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Total Number of Pages: 01

B.Tech.
PCAT4401

7th Semester Regular/Back Examination 2017-18

Vehicle Dynamics

BRANCH: AUTO

Time: 3 Hours

Max Marks: 70

Q.CODE: B201

Answer Question No.1 which is compulsory and any five from the rest.

The figures in the right hand margin indicate marks.

- Q1 Answer the following questions: (2 x 10)**
- a) Draw a quarter car model.
 - b) Where a Vibration absorber is used in automobile.
 - c) What is Ackerman and anti Ackerman steering geometry?
 - d) What is sprung mass frequency?
 - e) What is the sprung and unsprung mass?
 - f) What is tubeless tyre and its advantages?
 - g) What is slip angle?
 - h) What is steering ratio?
 - i) What is spring rate?
 - j) What is air suspension?
- Q2 a) Differentiate between dependent and independent suspension. (2)**
b) Write the procedure to find out the roll center of McPherson suspension. (8)
- Q3 a) With neat sketch explain the front suspension geometry like caster, camber, toe in, toe out and king pin angle. (5)**
b) Explain, how selection of tyre affects vehicle dynamics and also explain with example, how a tyre is specified? (5)
- Q4 a) Explain stability of a vehicle on cornering. (5)**
b) Explain the construction and working of shock absorber with neat sketch. (5)
- Q5 a) Explain principle of correct steering with neat sketch. (5)**
b) Explain with neat sketch the condition of under steer and over steer. (5)
- Q6 a) Draw the full-car model. What is its advantage over half- car model? (5)**
b) A vehicle has a mass of 1150kg and a wheelbase of 3m. The mass center is 1.4m from the front axle. The radius of gyration of the vehicle about C.G is 1.2. The spring constants of the front and the rear springs are 30 KN/m and 40 KN/m respectively. Determine the bump, pitch and roll natural frequencies of the vehicle. (5)
- Q7 Derive expression for logarithmic decrement. How it is applicable to automobile suspension. (10)**
- Q8 Write short answer on any TWO : (5 x 2)**
- a) Wheel hop, wheel wobble and wheel shimmy
 - b) Dunkerley's method for fundamental frequency
 - c) Effective spring rate
 - d) Vibration Magnification factor