Processor based System Design

Sr. No.	Content
1.	**Processor Fundamentals** Introduction to Processor architecture and programmer's model, Introduction to Processor Instruction Set Architecture, Interrupt mechanisms and Exception handling, Cross compilation
2.	**System Development** Tool chains and Development environments
3.	**System Programming** Programming using Assembly, C and Mixing the Assembly and C programming
4.	**Processor Interfacing** Interfacing switches, LCD, Keyboard, IO programming, etc. through processor ports, Generating delays and PWM using timers, and Watchdog mechanism
5.	**Serial and other Interfacing** Working with PC and RS-232, Serial Peripheral interfacing through I2C,SPI etc, Interfacing with Memory, Providing Reset and Clock on a board
6.	**Complete System** Interacting with real world using ADC and DAC

Reference Books:

1. The Definitive Guide to the ARM Cortex M3 by Joseph Yiu
2. ARM System Development Guide- Designing and Optimizing System Software by Andrew Sloss, Dominic Symes and Chris Wright
3. ARM System-on-Chip Architecture by Steve B. Furber

Syllabus for Course on PCB DESIGN

Sr. No.	Content
1.	**PCB BASIC PRINCIPLE** Specification and classification of PCBs • Techniques of layout design • Artwork generation Methods - manual and CAD • General design factor for digital and analog circuits • Layout and Artwork making for SS, DS and ML Boards • Design for manufacturability • Specification design standards
2.	**PCB FABRICATION** Introduction to PCB technology • PCB Fabrication techniques-single, double sided and multilayer • Etching: chemical principles and mechanisms • Post operations- stripping, black oxide coating and solder masking • PCB component assembly processes
3.	**TRANSMISSION LINES** Transmission lines and their parameters • Fundamental electrical concepts • Transmission lines and wave propagation • Current paths on a PCB return current • Attenuation of signals on lines skin effect, loss tangent • Coupling, mutual capacitance and mutual inductance • Power distribution. Power requirements • Coping with changing currents. Board level de- coupling - limitations • Component level de-coupling • Impedance Control
4.	**CROSSTALK** The crosstalk in transmission lines • Capacitive and inductive crosstalk Dependence on edge rate • Coupling factor. Ground plane effects Forward and backward crosstalk • Crosstalk control in PCB design parts, planes, tracks, connectors, terminations • Minimization of crosstalk.
5.	**CONNECTORS, PACKAGES AND VIAS** Effects of inductively coupled connector pin fields • Connector design guidelines Discontinuities reflections, critical length,

	connectors and Vias
6.	**DESIGN METHODOLOGIES** Simulation reference loads • Signal integrity • Lines, loads and track routing • Effect of impedance and loading on signal propagation delay • Load distribution and topology • Merits of different schemes • General routing and termination considerations
7.	**MIXED MODE PCB DESIGN** Mixing RF and digital on the same PCB • Mixing analog (audio) and digital signals on the same PCB

Reference Books:

1. Printed Circuit Boards: Design, Fabrication, and Assembly (McGraw-Hill Electronic Engineering) by Raghbir Singh Khandpur
2. Complete PCB Design Using OrCad Capture and Layout by Kraig Mitzne
3. Complete PCB Design Using OrCAD Capture and PCB Editor by Kraig Mitzner
4. Printed Circuit Assembly Design by Leonard Marks

Syllabus for Embedded System Design

Indicative List of Contents

Sr. No.	Contents
1	**Introduction:** • What is Embedded System? • Microprocessor vs Microcontroller • CISC vs RISC
2	**Overview of Architecture of ATMEGA16:** • Processor Core and Functional Block Diagram • Description of memory organization • Overview of ALL SFR's and their basic functionality **Low Level programming Concepts:** • Addressing Modes • Instruction Set and Assembly Language programming(ALP) • Developing, Building, and Debugging ALP's **Middle Level Programming Concepts:** • Cross Compiler • Embedded C language implementation, programming,& debugging • Differences from ANSI-C • Library reference • Use of #prama directive • Functions, Parameter passing and return types **On-Chip Peripherals Study, Programming, and Application:** • Ports: Input/Output • Timers & Counters • UART • Interrupts • SPI • Analog Comparator **External Interfaces Study, Programming and Applications :** • LEDS • Switches(Momentary type, Toggle type) • Seven Segment Display: (Normal mode, BCD mode, Internal Multiplexing & External Multiplexing) • LCD (8bit, 4bit, Busy flag, custom character generation) • Keypad Matrix **Protocols Study, Programming and Applications :** • I2C (EEPROM and RTC) • SPI (EEPROM) • I Wire(Sensor) • Infrared Communication(RC5 protocol)
3	**Philips LPC2000 series (The ARM7 CPU Core Based Microcontroller)** **Outline architecture** • The Pipeline • Registers • Current Program Status Register • Exception Modes **The ARM 7 Instruction Set**

