Vehicle Dynamics

B.E. Sem. VIII [AUTO]

EVALUATION SYSTEM

	Time	Marks
Theory Exam	4 Hrs.	100
Practical & Oral	–	–
Oral Exam	–	–
Term Work	–	–

SYLLABUS

1. **Fundamentals of vehicle dynamics**
   Simple spring mass system of two masses, Motion after the hump, Acceleration for stepped input, Single mass system with two degree of freedom, Theory and problems from Conjugate points, Fundamental approach to vehicle modeling. Road loads
   Aerodynamics - Drag, side force, Lift force, Rolling resistance, Total road loads, Ride, Vehicle response properties, Perception of ride.

2. **Tyres & Suspension systems**
   Tyres: Tyre construction, Tractive properties, Cornering properties, Camber thrust, Aligning moment, Combined braking and cornering, Conicity and ply steer, Tire vibrations, Jack Knifeing of articulated vehicles, Tyre properties affecting vehicle rollover.
   Suspension systems: Solid axles, Independent suspensions, Anti- Squat and anti- pitch suspension geometry, Equalizing type of suspension, Interconnected suspension, Active suspension, Variable rate leaf spring.

3. **Steering Systems**
   Steering geometry, Front wheel geometry, Steering system forces and moments, Steering system effects, Influence of front wheel drive, Four wheel steering, Steering oscillations, Shimmy & wheel wobble

4. **Dynamics of systems**
   Steady state cornering, Low speed turning, High speed cornering, Suspension effect of cornering, Stability derivatives (Derivation and problems), Analysis of two degree of freedom model in yaw and side slip, Steady state and Transient behavior

5. **Vehicle Rollover**
   Roll Center of suspension linkages, Roll axes and roll angles, Non- Roll layout, No Roll suspensions, Anti- roll bar and its effects, Euler's equation of motion, Inertia tensor axes, Characteristics of on road rollover, Rollover résistance.

6. **Recent trends in vehicle dynamics**
   Stability Control systems, Introduction of vehicle sensors, Central tyre inflation systems, Influence of parameters at vehicle rollover, Vehicle dynamics simulations, Latest trends

References Books :

1. Vehicle dynamics (*S.R. Ellis*).
2. Fundamentals of Vehicle Dynamics (*Thomas. D. Gillespie*).
3. Road Dynamics (*W. Steed*)
4. Mechanics of Road vehicle (*Steeds*)
5. Vehicle Dynamics (*R.K.Kulkarni*) Narosa Publication,New Delhi
6. Mechanics of vehicles (*J.J. Taborelc*).
7. Automobile suspension and Handling (*Colin Campell*).
8. Car suspension (*Bastow*).
9. SAE SP-1445
10. SAE 2000-01-1624
11. SAE 2000-01-2669

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