Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

A Constituent Institution of Manipal University

VI SEMESTER B.TECH. (AUTOMOBILE ENGINEERING)

END SEMESTER EXAMINATIONS, APR/MAY 2017

SUBJECT: AUTOMOTIVE CHASSIS AND SUSPENSION [AAE 3252]

REVISED CREDIT SYSTEM
(25/04/2017)

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer **ALL** the questions.
- Missing data may be suitable assumed.

1A. What is Hydro-form technology? Mention the advantages of the chassis which uses this technology for its construction. **(02)**

1B. Describe horizontal lozenging? State the disadvantages of this operation. **(02)**

1C. An automobile chassis considered as a simply supported beam is 9-meter-long and has a uniformly distributed load of 2.25kN/m for 4.4m from the front support. The powertrain load is measured as a point load of 6kN acting at 6m from the front-end support, on the chassis. Calculate the maximum bending moment. Draw the shear force and bending moment diagram as well. **(06)**

2A. How can a chassis be designed for maximum occupant safety? **(02)**

2B. Write a brief note on different grades of steel used in the manufacturing of an automobile chassis? **(03)**

2C. How are disc brakes classified? Explain the construction and working of Fixed caliper and Floating cylinder. **(05)**

3A. A vehicle with a mass of 1000 kg is travelling at a velocity of 60 km/h. Determine the kinetic energy of the vehicle as well as the average braking force required to bring the vehicle to rest in 15 m. **(02)**

3B. With neat sketches, explain the different torque incrementing techniques in drum brakes. **(03)**

3C. A motorbike has a wheelbase of 1.54 m. The Centre of gravity of the bike and the rider is 0.75 m above the ground level and it is 0.7 m in front of the rear axle. The coefficient of friction between the road and the tyre is 0.55. If the rear wheel is braked, find the greatest deceleration that can be obtained in **(05)**

I. If the bike is moving in a straight path
II. If the bike is negotiating a turn of 45.7 m radius at 45 km/h

4A. Mention the role of anti-roll bars in a suspension system. When are these bars functionally active? **(02)**

4B. A coil spring has 12 active coils with a mean diameter of 120 mm. It is made from wire of 25 mm diameter. The coil spring is designed to take a static load of 2000 N. Determine the shear stress and deflection under the above loading. What could be the maximum possible clearance, if maximum shear stress of 63765 kPa is allowable in the material. Consider Modulus of Rigidity as 80GPa. **(03)**

4C. Categorise leaf springs based on the basic construction style. Explain the selection of basic construction to make master leaves with graduated leaves and full leaves. Also, explain nipping of leaf springs with a neat sketch along with its advantages. **(05)**

5A. How does the cornering force get influenced by the vertical load of a tyre? **(02)**

5B. Write a small note on cross ply tyres and its advantages. Determine the section height of a radial tyre, 205/85 R14 89 S. **(03)**

5C. A vehicle with a wheelbase of 3.6 m has turning circle radius of 5.8 m while negotiating its shortest turn. The angle of the inner lock is found to be 55°. The distance between the pivot centres is 1.9 m. Considering the true rolling condition, determine **(05)**

i. the front and rear wheel track
ii. turning radius of the inner front wheel
iii. turning radius of the outer front wheel