Automotive Engineering Roadmap (12 Weeks)

📅 Week 1: Introduction to Automotive Engineering

- History and evolution of automobiles.
- Types of vehicles and classifications.
- Overview of automotive systems.

📅 Week 2: Automotive Materials and Manufacturing

- Materials used in vehicles: metals, composites, plastics.
- Manufacturing processes: casting, forging, machining.
- Lightweight materials and their importance.

📅 Week 3: Engine Fundamentals

- Types of engines: SI, CI, electric motors.
- Working principles of 4-stroke and 2-stroke engines.
- Fuel systems and combustion process.

📅 Week 4: Transmission Systems

- Clutch types and working.
- Gearboxes: manual, automatic, CVT.
- Drive shafts and differentials.

📅 Week 5: Suspension and Steering Systems

- Suspension types: independent, dependent.
- Shock absorbers and springs.
- Steering mechanisms and power steering.

📅 Week 6: Brake Systems

- Types of brakes: drum, disc, ABS.

- Brake system components and working.
- Brake fluid and hydraulic systems.

🗓️ Week 7: Automotive Electrical and Electronics

- Electrical circuits and wiring.
- Sensors and actuators.
- Electronic Control Units (ECUs) and CAN bus.

🗓️ Week 8: Vehicle Dynamics

- Forces acting on vehicles.
- Stability and control.
- Tyre mechanics and traction.

🗓️ Week 9: Emission and Pollution Control

- Exhaust systems and catalytic converters.
- Emission standards and testing.
- Alternative fuels and electric vehicles.

🗓️ Week 10: Automotive Safety Systems

- Passive safety: airbags, seat belts.
- Active safety: ABS, traction control.
- Crashworthiness and safety testing.

🗓️ Week 11: Emerging Technologies

- Hybrid and electric vehicles.
- Autonomous driving basics.
- Connected car technologies (IoT in automotive).

🗓️ Week 12: Final Project / Case Study

- Design and analysis of an automotive subsystem.
- Simulation using automotive software (e.g., MATLAB/Simulink).
- Present case study on EV or autonomous vehicle.

🛠️ Tools & Software:

- MATLAB/Simulink, CATIA, ANSYS, SolidWorks
- Automotive simulation tools: CarSim, AVL Cruise