Vehicle Acoustics I.

Topics for Final Exam

1. **General acoustics – physical basics**
   - NVH, sound, noise
   - Physical description of sounds
   - Characterization of sounds
2. **General acoustics – wave phenomena of sounds**
   - List and explain acoustical wave phenomena
3. **General acoustics – power, pressure, intensity, dB levels and sound weighting**
4. **Vibration theory – 1 DOF systems**
   - Building elements and their characteristics
   - 1 DOF systems and their characterization
   - Magnification and phase response
5. **Vibration theory – Multi-DOF systems, modal analysis, transfer function**
6. **Vibration theory – resonance**
   - Physical background
   - Vibration and cavity resonances
   - Real life examples
7. **Vibrations of vehicles, order analysis**
   - Sources of vibration
   - Campbell diagram and its reading
   - Example for order analysis
8. **Noises of vehicles – tire-road, wind, engine, other sources**
9. **Acoustical simulations**
   - Simulation methods
   - Advantages and limits of their application
10. **Acoustical measurements**
    - Measurement system, sensors
    - Data acquisition and signal processing
11. **Noise exposure of humans, noise safety, environmental acoustics**
    - Effects of noise and vibrations on humans
    - Exposure limits (noise and vibration)
    - Calculation and quantification of environmental noise pollution
12. **Noise- and vibration reduction**
    - Balancing
    - Isolation, damping, reduction
    - Examples from vehicle industry