

GUJARAT TECHNOLOGICAL UNIVERSITY
BE VII - SEMESTER – • EXAMINATION – WINTER 2017

Subject Code: 170203

Date: 03/05/2018

Subject Name: VEHICLE DYNAMICS

Time: 02:30 PM TO 05:00 PM

Total Marks: 70

Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) Draw force diagram of a four wheel drive vehicle moving uphill with high speed and trailer attached to the vehicle. Enlist all the forces acting for the given condition. **07**
- (b) Draw vehicle SAE axis system. Represent all the forces and moments in it. Define all the terminologies represented on SAE axis system. **07**
- Q.2** (a) What is the difference between power limited acceleration and traction limited acceleration? Derive an expression of tractive effort with respect to limiting engine power. **07**
- (b) Define: Vehicle Slip, Slip angle, Camber thrust, Cornering stiffness, peak coefficient of friction, Longitudinal Stiffness, Camber coefficient. **07**
- OR**
- (b) Draw Tyre axis system. Represent all the forces and moment acting on it. **07**
- Q.3** (a) Explain Anti lock braking system. **07**
- (b) Define terms : 1) Braking factor 2) Braking torque 3) Braking efficiency 4) Wheel lockup 5) Pedal force gain 6) Brake proportionality 7) Federal requirement of braking performance. **07**
- OR**
- Q.3** (a) Explain the necessary condition for anti pitch and anti squat for independent suspension system. **07**
- (b) Differentiate active, semi active, passive suspension system. **07**
- Q.4** (a) What is roll center and roll axis? Draw and write down necessary step for roll center for wishbone and Macpherson strut type suspension system. **07**
- (b) Explain Understeer, Oversteer and Neutral steer. **07**
- OR**
- Q.4** (a) Derive necessary condition for true rolling for Ackerman steering system. **07**
- (b) Draw the figure showing pressure distribution along the center line of car and explain aerodynamic aids. **07**
- Q.5** (a) What is Ride? Explain sources of vibration for ride. **07**
- (b) What is rolling resistance? Explain the various parameters affection rolling resistance. **07**
- OR**
- Q.5** (a) Draw quarter car model of vehicle representing passive suspension system. Obtain the mathematical model for the same in steady state vibration for sprung and unsprung mass. **07**
- (b) Explain four wheel steering system mechanism. What is the effect of four wheel steering system on low speed turning and high speed turning? **07**