	• Branching • Data Processing Instructions • Copying Registers • Copying Multiple Registers • Swap Instruction • Modifying The Status Registers • Software Interrupt • MAC Unit • THUMB Instruction Set **System Peripherals** • Bus Structure • Memory Map • Register Programming • Memory Accelerator Module • Memory Map Control • Bootloader • External Bus Interface • External Memory Interface • Phase Locked Loop • VLSI Peripheral Bus Divider • Pin Connect Block • External Interrupt Pins • Interrupt Structure **Software Development** • uVision IDE: Embedded C • Startup Code • Interworking ARM/THUMB Code • Locating Code In RAM • Inline Functions • Fixing Objects At Absolute Locations • Inline Assembler
4	**Accessing User Onchip Peripherals** • General Purpose I/O • General Purpose Timers • Watchdog • PWM Modulator • Real Time Clock • UART • I2C Interface • SPI Interface • Analog To Digital Converter • Interrupt Service Routines • Software Interrupt • Hardware Debugging Tools

Reference Books:

1. Programming Embedded Systems: With C and GNU Development Tools, 2nd Edition, by Michael Barr and Anthony Massa
2. Designing Embedded Hardware, 2nd Edition, by John Catsoulis
3. Analog Interfacing to Embedded Microprocessors: Real World Design, by Stuart Ball
4. ARM Architecture Reference Manual by David Sea
5. ARM System-on-Chip Architecture by Steve B. Furber

Course Syllabus for Basics of C programming

Sr. No	Content
1.	**C Basics** • History of C • Characteristics of C • C Program Structure • Variables - Defining Global Variables - Printing Out and Inputting Variables • Constants • Arithmetic Operations • Comparison Operations • Logical Operators • Order of Precedence
2.	**Conditionals** • Conditionals • The if statement • The : ? Operator • The switch Statement
3	**Looping and Iteration** • The for statement • The while statement • The do-while statement • Break and continue
4	**Arrays and Strings** • Defining, initializing and using arrays • Single and Multi-dimensional Arrays • Arrays of Characters and Strings • Arrays and pointers • Strings
5	**Functions** • Role of Functions • Passing arguments to functions • Returning values from functions • Recursive functions • Call back functions • Implications on Stack • Pass by value / reference • Passing Arrays to functions
6	**String Handling : <string.h>** • Basic String handling functions

	• String Searching • Character Conversions and testing : <ctype.h> • Memory Operations: <memory.h>
7	**Structures and Unions** • Structures • Nested Structures • Array of Structures • Allocation of memory and holes • Unions
8	**Further Data Types** • Coercion or Type-Casting • Enumerated Types • Static Variables
9	**Dynamic Memory Allocation & Dynamic Structures** • Malloc, Sized, and Free • Calloc and Realloc
10	**Advanced Pointer Topics** • The purpose of pointers • Defining pointers • The & and * Operators • Pointer Assignment • Pointers with functions • Pointer Arithmetic • Advanced pointer types • Pointers to functions • Pointers to String • Pointers and Dynamic memory • Pointers and Structures • Common Pointer Pitfalls - Not assigning a pointer to memory address before using it - Illegal indirection
11	**Storage Classes** • Scope • Internal • External • Automatic • Static • Scope and extent of parameters
12	**Low Level Operators and Bit Fields** • Bitwise Operators • Bit Fields - Bit Fields: Practical Example - A note of Caution: Portability

13	**The C Processor** • #define • #undef • #include • #if – conditional inclusion • Preprocessor Compiler Control • Other Preprocessor Commands
14	**Integer Functions, Random Number** • String Conversion : <stdlib.h> • Arithmetic Functions • Random Numbers String Conversion
15	**Mathematics: <math.h>** • Math Functions • Math Constants
16	**Input and Output (I/O) : <stdio.h>** • Reporting Errors perror() errno exit() • Streams - Predefined Streams Redirection • Basic I/O Formatted I/O - Printf • Scanf • Files - Reading and writing files • Sprintf and sscanf - Stream Status Enquiries
17	**Data Structures** • Linked Lists • Stacks & Queues • Binary Tree
18	**Sorting & Searching Techniques** • Insertion Sort • Merge Sort • Quick Sort
19	**Writing Larger Programs** • Header Files • Advantages of Using Several Files • How to Divide a Program between Several Files • Organization of Data in each file • The Make Utility

	• Make Programming • Creating a make file • Make Macros

Reference Books :

1. Programming with C 3rd Edition by Byron Gottfried
2.

Microprocessor/Microcontroller based System Design (focused around AVR and ARM)

