



RADIANCE  
2011

PRE-FESTIVAL WORKSHOP ON AUTOMOBILES



## **Content of the workshop**

### **DAY 1**

#### **Session-1: Introduction (1 Hr)**

- What is an automobile?
- Brief history
- Changes over the years
- Indian automobile industry
- Sigma ratings

#### **Session-2: Chassis design (1 Hr)**

- Brief terminology
  1. Multi point strut bar
  2. Fender bar
  3. Anti roll bar
  4. Monocoque
  5. Tubular space
  6. Longerons rh, lh
- Types of chassis
  1. Ladder frame chassis
  2. Tubular space frame chassis
  3. Monocoque frame chassis
  4. Ulsab monocoque
  5. Backbone frame chassis
  6. Aluminium space frame
  7. Carbon fibre monocoque

All these will be explained with their current applications and the **advantages & disadvantages in various applications.**

#### **Session 3: Suspension Unit (1 Hr 30 Min)**

- Brief terminology
  1. Weight transfer (sprung and unsprung)
  2. Jacking forces
  3. Camber and caster angle
  4. Anti dive & anti squat
  5. Spring Rate
  6. Travel
- Types of suspensions
  1. Dependent suspension
  2. Independent suspension
- Front Independent Suspensions
  1. McPherson Strut
  2. Double wishbone

3. Coil Spring type1
  4. Coil spring type2
  5. Multi link type
  6. Trailing arm suspension
  7. I beam suspension
- Rear suspension - dependant systems
    1. Solid-axle, leaf-spring
    2. Solid-axle, coil-spring
    3. Beam Axle
  - Hydra gas Suspension
  - Hydro pneumatic Suspension
  - Progressively wound springs
  - Torsion bars

#### **Session 4: Braking Unit (1Hr)**

- Disc brakes
  1. Self adjusting nature
  2. Disc damage modes
  3. Servicing your disc
- Drum brakes
- Magnetic brakes
- Vaccum brakes
- Anti-lock braking system
  1. Four-channel, four-sensor ABS
  2. Three-channel, three-sensor ABS
  3. One-channel, one-sensor ABS
- Brake Actuators
  1. Cable-operated
  2. Solid bar connection
  3. Single-circuit hydraulic
  4. Dual-circuit hydraulic
  5. Brake-by-wire
- Power Brakes and master cylinders
- Brake fluids

#### **Query Session (30 Min)**

#### **Session 5: Designing Using Software- Basics of AutoCAD & CATIA V5 (2 Hr)**

- Drawing, modifying & dimensions in AutoCAD
- Sketching & Part modeling in CATIA.

On the basis of the commands taught one component of engine will be made to illustrate the use of commands in a better way.

### **Query and Competition (1 Hr)**

### **DAY 2**

### **Session 5: Designing Using Software- Basics of AutoCAD & CATIA V5 (1 Hr Continue...)**

### **Session 6: Transmission system (2Hr)**

- Types of Transmission system
  1. Manual transmission
    - Gear ratio
    - Different types of gear
    - Clutch & its components
    - Reverse & it's working
  2. Automatic transmission
    - Planetary gearsets
    - DSG / DCT Gearboxes
    - Torque Converters
  3. Semi automatic Transmission
  4. Continuously variable transmission
- Differentials
  - 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 7: IC Engines (2 Hr)**

- Types
  - Compression ignition
  - Spark ignition

- Layout
- Engine balancing
- Spark plug
- Carburetor
- Fuel injector
- Valves & valve timing
- Valve trains
- Engine cooling
- Turbochargers
- Superchargers
- Air/Fuel ratios
- Wankel Engine (6 stroke)
- Latest technologies
  - PGMFi
  - DTS-Fi
  - MPFI
  - CRDI
  - RTR
  - VVTi
  - i-Vtec
  - TDI

#### **Session 8: Air Bags & Steering System (1 hr 30 Min)**

- Apart from this a deep insight (how it works, how to make one, where to participate, how to go about the competition, various technical and financial aspects) of various student car projects like
  - a) Formula student car project
  - b) Solar vehicle
  - c) Mini Baja
  - d) Super Mileage Vehicle
  - e) Hybrid vehicle
 will be given to the participants.

#### **Live Engine Demonstration - Honda 110 CC (45 Min)**

#### **Query and Competition (1 Hr)**