Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

A Constituent Institution of Manipal University

VI SEMESTER B.TECH. (AUTOMOBILE ENGINEERING)

MAKEUP EXAMINATIONS, JUNE 2017

SUBJECT: AUTOMOTIVE CHASSIS AND SUSPENSION [AAE 3252]

REVISED CREDIT SYSTEM
(17/06/2017)

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

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

1A. Classify automobiles based on the location of the power plant. Also, Mention their advantages and shortcomings. **(02)**

1B. What are the advantages of body-on-frame type of chassis? Mention the classifications of this chassis. **(02)**

1C. The chassis of a vehicle considered as a simply supported beam is 7-meter-long and has a uniformly distributed load of 2 k N/m for 4 m from the front support. The engine and the powertrain load is measured as a point load of 5 kN acting at 5 m from the front-end support, on the chassis. Calculate the distance from the front-end where the bending moment is maximum. Draw the shear force and bending moment diagram as well. **(06)**

2A. Explain Brake factor and shoe factor **(02)**

2B. Give a brief note on the factors which influences the self-energization of brakes. **(03)**

2C. Explain the construction and working of leading and trailing shoe drum brake system. What will be the shoe factor of this type of braking system? **(05)**

3A. Describe the following with a neat diagram **(02)**

I. Camber
II. Caster
III. Scrub radius

3B. Draw a quarter-car model of a car and explain the various components of it. Also, discuss the various energy dissipation techniques of an automobile suspension. **(03)**

3C. Deduce the reaction forces of a vehicle, travelling on a levelled surface for the following conditions as listed below. **(05)**

I. Brake applied to front wheels
II. Brake applied to rear wheels
III. Brake applied to all wheels

4A. Discuss the advantages of coil springs over leaf springs. Explain why the energy storage capacity of coil spring is higher than leaf springs. **(02)**

4B. What are the different types of steering gear boxes? Explain the differences advantages of the rack and pinion steering system over screw and nut steering gear mechanism. **(03)**

4C. Illustrate the construction and working of hydraulic regenerative braking system with a brief description. **(05)**

5A. Classify tyres based on its construction. Mention their Advantages and Shortcomings. **(02)**

5B. Give a brief note on the various mechanism while tyre interacts with road surface. **(03)**

5C. Discuss the different loads acting on a steering system. Also describe the forces and moments which acts on steering system, with an illustration. **(05)**