B.Tech. Examination, MAY 2014

Subject: Vehicle Dynamics

Roll No_____ **Subject Code: BTAE-603**

Time Allowed: 03 Hours **Max. Marks: 60**

Note: Section A is compulsory. Answer any four questions from section B. Answer any two questions from section C. Assume any missing data suitably.

Section A

1	(i)	What is meant by resonance and what is its significance?	(2)
	(ii)	What is meant by fundamental mode of vibration?	(2)
	(iii)	What is meant by wheel wobble?	(2)
	(iv)	Describe orthogonality property of mode shapes.	(2)
	(v)	What is modal testing?	(2)
	(vi)	What is meant by sprung mass frequency?	(2)
	(vii)	What is meant by wheel shimmy?	(2)
	(viii)	What is meant by critical speed?	(2)
	(ix)	Name different types of suspensions used in vehicles.	(2)
	(x)	What is the physical significance of aligning torque?	(2)

Section B

2	Derive the formula for natural frequency of single-DOF spring-mass system.	(5)
3	The curb weights of a 4-door sedan without passengers or cargo are 2313 lb on the front axle and 1322 lb on the rear. The wheelbase is 109". Determine the fore / aft position of center of gravity for the vehicle.	(5)
4	Describe Holzer method by taking example of two degree of freedom system.	(5)
5	Explain the Gough's tyre characteristics.	(5)
6	Describe the effect of camber in vehicle handling.	(5)

Section C

7 Determine the pitch and bounce frequencies and location of ascillation centers of an automobile with following data:
Mass = 1000 kg
Radius of gyration = 0.9 m
Distance between front axle and C.G. = 1m
Distance between rear axle and C.G. = 1m
Front spring stiffness = 18 kN/m
Rear spring stiffness = 22 kN/m (10)

8 Differentiate between neutral steer, over steer and under steer conditions. (10)

9 Describe the method of calculation of Tractive effort and reactions for different drives. (10)

END