

Time: 3 Hrs

Marks : 80

- NB: - 1) Draw neat sketches whenever necessary.
2) Q. No. 1 is compulsory.
3) Solve any **three** questions from the remaining five questions.
4) Assume suitable data wherever necessary.

- Q.1** Answer **any five** of the following : **20**
- a) Explain Steering geometry angles.
 - b) Why suspension spring rates are kept low practically?
 - c) What is slip angle and explain its effect on performance.
 - d) What is rolling resistance? Enlist mechanisms which generate rolling resistance.
 - e) Write a note on road resistance.
 - f) What are the advantages of Ackerman steering Linkages ?
- Q.2** a) Find the distance between the double conjugate points for the passenger car – **10**
Sprung mass = 900 kg, wheel base = 1.2 m , Distance of CG from front axle = 1.2 m ,
Front suspension stiffness = 50 KN/m,
Rear suspension stiffness = 150 KN / m
- b) Derive an equation for steady state response to side force. Explain the importance of stability derivatives. **10**
- Q.3** a) What is body roll ? Explain the importance of Anti roll bar in context with vehicle dynamics with its working. **10**
- b) Derive equation to find out pair of double conjugate points. How it is applied to real vehicle? **10**
- Q.4** a) Explain interconnected suspension with diagram. Why it is used in automobiles and how it is achieved? **10**
- b) Explain conicity and ply steer? How it affects vehicle performan **10**
- Q.5** a) What are the tractive properties of tyre and how it affects vehicle performance? **10**
- b) Find the yawing velocity of car when side force of 250 N is acting on it – **10**
Mass – 1200 kg, wheel base – 2.5 m, CF = -70000 N/rad, CR = - 75000 N/rad
Distance of CG from front axle = 1.4 m.
Velocity = 60 KMPH

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Q.6 Write short note on (Any Four)

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- a) Air suspension
- b) Jack knifing of articulated vehicles
- c) Roll centre and roll axis
- d) Central tyre inflation system
- e) Wheel wobble and wheel shimmy
- f) Active suspension