Sr. No.	Content
1.	**Microprocessor/Microcontroller System Design** • Components of a microprocessor system. • Embedded systems vs general-purpose computer • Design methodologies available to implement an embedded microprocessor system.
2.	**Microprocessor/Microcontroller Organization** • Programming Models • RISC vs CISC • Memory Architectures used
3.	**Development tools and Environments** • Syntax of assembly, working with tool chain, purpose of various files (list, map, hex files) • Debugging tools • Phasing of Embedded system design
4.	**Microprocessor/Microcontroller Instruction set , Assembly Programming** • Addressing Modes, Assembler Directives, Processor Modes for accessing registers, memory and I/O • Word length and alignment issues • Developing programs to do Data processing and Arithmetic operations • Hardwired stack vs Soft Stack
5.	**Interrupts and Exception in Microprocessor/Microcontroller** • Polling vs Interrupt driven programming • Writing ISR to do specified task
6.	**Microprocessor/Microcontroller Supporting Circuits (I/O subsystems)** • Clocking Options available

	• Power Down Modes • Pins Configurations (Time multiplexed vs Configurable pins) • GPIO • Decoding Logic of IO devices
7.	**Microprocessor/Microcontroller Peripheral Devices** • Timers • PWM • DMA controllers
8.	**Memory System Design for Microprocessor/Microcontroller** • Characteristics of RAM/ROM • Working with EPROM, SRAM devices • Address Decoding and Memory map design
9.	**Interfacing Microprocessor/Microcontroller with** Switches, Keypads, Displays Serial I/O Analog Signals

Resources:

link for minikit and Quick start +kit from analog around ADUC7061 Precision Analog microcontrollers

http://www.analog.com/en/content/microconverter_development_tools/fca.html

http://www.analog.com/en/processors-dsp/analog-microcontrollers/aduc7060/products/EVAL-ADUC7060/eb.html

The mbed Rapid Prototyping platform is designed for experienced embedded developers as a productive platform for developing microcontroller-based proof-of-concepts. For developers new to 32-bit microcontrollers, mbed provides an accessible way to get projects built with the backing of resources and support shared in the mbed community.

Http://www.mbed.org

http://mbed.org/cookbook/Course-Notes

http://mbed.org/cookbook/Homepage

http://mbed.org/handbook/mbed-Developer-Website

ARM teaching Resources

http://www.arm.com/support/university/academic-resources.php

http://home.iitj.ac.in/~sk/emsys.html

http://users.ece.utexas.edu/~valvano/

http://martin.hinner.info/ARM-Microcontroller-HOWTO/ARM-Microcontroller-HOWTO.html

Bulding arm-elf-gcc in ubuntu-10.04

http://lejosrt.org/tuto/install-gnu-arm-toolchain-under-linux

http://openhardware.net/Embedded_ARM/Toolchain/

http://www.ibm.com/developerworks/linux/library/l-arm-toolchain/

Linux Kernel for ARM

http://www.arm.linux.org.uk/docs/whatis.php

Syllabus for Computer Networks

Sr. No.	Content
1.	**INTRODUCTION** Historical perspective, theoretical and practical models of network architecture particularly the ISO OSI seven layer model and the TCP/IP protocol stack. Example networks and services including prototype new technologies. These would include Frame Relay, ISDN, ATM, WiFi, xDSL, WiMAX, 2G and 3G.
2.	**DIGITAL COMMUNICATION** Physical properties of copper media, fibre optics, radio communication, and data communication standards. Maximum data rates (theoretical and practical) for different media including some simple analysis of signals. Data encoding of digital signals. The distinction between, and analysis of, physical media and wireless media properties. The difference between narrow band and broad band technologies with particular reference to ISDN and xDSL.
3.	**LOCAL AREA NETWORKS** Types of LAN covering standards, topology and performance. Example architectures such as ethernet and fast ethernet, ATM, and WiFi. The operation of LAN switches and the configuration of virtual LANs.
4.	**WIDE AREA NETWORKS** Circuit versus packet switching and associated routing and flow control. Detailed examples of existing architectures such as Frame Relay, ISDN, ATM, Multi-protocol Label Switching (MPLS) and Virtual Private Networks (VPN).
5.	**INTER NETWORKS** Principles of inter networking, architectures, addressing and protocols. Particular reference to IPv4, IPv6, TCP and UDP.
6.	**ERRORS**

	The main causes of errors and their effects on transmission. Single bit and burst errors. Various error detection and correction strategies including parity, block sum, Hamming Codes, Cyclic Redundancy Checks and Forward versus Backward error control. Statistical analysis of the effectiveness of error detection and correction code.
7.	**QUALITY OF SERVICE** A definition of quality of service and the main parameters that define network performance. Router functionality including frame prioritisation, classification and queue management techniques. The provision of quality of service management in practical networks such as Frame Relay, ATM and the Internet**.**

