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MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent unit of MAHE, Manipal)

V SEMESTER B.TECH. (AUTOMOBILE ENGINEERING)

END SEMESTER EXAMINATIONS, JAN 2021

SUBJECT: AUTOMOTIVE CHASIS AND SUSPENSION [AAE 3171]

REVISED CREDIT SYSTEM
(28/01/2021)

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

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

1A. Explain the effect of body roll on suspension system and drivability of a vehicle. **(03)**

1B. Discuss energy storage capacity of different types of suspension springs. **(04)**

1C. What is perfect steering? Derive expression for the basic condition to be satisfied for a perfect steering mechanism. **(03)**

2A. With sketch explain the features of double wish bone transverse link suspension system. **(03)**

2B. "Air spring is superior to leaf and coil springs". With suitable points justify the statement. **(03)**

2C. With suitable sketch, explain the damping action of single tube damper. **(04)**

3A. A vehicle has its wheel base equal to 4 times the height of its CG above the ground. If the vehicle is braked on all four wheels over a road whose adhesion factor is 0.45, determine the weight transferred from the rear to front wheels. **(02)**

3B. A motor vehicle of weight 15568.5 N with brakes on all four wheels is slowed down uniformly from 96 km/h to 48 km/h in a distance of 305 m while running down an incline of 1 in 12. Assume uniform distribution of braking force, calculate the mean lining pressure in N/m^2 from the following data.
Effective wheel diameter of 0.76 m, Brake drum diameter of 0.36 m, brake lining width of 0.04 m, lining contact angle in each drum 240°, coefficient of friction 0.4. Calculate the heat generated at each wheel during braking operation. Assume symmetrical lining, fixed cam and ratio of the effective radius of frictional force and radius of shoes as one. **(04)**

3C. With simple sketch, explain the working and forces acting on disc brake. **(04)**

4A. Make a schematic diagram to show the engine exhaust brake and discuss its working. **(03)**

4B. Identify and sketch the layouts of commonly used split braking system and explain the features of the same. **(03)**

4C. Explain the factors influencing tyre grip and also explain the effect of different **(04)**

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road surface on tyre grip.

5A. With simple sketch explain the effect of side forces on the directional stability of a vehicle on turns. **(04)**

5B. Identify and explain the features of types of side and cross member joints for medium duty vehicles. **(03)**

5C. Explain the forces acting on vehicle at rest on an inclined plane and discuss the importance of inclination on stability of the vehicle. **(03)**