BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: MTECH (EVT) **SEMESTER : Ist**
BRANCH: EEE **SESSION : MO/2025**

SUBJECT: EE582 VEHICLE DYNAMICS

TIME: 3 Hours **FULL MARKS: 50**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Before attempting the question paper, be sure that you have got the correct question paper.**
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

			CO	BL
Q.1(a)	List two different methods of yaw stability control. Explain them briefly	[5]	1	1
Q.1(b)	What is ISO8555/DIN7000 Orientation. Explain with the help of a proper diagram	[5]	1	1
Q.2(a)	Compare error state space dynamic model with general state space dynamic model in the case of a vehicle.	[5]	2	2
Q.2(b)	Differentiate between lateral acceleration and longitudinal acceleration.	[5]	2	2
Q.3(a)	Analyze the role of Full State Feedback controller for stable operation of a vehicle.	[5]	3	3
Q.3(b)	Find out controller gain of the following system in order to place the eigen values at -5+2i and -5-2i. $$\dot{x(t)} = \begin{bmatrix} 0 & 3 \\ 2 & 4 \end{bmatrix} x(t) + \begin{bmatrix} -2 \\ 1 \end{bmatrix} u(t)$$	[5]	3	3
Q.4(a)	Apply the coast-down method to compute the velocity of car in the presence of an aerodynamic drag force.	[5]	4	4
Q.4(b)	Apply balanced moments about the contact point of the front tire and rear tire, and compute the normal tire forces	[5]	4	4
Q.5(a)	Design a active suspension system using block diagram.	[5]	5	5
Q.5(b)	Derive a Dynamic equation of motion of sprung mass and the unsprung mass in the case of semi-active system.	[5]	5	5

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