Syllabus of Electronic Systems Packaging

Sr. No.	Content
1.	**Packaging of Electronic Systems** Electronic systems and needs. Physical integration of circuits, packages, boards and full electronic systems, Connectivity in Electronic equipment's, Evolutions of Printed Circuit Boards, Classification of Printed Circuit Boards ,Challenges in Modern PCB Design and Manufacture, Major Market Drivers for PCB Industry , PCB for Electronic Systems, Useful Standards, Introduction to Electronic Packaging ,Issues in Electronic Packaging ,Packaging hierarchy of electronic products and systems,Hierarchy of Interconnection Levels,The Three Breakthroughs inChip Packaging Technology, Layout Planning & Design, Basic Design Consideration for Special Circuits, Interconnection, thermal, signal integrity, electromagnetic interference and protection issues in electronic components and systems Soldering and its Techniques, Restriction of Hazardous Substances (RoHS) compliance
2.	**Manufacture of chips and boards** Miniaturization & its impact on characterization of Electronic Systems, Introduction, Trends & Projections in IC Design & Technology. Comparison between semiconductor materials, Basics of Thick and thin Film Hybrid Technology and monolithic chips. Advantages, limitations& Classification of ICs. Introduction to packaging, Package design considerations, VLSI Assembly techniques, Packaging fabrication technology. Surface Mount Technology (SMI}. Through hole technology, Surface Mount Technology, applications & SM Components, Chip Scale Packages (CSP), CSP Benefits and Drawbacks, Chip-Package Connection-Wire Bonding, TAB & Flip Chip, Single Sided PC Boards, Double Sided PC Boards, Multilayer PC Boards, Interconnection Techniques, Materials for Multilayer boards, Design Features of Multilayer Boards, Fabrication Process of Multilayer Boards Useful Standards, Flexible Printed Circuit Boards, Design Consideration in flexible printed circuits boards, Manufacture of Flexible Circuits, Rigid Flex PCBs, Terminations, Advantages of Flexible PCBs, Special Circuits Applications on flexible PCBs and Useful Standards
3.	**Thermal design of chips and boards** Thermal management of electronic devices and systems, Overview, Thermal resistance of devices Thermal time constants. Thermal interface material. Heat density in electronic components, Heat transfer through conduction, convection and radiation, Methodologies, Heat sinks, Principle, Construction and materials. Performance, Method of cooling for a given board, Convective air cooling, Forced air cooling. Heat pipes, Peltier cooling plates. Synthetic jet air cooling, Electrostatic fluid acceleration. Recent developments, Application in Electronics Systems, Personal Computers, Batteries and Soldering
4.	**Design of HDI PWBs for Manufacturability, Reliability and Testability** Design Rules for Analog Circuits, Design Rules of Digital Circuits, Design Rules for High Frequency Circuits, Design Rules for Power Electronic Circuits, Need of High Density Interconnection Structures, Drivers for HDI,HDI via structures effect on PCB design flexibility, constraints and cost, Need for HDI structures using microvias, Drilling, Vias, Microvias, Staggered Sequential Microvia Build-up, Stacked Sequential Microvia Build-up, Co-Laminated Any Layer Microvia Build-up, PCB Basis, PCB Basis, Setting Up HDI

	Routing, Design a four layer high density and high performance PCB using PCB CAD, Characteristics of a Package, Thermal performance, Signal integrity Power distribution, Manufacturability, Testability, Reliability
5.	**Design of Interconnections** Design high frequency interconnections on PCBs, Performance of interconnections at high frequencies
6.	**Electromagnetic Compatibility** **E**lectromagnetic interference in electronic systems and its impact, Types, Susceptibilities of different radio technologies, Interference to consumer devices and systems, Analyze the electronic circuit from the noise emission point of view (both conducted and radiated emission) cross talk and reflection behavior of the circuit in time domain,. Design a power supply distribution network for the digital and analog circuits

References:

3. Printed Circuit Boards: Design, Fabrication, and Assembly (McGraw-Hill Electronic Engineering) by Raghbir Singh Khandpur
4. Packaging Handbook by Charles A harper.
5. Electronics Packaging Design, material, Process and Reliability by Wataru nakayama, John H. lau, C.P. Wong and John Prince.
6. System and Package by Ed Rao Tummala.

Syllabus of FPGA DESIGN Using DHL/VHDL

Sr. No.	Content
1.	**Digital Design** • Combinatorial Logic Design Sequential Logic Design State machines Advanced Design Issues Metastability Noise margins Power Fan-out Design rules Skew Timing consideration
2.	**FPGA Architecture** • Architecture Study of some popular FPGA families • Detailed study of a Xilinx FPGA family (Virtex 6) Architecture of Microcontrollers in FPGA (ARM) The back end tools • Integrateing non-HDL modules Building macros
3.	**High Level Design Methodology** (VHDL (In accordance with standard IEEE 1076-2008) • Introduction to HDL • VHDL Flow Language constructs Concurrent constructs Sequential Constructs Subprogram Packaging • Timing Issues
4.	**HDL Simulation and Synthesis** • The concept of Simulation • HDL Simulation and Modeling The Synthesis Concept Synthesis of high level constructs Timing Analysis of Logic Circuits

	Combinatorial Logic Synthesis State Machine Synthesis Efficient Coding Styles Hierarchical and flat designs Constraining Designs Partitioning for Synthesis Pipelining Resource sharing • Optimizing arithmetic expressions Design reuse • The Simulation and Synthesis Tools

