understand the methods of soldering of PCBs., material used in soldering process. Understand Methods of soldering.
- Understand the basic concept of SMD Soldering and understand repair and rework methods
- Understand the design and manufacturing Techniques of Printed Circuit Boards.



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DETAILED COURSE SYLLABUS:

1. Automation

- ❖ MechanizationAutomationHistory of Automation
- ❖ Reasons for automationMerits and limitationsAutomation systems
- ❖ Types of AutomationProgrammable Automation
- ❖ Intelligent Industrial AutomationAutomation and Robotics.

2. Fundamentals of Robots

- ❖ Definition of Fundamentals of RobotsHistorical background
- ❖ Various generations of robotsRobotAnatomy
- ❖ Robot configurationJoint-armconfiguration
- ❖ Degree of freedomWork volume and Dead zone
- ❖ Dynamic performanceSpeed of response and Stability
- ❖ Precision of movementSpatial Resolution & Accuracy
- ❖ Repeatability and Compliance

3. Introduction to Robot End Effectors, Sensors and Control System

- ❖ Introduction to Robot End EffectorsEnd Effectors
- ❖ Characteristics & FeaturesMechanical grippers
- ❖ Magnetic grippersAdhesive gripper
- ❖ Vacuum cupsHooks and Scoops
- ❖ Tools as end effectorsRobot / End-effectors interface
- ❖ Consideration in Gripper selection and Design


4. Robot Programming and Applications

- ❖ Robot ProgrammingTextural Programming
- ❖ Requirements of robot programming language
- ❖ Problems pertaining to robot programming languagesAnalysis the problems
- ❖ Common languagesSoftware details
- ❖ Robot programsRobot program as a path in space
- ❖ Factors influencing the selection of RobotsRobots for Materials handling
- ❖ Assembly, Agriculture and Chemical PlantsAdvanced applications

5. Intelligent Robots and Lab work

- ❖ Intelligent RobotsIntroduction to Mobile Robots
- ❖ Legged Robots and Remote Controlled RobotsAutomated Guided Robots
- ❖ Micro RobotsControl and Safety Issues

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