Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII (NEW) EXAMINATION – SUMMER 2022

Subject Code:3170203 Date:14/06/2022

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.**
4. **Simple and non-programmable scientific calculators are allowed.**

			MARKS
Q.1	**(a)**	Define : (i) Rolling Moment (ii) Yawing Moment (iii) Heading Engle	**03**
	(b)	Explain air pressure distribution over the vehicle body in brief.	**04**
	(c)	Derive the expression of vehicle dynamic axle loading condition and conclude that if vehicle is parked on level ground, height of CG does not affect axle loading condition.	**07**
Q.2	**(a)**	Draw and explain earth's fixed coordinate system used in vehicle dynamic system.	**03**
	(b)	Enlist any four aerodynamic aids and explain rear spoiler in brief with neat sketch.	**04**
	(c)	Calculate the max tractive effort and max corresponding road speed with following data : Tractive effort= 201 ft.lb Transmission ratio & efficiency = 4.28 & 0.966 Final drive ratio & efficiency = 2.92 & 0.99 Wheel radius = 12 in/ft Engine speed = 4400 rpm Wheel rotation = 36.87 rad/sec	**07**
		OR	
	(c)	Define drag force and explain aerodynamic pressure drag around various shaped bodies.	**07**
Q.3	**(a)**	Differentiate between dependent and independent suspension system with example.	**03**
	(b)	Explain the tyre axis system in brief with neat sketch.	**04**
	(c)	Explain the effect of slip angle and tyre type on vehicle cornering performance.	**07**
		OR	
Q.3	**(a)**	Explain the Mac person strut type suspension in short.	**03**
	(b)	Explain the effect of conicity of tyre on vehicle performance.	**04**
	(c)	Explain the effect of tyre tread design and tyre inflation pressure on vehicle cornering performance.	**07**
Q.4	**(a)**	Define : Roll center , Roll axis and Roll center height	**03**
	(b)	Explain active suspension system in brief for vehicle.	**04**
	(c)	Deliver the expression for anti-squat drive mechanism for vehicle equipped with trailing arm with neat sketch.	**07**
		OR	
Q.4	**(a)**	Define : Caster angle , Toe angle and Camber angle	**03**
	(b)	Explain steering linkages in brief and give condition of correct Ackerman steering geometry.	**04**
	(c)	Explain the Anti-dive suspension geometry with neat sketch.	**07**

Q.5	**(a)**	Explain under steer, over steer and natural steer.	**03**
	(b)	Explain four wheel steering system in brief.	**04**
	(c)	Explain quasi static rollover of rigid vehicle showing all acting forces.	**07**

OR

Q.5	**(a)**	Explain working of anti-roll bar and its importance in automobile.	**03**
	(b)	Define fork offset and wheel flop of motorcycle.	**04**
	(c)	Explain steering geometry errors in details.	**07**

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