References:

1. FPGA Based System Design by Wayne Wolf
2. Digital System Design using Programmable Logic Devices by Parag K Lala
3. Digital Design by John F Wakerly

Syllabus of DESIGN Using VERILOG

Sr. No.	Content
1.	**Digital Design** • Combinatorial Logic Design Sequential Logic Design State machines Advanced Design Issues Metastability Noise margins Power Fan-out Design rules Skew Timing consideration
2.	**Verilog (In accordance with IEEE 1364-2005 and 2009)** • Data types Modeling concepts, Task and Functions Specify block and Timing checks Verification and Writing test benches
3.	**ASIC Design Issues** • ASIC Design Flow • Testability: Test principles, fault models, fault coverage, test vectors Design for test Reliability considerations Different technology options Power calculations Package selection Clock methodologies Design Flow (Design Specifications, Verification Plan, RTL Description, Functional Verification, Synthesis)

Reference Books:

1. Digital Design by John F Wakerly
2. Verilog HDL : A Guide to Digital Design and Synthesis (2nd Ed) by Samir Palnitkar

3. The Verilog Hardware Description Language by Philip R. Moorby, Donald E. Thomas
4. A Verilog HDL Primer by J Bhasker

Syllabus on Industrial Product Design

Sr. No.	Content
1.	**Introduction to Industrial Design** Introduction to the course, role of ID in the domain of industry, product innovation, Designer's philosophy and role in product design, What is good design.
2.	**Product Design Methodology** User Centered Design methods, Systems Approach, Electronic Product Design and Development Methodology, Design Thinking, Creativity and Innovation. Introduction to Sustainable Design. Design Case Studies.
3.	**Product Analysis** Deconstructing Product Design - Product Analysis
4.	**Visual Communication Techniques** Free Hand sketching and drawing techniques for concept presentation, Perspectives, and rendering techniques, colour in design, Engineering drawing practice, exploded views.
5.	**Design Principles** Visual information through design principles, Figure-ground relationship, Visual information distribution, Gestalt principles, Theory of object perception, Symmetry, Asymmetry, Closure, Continuance, Unifying principles of design. **Design Expressions** : Mood board, Design trends, Application of design principles and product aesthetics.
6.	**Ergonomics** Ergonomics of electronic products and systems, Control panel design, User interface design, Human-Computer Interaction, Case studies.
7.	**Product Engineering**

Reference Books :

1. Product Design and Development – Karl T. Ulrich, Steven D. Eppinger & Anita Goyal, MGH
2. Material and Design: The Art and Science of material Selection in Product Design- Ashby, Michael & Johnson, Kara, Butterworth – Heinemann
3. Elements of Design – Gail Greet Hannah, Princeton Architectural Press.
4. Product Design & manufacturing – John R. Lindberg, PHI

Syllabus of Fiber Optics Interconnections

Sr. No.	Content
1.	**Optical Fiber** Fundamentals of Optical Fibers, Single Mode and Multimode Fibers, Losses and Dispersion in Optical Fibers, Optical Fiber cables, Connecterisation and splicing
2.	**Sources** LED and lasers as sources for optical fiber link, their characteristics and properties.
3.	**Detectors** Detectors in optical fiber link (PIN and Avalanche Detector) and their characteristics. Testing and maintenance of optical links
4.	**Mesuring Equipments** Study of Power Meter, Attenuator, OTDR etc.

Reference Books:

1. J.Senior, "Optical Communication, Principles and Practice", Prentice Hall of India, 1994.
2. Gerd Keiser, "Optical Fiber Communication" McGraw -Hill International, Singapore, 3rd ed., 2000
3. 2. J.Gower, "Optical Communication System", Prentice Hall of India, 2001.

Course Syllabus for OS and Device Driver Development for Embedded System

Sr. No.	Contents
1	**Overview of Operating System** Introduction to Operating system, Role of Operating System as resource manager, function of kernel and shell, operating system structures, views of an operating system. **Process management:** CPU scheduling, Scheduling Algorithms, PCB, Process synchronization, Deadlocks, Prevention, Detection and Recovery **Memory Management:** Overlays, Memory management policies, Fragmentation and its types, Partitioned memory managements, Paging, Segmentation, Need of Virtual memories, Page replacement Algorithms, Concept of Thrashing **Device Management:** I/O system and secondary storage structure, Device management policies, Role of I/O traffic controller, scheduler **File Management:** File System Architecture, Layered Architecture, Physical and Logical File Systems, Protection and Security: Brief study to multiprocessor and distributed operating systems **LINUX Basics** **Introduction to linux operating system** • operating system services • why linux **Different types operating systems** • Monolithic • Micro etc **Basic linux user commands** **Linux root file system structure.** **Introduction to GNU Tool chain** • GCC compiler • Make file • GDB.
3	**Introduction to Device Drivers - Module Programming** • The role of the device driver • Classification of Devices and Modules • Building and running Modules • Hello world Module • Process context, interrupt context, Kernel timers • The Linux device model (devices, udev,sysfs,procfs) • Character Driver basics **Writing Device Driver Programming in Linux.** • Open, Read, Write and Close System Calls • Major and Minor Numbers • Charater Device Data structures • Charater Device Registration

