



IIT Bhubaneswar

The Annual Techno Management Fest

WISSENAIRE

Auto Mobiles and Electric vehicles

4 (3+1) Weeks Program

➤ SESSION 01

Introduction to Auto Mobiles and Electric Vehicles

- About Automobile Mechanics
- About Engines
- Why El Systems Technologies only?
- Expectations from this training program.
- Possibilities in future.

➤ SESSION 02

Basic Automobile and Designing

1. Introduction to Automobile mechanics
2. Locomotive Vehicles
3. Chassis design
 - Multipoint Strut Bar
 - Fender bar
 - Anti-Roll Bar
 - Monocoque
 - Tubular Space
 - Longeron RH, LH
4. Brief terminology
 - Ladder Frame Chassis
 - Tubular Space Frame chassis
 - Monocoque Frame Chassis
 - Ulsab Monocoque
 - Backbone Frame Chassis
 - Aluminium Space Frame
 - Carbon Fibre Monocoque
5. Types of Chassis
 - Ladder Frame Chassis
 - Tubular Space Frame chassis
 - Monocoque Frame Chassis
 - Ulsab Monocoque
 - Backbone Frame Chassis
 - Aluminium Space Frame
 - Carbon Fibre Monocoque



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➤ SESSION 03

Suspension Unit Brief Terminology

1. Weight transfer sprung and unsprung
2. Jacking Forces

Camber & Caster angle

Anti-Dive & Anti Squat

Spring Rate

Travel Types of suspensions

Dependent Suspension

Independent Suspension

Front Independent Suspensions

McPherson Strut

Double Wishbone

Coil Spring type1

Coil Spring type2

Multi-link type

Trailing Arm Suspension

Beam suspension

Rear suspension - Dependant Systems

Solid-axle, leaf-spring

Solid-axle, coil-spring

Beam Axle

Hydragas Suspension

Hydropneumatic Suspension

Progressively wound springs

Torsion bars



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➤ SESSION 04

Breaking Unit Disc brakes

- 1. Self-adjusting nature
- 2. Disc
- Damage
- Modes
- Servicing
- Your Disc
- Drum
- Brakes

Anti-locking Breaking system

Four-channel, Four-sensor ABS

Three-channel, Three-sensor ABS

One-channel, One-Sensor ABS

Brake Actuators

Cable-Operated

Solid Bar Connection

Single-Circuit Hydraulic

Dual-Circuit Hydraulic

Brake-by-Wire

Power Brakes and Master Cylinders

Brake fluids

➤ SESSION 05

Transmission

Gear ratio

Different types of gear

Clutch & its components

Reverse & ilk working

Automatic transmission

Planetary gearsets

DSG / DCT Gearboxes

Torque Converters



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➤ **SESSION 06**

Differential & Traction
Open Differentials
Limited-slip Differentials
Locking Differentials
2WD, 4WD, AWD

Tyres and Traction Control

Tyre size notations
Tyre types for passenger cars
Tyre constructions
Cross-ply construction
Radial Construction
Tyre Tread
Traction & its control

➤ **SESSION 07&08**

IC Engines Session
Types
Compression ignition Spark ignition
Layout
Engine balancing
Spark Plug
Carburetor
Fuel Injector
Valves & Valve Timing
Valve trains
Engine Cooling
Turbochargers & Superchargers



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➤ **SESSION 09**

Virtual Engine Dis-assembly Session

➤ **SESSION 10**

Software & Designing Session.

➤ **SESSION 11**

Technology Session

Latest Technologies

PGMF1

[DTS.fi](#) MPFI CRDI RTR

1-Vtec & Tem

Airbags & Steering System

➤ **SESSION 12**

Electric Vehicles -1

Introduction

Systems Integration and Analytical Tools

Vehicle Development Process Overview

Requirements Development

Hybrid Components and Architectures

Vehicle and Charging Standards

Electric Vehicle Supply Equipment

(EVSE) Descriptions Governing Bodies

for Regulations Certification

Requirements and Options

Battery Management Systems

Block Diagram - Main Functions of a BMS

Sensing Requirements

Cell/module level: cell voltage, cell/module temperature, (humidity, smoke, air/fluid flow)

Pack level: current, pre-charge temperature, bus voltage, pack voltage, isolation Control Requirements

Contactor control, pre-charge circuitry

Thermal system control

Cell Balancing: Active versus passive, strategies



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➤ SESSION 13

Electric Vehicles -2

Electrochemistry and Battery Materials
Design Electrochemical Principles of Energy
Storage Systems

General Overview; Physics and Chemistry of Advanced
Lithium Battery Materials Future Trends and New
Concepts in Battery Materials and Design

Power Electronics

Introduction - Why Power Electronics?

Overview of Power Density

Effects of air vs. liquid cooling

Effects of efficiency

Converter Topologies

Buck, boost, transformer

Power Semiconductors

Insulated Gate Bi-polar Transistor (IGBT)

Metal-Oxide-Silicon Field Effect Transistor (MOSFET)

➤ SESSION 14

Electric Vehicles -3

Electric Motors

Force/Torque Production Non-Linear magnetic material behaviour
Losses and,

Efficiency Fundamental Theory, Performance, Construction & Control
Transformers Synchronous Machines

Wound-field Permanent Magnet Reluctance Machine

Switched Reluctance Synchronous Reluctance Flux Modulating
Machines.

Machines on-Electromagnetic Design & System Considerations



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➤ SESSION 15

Electric Vehicles -5

Lithium-Ion Battery Design

Overview of Battery Design

Major Cell Components

Overview of Battery Modelling and Simulation

Lithium-Ion Cell Design Example

Thermal Management for Batteries and Power Electronics

Battery Heat Transfer

Thermal Management of Power Electronics