AUTOMOTIVE EMBEDDED SYSTEM SYLLABUS

Introduction to C Programming:
- Introduction to C, software description
- Compilation stages, structure of C
- I/O format specifier
- C token
- C identifier
- Keyword
- Data types
- Arrays
- Strings
- Storage classes
- Constant
- Operators
- C variables
- Pre-processor
- Type casting
- Conditional branch and looping control statements
- Error handling, C function, function arguments
- Loops, data structure, variable scope, pointers, Memory managements, GNU GCC compiler, Creating libraries, Make files

ARM Microcontroller:
- Basic electronic components details
- Introduction about embedded system and its classifications
- (architecture, bit, instruction set)
- Pipeline
- Bus
- Memory
- Microprocessor & microcontroller difference

Introduction to ARM LPC2148:
- About GPIO registers
- External hardware interfacing
- LED
- SSD
- LCD interfacing
- Motor interfacing
- Relay interfacin
- Matrix keypad interfacing

Serial Communication Protocols:
- UART
- SPI
- I2C
- CAN

Wireless Protocols:
- Bluetooth
- GSM
- GPS

- RFID
- ZIGBEE

Automotive Embedded System Design:
- Introduction to Automotive
- Embedded System
- Introduction to CAN protocol

Controller Area Network:
- Structure of CAN node
- CAN with different layers
- Message transfer
- Arbitration
- CRC checking
- Error detection
- Fault confinement

LIN - Local Interconnect Network:
- Introduction to LIN
- Message Fields
- Frame Types
- LIN layers

Flexray Protocol:
- Introduction to Flexray
- Flexray Topology
- Flexray layout
- Flexray network database

Diagnostic:
- Why diagnostic
- Diagnostic tester
- Goals of Diagnostic communication
- Comparison of UDS
- KWP protocol

UDS - Unified Diagnostic Service:
- Unified Diagnostic Service Flow control in UDS
- Diagnostic session control service
- ECU Reset service
- Security access service
- Communication control service
- Tester present service
- Access timing parameter service
- Secured data transmission service
- Control DTS setting service
- Response on event service
- Link control service
- Read data by identifier service
- Read memory by address service
- Read scaling data by identifier service
- Read data by periodic identifier
- Dynamically define data identifier service

- Write data by identifier
- Write memory by address service
- Clear diagnostic information service
- I/P and O/P control by identifier service
- Request download service
- Request upload service
- Transfer data service
- Request transfer exit service

CANoe Software:
- Introduction to CANoe software
- ECU Simulation
- Interaction with ECU

CANoe Analysis Toolbar:
- CAN Statistics
- Trace
- Data
- Graphics
- Work with interactive generator block
- Sending request and getting response with interactive generator block
- Insert network node and writing CAPL scripting

Panel:
- New panel
- Add panel
- Designing a panel using vector standard controls
- Introduction to CAPL (Communication Access Programming Language) scripting
- Using database with CAPL
- Using panels with CAPL

Using Timers:
- Declaring a timer
- Starting a timer
- Resetting a timer
- Stopping a timer before it expires

Using Environment Variables:
- Environment variable types
- Environment variable initialization
- Declaring an environment variable even
- Event execution
- CAN implementation with CANoe tool
- LIN implementation with CANoe software tool
- Flexray implementation with CANoe software tool
- Vector CAN/LIN Hardware

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Introduction to ETAP:
- What is ETAP?
- Why ETAP for System design?
- History of ETAP
- Key features & Benefits of ETAP
- Codes & Standards

Working with ETAP software:
- Starting ETAP software
- Creating a new project
- Changing the Project standard
- File Management
- Exploring GUI

Toolbar Description:
- Project Toolbar
- Theme Toolbar
- System Toolbar
- Mode Toolbar
- Base & Revision Toolbar

Inserting Circuit Elements:
- Library for Circuit Elements
- System Elements and Components
- Element Classification
- AC Elements
- DC Elements
- AC-DC Elements
- Instrumentation Elements
- Component Editor

Editing a one-line diagram:
- Add Elements
- Add Multiple Elements
- Connect Elements
- Select & Deselect Elements
- Auto Select
- Element & Connector Weight
- Relocate elements
- Cut, copy, paste
- Group & Ungroup
- Nodes & Buses

Editing a one-line diagram:

- Element Size
- Element symbols
- Element & Connector Colors
- Element Alignment
- Element Classification
- Element Rotation
- Get Template and Add to Template
- Connector Routing
  Element Status

Modules in ETAP:
- Load Flow Analysis
- Short Circuit Analysis
- Motor Acceleration
- Transformer Sizing
- Cable Sizing
- Relay Co-ordination
- Harmonic Analysis
- Arc Flash
- Ground Grid System

Design a Single line diagram and run the Load Flow Analysis with ETAPsoftware

Design a Single line diagram and run the Short Circuit Analysis with ETAPsoftware

Design a Single line diagram and run the Motor Acceleration with ETAPsoftware

Design a Single line diagram and run the Transformer Sizing with ETAPsoftware

Introduction to Cables:
- Cables types
- Comparison of Underground cables and Overhead lines
- General construction of cables
- Type of Cables
- Insulating materials for cables
- Cable Sizing

Introduction to Power System Protection:
- Power system protection
- Need of protection in Power System
- Protective system Elements
- Fuse
- Circuit breaker
- Current Transformer
- Potential transformer

- Types of Circuit breaker

Types of Relay:
- Electromechanical Relay
- Static Relay
- Numerical Relay
- Digital Relay
- Comparison of Different types of Relay
- Protective Relays
- Electromagnetic attraction type relay
- Induction type relay
- Directional type relay
- Distance type relay
- Differential type relay
- Relay Co-ordination

Earthing system:
- What is earthing?
- Why is earthing necessary?
- Types of earthing
- What factors affect earthing?
- Step potential
- Touch potential

Ground grid studies:
- IEEE method
- Finite Element Method(FEM)