	• Writing Simple Charater Device Driver • Debugging by Printing, Concurrency and Race Conditions (Semaphores, Mutexes, Completions, Spinlocks) • Advance char device operations (ioctl), Kernel Timer • I/O Ports and I/O Memory - Writing Parallel port driver Interfacing With LED, Seven Segment Display. • Interrupt Handling With Parallel Port • UART Driver **Kernel Configuration and Compilation for 0x86Requirements for Building and using the kernel,** • Retrieving the Kernel Source • Configuring and Building, Installing and Booting from a Kernel • Upgrading a kernel, Customizing a Kernel • Boot loader - Grub Loader, U-Boot **Implementing Device driver application program related to the Driver** • Interaction between the User and Kernel Level With System calls • Explain Device driver application flowchart • Exaplain kernel Device driver and user device driver program

Reference Books:

1. Operating System Principles by Abraham Silberschatz, Peter Baer Galvin, Greg Gagne
2. Beginning Linux Programming by Niel Matthew and Richard Stones
3. Linux Kernel Development by Rober Love

Syllabus on Course for AUTOCAD

Sr. No	Content
1.	**Getting Started** **Getting Started with AutoCAD** • Starting AutoCAD • AutoCAD's User Interface • Working with Commands • AutoCAD's Cartesian Workspace • Opening an Existing Drawing File • Viewing Your Work • Saving Your Work **Basic Drawing & Editing Commands** • Drawing Lines • Erasing Objects • Drawing Lines with Polar Tracking • Drawing Rectangles • Drawing Circles • Undo and Redo Actions **Drawing Precision in AutoCAD** • Using Running Object Snaps • Using Object Snap Overrides • Polar Tracking at Angles • Object Snap Tracking **Making Changes in Your Drawing** • Selecting Objects for Editing • Moving Objects • Copying Objects • Rotating Objects • Scaling Objects • Mirroring Objects • Editing with Grips **Organizing Your Drawing with Layers** • Creating New Drawings With Templates • What are Layers? • Layer States • Changing an Object's Lay

	Advanced Object Types • Drawing Arcs • Drawing Polylines • Editing Polylines • Drawing Polygons • Drawing Ellipses
2.	**Second Step** **Getting Information from Your Drawing** • Working with Object Properties • Measuring Objects **Advanced Editing Commands** • Trimming and Extending Objects • Stretching Objects • Creating Fillets and Chamfers • Offsetting Objects • Creating Arrays of Objects **Inserting Blocks** • What are Blocks? • Inserting Blocks • Working with Dynamic Blocks • Inserting Blocks with DesignCenter • Inserting Blocks with Content Explorer **Setting Up a Layout** • Printing Concepts • Working in Layouts • Copying Layouts • Creating Viewports • Guidelines for Layouts **Printing Your Drawing** • Printing Layouts • Printing from the Model Tab **Text** • Working with Annotations • Adding Text in a Drawing • Modifying Multiline Text

	• Formatting Multiline Text • Adding Notes with Leaders to Your Drawing • Creating Tables • Modifying Tables **Hatching** • Hatching • Editing Hatches **Adding Dimensions** • Dimensioning Concepts • Adding Linear Dimensions • Adding Radial and Angular Dimensions • Editing Dimensions
3.	**Adding Efficiency** **Working Effectively with AutoCAD** • Creating a Custom Workspace • Using the Keyboard Effectively • Object Creation, Selection and Visibility • Working in Multiple Drawings • Copying and Pasting Between Drawings • Using Grips Effectively • Additional Layer Tools **Accurate Positioning** • Coordinate Entry • Locating Points with Tracking • Construction Lines • Placing Reference Points **Parametric Drawing** • Working with Constraints • Geometric Constraints • Dimensional Constraints **Working with Blocks** • Creating Blocks • Editing Blocks • Removing Unused Elements • Adding Blocks to Tool Palettes

	• Modifying Tool Properties in Tool Palettes **Creating Templates** • Why Use Templates • Controlling Units Display • Creating New Layers • Adding Standard Layouts to Templates • Saving Templates **Annotation Styles** • Creating Text Styles • Creating Dimension Styles • Creating Multileader Styles **Advanced Layouts** • Quick View Layouts • Creating and Using Named Views • Advanced Viewport Options • Layer Overrides in Viewports • Additional Annotative Scale Features **External References** • Attaching External References • Modifying External References • XRef Specific Information

