

Enroll. No.

K. E. Society's
Rajarambapu Institute of Technology, Rajaramnagar
 (An Empowered Autonomous Institute, affiliated to SUK)
Mid-Semester Examination (2025-26)
 Final Year B. Tech. (Auto. Tech. / Mech. Engg. Auto.)

Q. P. Code
M 60

Course Code: AT4031

Course Name: Vehicle Dynamics

Day & Date: Saturday 20/09/2025

Time: 10:15 To 12:15

Max Marks- 50

- Instructions:
- 1) All questions are compulsory.
 - 2) Figures in rounded () brackets within the question, indicate scheme of marking for respective part of the question, whereas, figures in the first right column indicate total marks for that whole question.
 - 3) CO is the index number of the Course Outcome statement.
 - 4) The Bloom's taxonomy level (BL) for 1,2,3,4,5 and 6 is remember, understand, apply, analyze, evaluate and create respectively.
 - 5) Assume suitable data if necessary.
 - 6) Use of non-programmable calculator is allowed

		CO	Marks	BT Level
Q.1	Answer any TWO of the following:			
a	Elaborate 'Vehicle fixed coordinate system' and 'Earth fixed coordinate system' with help of sketches.	1	8	L3
b	Discuss tractive effort – speed characteristics for a typical manual transmission. Write your interpretation, based on same.	1	8	L2,L3
	OR			
b	Derive expression for stability of a vehicle on slope.	1	8	L4
Q.2	a A car has mass of 1500kg with an engine of 80 kw a 2000 rpm. Rear axle reduction is 4.5 with a transmission efficiency of 90%. The rolling resistance is 0.15 N per kg of mass and air resistance is given by $0.08V^2$ where v is speed of vehicle in Kmph. The equivalent mass of the car is 1800kg and wheel diameter is 60cm. calculate:	1	12	L4
	a) Speed of vehicle at engine speed of 2000 rpm.			
	b) Grade ability at this speed.			
	c) Maximum acceleration on level road at this speed.			
	OR			
a	The coefficient of rolling resistance for a truck weighting 62293.5 N is 0.018 and the coefficient of air resistance is 0.0276 in the formula $R = K_r.W + K_a.AV^2$, where A is of frontal area and V is the speed in kmph. The transmission efficiency in top gear of 6.2:1 is 90% and that in the second gear of 15:1 is 80%. The frontal area is 5.574. If the truck has to havemaximum speed of 88 kmph in top gear, calculate:	1	12	L4
	i) The engine BP required,			
	ii) The engine speed if driving wheel have an effective dia. of 0.8125 m			
	iii) The maximum grade the truck can negotiate at the above engine speed in second gear ,and			
	iv) The maximum draw bar pull available on the level at the above engine speed in the second gear.			
b	Explain "Traction & Tractive Effort"	1	4	L3



Q.3	a	Write mathematical expression for braking efficiency. Explain in brief.	2	7	L2,L 3
OR					
	b	Develop expression for dynamics of vehicle running on banked track.	3	7	L5
	c	What do you mean by brake proportioning? Why it is essential and how it is achieve?	2	7	L2.L 3
	d	Explain the concept of wheel lock.	2	4	L4

