Seat No.: _____ **Enrolment No._____**

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII (OLD) - EXAMINATION – SUMMER 2017

Subject Code: 170203 **Date: 11/05/2017**

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)**	With the help of clear sketch of Tyre axis system explain details of various forces acting in the tyre contact patch area.	**07**
	(b)	Derive the dynamic forces W_f & W_r acting on front & rear tyres, for the arbitrary forces acting on a vehicle moving on up gradient, with hitch load at an acceleration a_x. Draw neat sketch of vehicle showing all the forces acting on a moving vehicle.	**07**
Q.2	**(a)**	Draws clearly the drum brake system. Show forces acting on brake shoes and find brake factor and explain self servo effect.	**07**
	(b)	Draw neat sketches of SAE Axis system and Vehicle Earth Coordinate system to explain and define Euler angles.	**07**
		OR	
	(b)	Stopping distance and stopping time are important features of vehicle design, for the safety of passengers. Explain the parameters dependent on stopping distance and stopping time and energy consumed in braking.	**07**
Q.3	**(a)**	Describe Acceleration performance and fuel consumption performance of vehicle, on the basis of the importance of Power to weight ratio.	**07**
	(b)	Draw neat sketches of Radial & Biased tyres. Explain advantages and dis-advantages of different Types of Tyres in detail.	**07**
		OR	
Q.3	**(a)**	To explain the requirement of brake proportioning criteria in vehicles, draw a graph of maximum braking force on front and rear brakes. AND explain different method of brake proportioning.	**07**
	(b)	Define Neutral steer, Over steer and Under steer conditions in a vehicle and describe the dependent parameters.	**07**
Q.4	**(a)**	Draw neat sketches to describe types of suspensions used in automobiles and its advantages and disadvantages.	**07**
	(b)	Explain the sources of Ride excitation forces in a vehicle moving on the road and suggest different type of damping for vehicles.	**07**
		OR	
Q.4	**(a)**	Explain types of steering systems, AND it's functional advantages and disadvantages.	**07**
	(b)	Define braking efficiency and pedal force gain.	**07**
Q.5	**(a)**	Draw the figure showing pressure distribution along the center line of car & explain.	**07**
	(b)	Explain effect of Aerodynamic drag and Aerodynamic aids on performance of car.	**07**
		OR	
Q.5	**(a)**	Explain Roll over criteria in detail.	**07**
	(b)	Explain different types of steering geometry methods deployed in Automobiles.	**07**