4.	**Advance Topics**
	
	Advanced Text Objects
	
	• Annotation Scale Overview
	  ○ Working with Annotative Styles
	  ○ Viewing Annotative Objects at Different Scales
	  ○ Annotation Scale and Model Space
	  ○ Modifying Annotative Objects at Different Scales
	• Using Fields
	  ○ Updating and Modifying Fields
	  ○ Field Settings
	  ○ Object Fields
	  ○ Fields in Blocks
	  ○ Fields in Attributes
	• Controlling the Draw Order
	  ○ Draw Order
	  ○ Draw Order of Hatching
	  ○ Masking Annotation Objects

- Adding a Wipeout

Working with Tables

- Working with Linked Tables
  - Using the Data Link Manager
  - Updating Table Links
- Creating Table Styles
  - Cell Style Option

Dynamic Blocks

- Working with Dynamic Blocks
  - Inserting Dynamic Blocks
  - Modifying Dynamic Blocks
- Creating Dynamic Block Definitions
- Dynamic Block Authoring Tools
  - Block Editor Contextual Tab
  - Parameters
  - Actions
  - Parameter Sets
  - Constraints
  - Labeling Parameters
  - Testing the Block
  - Construction Geometry
  - Constraints in Dynamic Blocks
  - Creating a Block Table
- Additional Visibility Options

Attributes

- Inserting Blocks with Attributes
  - What are Attributes?
  - How Attribute Values Are Entered
  - Attribute Visibility
- Editing Attribute Values
  - Editing Attributes One at a Time
  - Editing Multiple Attribute Values
- Defining Attributes
  - Attribute Definition
  - Associating Attributes with Blocks
- Redefining Blocks with Attributes
  - Updating Blocks with New Attributes
- Extracting Attributes

Output and Publishing

- Output for Electronic Review
  - Plotting Electronic Files
  - Exporting DWF or PDF Files
- Autodesk Design Review
  - Viewing Markups in AutoCAD

	• Publishing Drawing Sets

5.	**Collaborration**
	
	Other Tools for Collaboration
	
	• eTransmit
	  ○ Transmittal Setups
	• Hyperlinks
	  ○ Using a Hyperlink
	
	Online Collaboration and 2D Automation
	
	• AutoCAD WS
	• Automatic Model Documentation
	  ○ Base View
	  ○ Projected View
	  ○ Editing Drawing Views
	
	Introduction to Sheet Sets
	
	• Overview of Sheet Sets
	  ○ Understanding the Sheet Set Manager
	• Creating Sheet Sets
	  ○ Sheet Set Properties
	• Creating Sheets in Sheet Sets
	  ○ Organizing Sheets in Subsets
	• Adding Views to Sheets
	  ○ Sheet Views Tab
	• Importing Layouts to Sheet Sets
	  ○ Create a Sheet Set from Existing Layouts
	  ○ Importing a Layout to a Sheet Set

6.	**Publishing**
	
	Publishing & Customizing Sheet Sets
	
	• Transmitting and Archiving Sheet Sets
	  ○ Archiving Sheet Sets
	• Publishing Sheet Sets
	  ○ Publish to DWFx
	  ○ Control Plotting Output
	  ○ Sheet Sets
	• Customizing Sheet Sets
	  ○ Sheet Set Properties
	  ○ Creating Custom Properties
	• Custom Blocks for Sheet Sets

	○ Creating a Title Label Block ○ Creating a Callout Block **Managing Layers** • Working in the Layer Properties Manager ○ Displaying Columns in the Layer ○ Properties Manager ○ Layer Settings • Creating Layer Filters ○ Using the Filter Tree ○ Property Filters ○ Group Filters • Setting Layer States
7.	**Things not to be left** **CAD Standards** • CAD Standards Concepts ○ Creating a Standards File • Configuring Standards ○ Plug-ins ○ CAD Standards Status Bar Icon ○ Notes • Checking Standards ○ CAD Standards Settings **System Setup** • Options Dialog Box • System Variables • Dynamic Input Settings • Drawing Utilities ○ Renaming Named Objects ○ Drawing Recovery and Repair ○ Checking a Drawing's Status • Managing Plotters ○ Add Plotter Wizard ○ Plotter Manager ○ Plotter Configuration Editor • Plot Styles ○ Concepts ○ Types of Plot Style Tables ○ Creating Plot Style Tables ○ Attaching Plot Style Tables to Layouts

8.

Customization

Introduction to Customization

- Why Customize?
  - Customization Guidelines
- What Can Be Customized?
- Creating a Custom Workspace

Customizing the User Interface

- Using the Customize User Interface (CUI) Dialog Box
  - Overview of the CUI Interface
- Customizing the Ribbon
  - Customize User Interface Dialog Box
  - Ribbon Contextual Tabs
  - Ribbon Fold Panels
- Customizing the Quick Access Toolbar
  - Multiple Quick Access Toolbars
- Customizing Menus
  - Controlling Menus in Workspaces
  - Modifying Shortcut Menus
- Creating Custom Toolbars
- Keyboard Shortcuts
  - Mouse Buttons
  - Customizing Double-Click Actions

Macros & Custom Routines

- Custom Commands and Macros
  - Creating a New Command
  - Command Macro
  - Special Characters used in Macros
  - Button Image
- Running Scripts
- Action Recorder
- Editing Action Macros
  - Working with the Action Macro Manage
  - Establishing a Base Point
  - Specifying Playback Values
- Loading Custom Routines
  - Loading Routines
  - APPLOAD Options

Syllabus for Computer Service and Maintenance

Sr. No.	Content
1.	**Computer Maintenance & Upgrading** • Investigating the evolution of computers. • Identifying internal/external computer components. • Selecting storage tapes, disks and drives. • Expanding the computer system. • Capturing text and images. • Working with printers. • Computer hazards and safety. • Investigating the operation of computer components. • Installing the Windows operating system. • Exploring the Windows desktop and control panel. • Installing and connecting peripheral devices.. • Installing an additional hard drive and memory. • Backing-up and restoring data. • Installing a scanner, printer and modem. • Installing anti-virus software. • Identifying portable computer components.
2.	**Computer Troubleshooting** • Troubleshooting methodology. • Company policies and customer support. • Telephone support. • Tools of the trade. • Call tracking and asset management systems. • Preventive maintenance. • Hardware and software compatibility. • Service and warranty. • The main components of a computer system. • The boot sequence. • Completing customer service forms. • Troubleshooting methodology and tools. • Safety and preventive maintenance. • Testing computer systems. • Error messages and POST error codes. • Troubleshooting peripheral devices.

	• Troubleshooting internal hardware devices. • Windows drivers and resource management. • Resolving resource conflicts. • Identifying power supply problems. • Troubleshooting software problems.
3.	**Investigating Computers** • Comparison of different operating systems. • Windows file management. • Installation of an operating system. • Installation and repair of software. • The computer start-up sequence. • Windows operating modes. • Using user profiles. • Memory types and memory management. • Examining the Windows desktop. • Exploring the Internet. • Hardware management methods. • Installing the Windows 98 operating system. • Installing the Windows 2000 operating system. • Installing Windows 2000 workstation. • Investigating network transmission methods. • Monitoring performance. • Printing with Windows. • Examining network devices. • Implementing networks. • Software management methods. • Troubleshooting computer hardware.

Reference Books :

1. IBM PC & Clones: Hardware trouble shooting & maintenance by Govindarajalu, Tata McGraw Hill
2. Inside the PC By Peter Norton, 8th Edition Tec media Publications
3. Bigelow's PC troubleshooting & Repair By Stephen Bigelow, Dreemtech Press
4. Uninterruptible Power Supplies by David C. Griffith, Marcel Dekker Inc

Syllabus for PLC and SCADA

Sr. No	Content
1.	**INTRODUCTION TO AUTOMATION** • Brief Description of a Control System • Pneumatic Controller, PID Controller, PLC Controller • History & Need of Industrial Automation • Application of Industrial Automation • Basic Components of Automation • Hardware Classification of Automation
2.	**GETTING FAMILIAR WITH PLC** • Type of PLC • Hardware & Architecture of PLC • Application and Advantage of PLCs • Sourcing and Sinking concept • Programming Language of a PLC • Introduction to field Device(Input / Output) • Data files in PLC Programming • Brief Description of a Logic Gates • Simulator analysis of a PLC Programming • Communication with PLC • Wiring different field device to PLC • Uploading, Downloading & Monitoring programs • Introduction to SFC • Introduction to Instruction List • Introduction to Ladder Logic
3.	**ADVANCE PROGRAMMING IN PLC** • Introduction to jump and label instruction. • Introduction to SBR and JSR instruction. • Forcing of I/O • Monitoring/Modifying Data table values • Hands on experience on real time applications • Fault finding/troubleshooting and documentation

	• Interfacing proximity sensor with PLC • Interfacing with Relay • Control circuit designing with feedback concept
4.	**LADDER LOGIC PROGRAMMING** • Comparison b/w Gates, Relay Logic& ladder logic • Description of using Memory bit in a programming • Mathematical Concept ADD,SUB,MUL,DIV and etc • Logical Concept AND,ANI,OR,ORI, EXOR,NOT etc • Special Function MOV,SET,RST,CMP,INC,DEC • Programming based on Timer And Counter
5.	**GETTING FAMILIAR WITH SCADA** • Introduction to SCADA Software • Creating new SCADA Project • GUI Designing • Tag Substitutions • Dynamic Process Mimic • Real Time Trend • Historical Trend • How to create Alarms & Event • Recipe Management • Introduction to graphic Properties like Sizing, Blinking, Filling, Analog Entry, Movement of Objects, Visibility etc. • Net DDE Communication • Application of scripts • Communication with PLC
6.	**WORKING WITH DIFFERENT SCADA TOOLS** • Introduction to other SCADA • Communication through DDE/OPC/DIRECT driver. • Various other related properties
7.	**Project work**

Reference Books:

1. Programmable Logic Controller 4th Edition By W. Bolton
2. Number of down able available for SCADA