Exam Date & Time: 31-Dec-2020 (02:00 PM - 05:00 PM)



MANIPAL INSTITUTE OF TECHNOLOGY

(A constituent unit of MAHE, Manipal)

V SEMESTER B.TECH END SEMESTER EXAMINATIONS, DEC 2020 AUTOMOTIVE CHASSIS AND SUSPENSION [AAE 3171]

A

Marks: 50

Duration: 180 mins.

Answer all the questions. Briefly discuss the desired features of a vehicle suspension system. 1) (3) Explain in detail the function and construction of a leaf spring and with simple sketches 2) explain the different methods of mounting to the chassis. (4)3) What is an interconnected suspension system? With simple sketch discuss the main constructional features of any such system and also it's working. (3) Define cornering force and explain the effect of slip angle and tyre load on cornering 4) force. (2)Explain the necessity of power steering in a vehicle. Sketch hydraulic rack and pinion 5) power steering system and explain the functions each component. (4) With simple sketches explain the constructional features of radial and diagonal ply 6) tyres? Also compare the radial and diagonal ply tyres. (4)Two disc brake pads operated at a mean radius of 0.14 m. The force applied to each pad 7) is 4450 N and the coefficient of friction between each pad and disc is 0.35. When the disc rotate at 500 RPM, calculate (a) Frictional torque acting on the disc (3)(b) Work done per minute by this torque (c) Heat energy generated per second 8) A motor car has a wheel base of 2.64 m, the height of its C. G. above the ground is 0.61 m and it is 1.12 m in front of the rear axle. If the car is travelling at 40 km/hr on a level track, determine the minimum distance in which the car may be stopped, when (a) The (3)rear wheels are braked, (b) The front wheels are braked, (c) All wheels are braked. The coefficient of friction between tyre and road may be taken as 0.6. With simple sketch explain the fundamental forces acting on leading and trailing shoe 9) during braking and also derive the expression for braking torque for leading and trailing (4)shoe. 10)Explain how does work done by the brake drums during braking related to the kinetic (2)energy of the vehicle.

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11)	List and explain the essential characteristics of friction lining and pad materials.	(4)
12)	Draw a schematic diagram showing the layout of hydraulic braking system and explain the important features of the major components of the system.	(4)
13)	The load distribution between the front and the rear axle of a motor vehicle weighing 1870 kgs is that 42% of the total load is taken by the front axle. The width of the track is 150 cm and the distance between the centers of the spring pads is 70 cm. Design a suitable I-section for the front axle assuming that the width of the flange and its thickness are 0.6 and 0.2 of the overall depth of the section respectively and the thickness of the web 0.25 of the width of the flange. Assume a working stress of 978 kg/cm ² .	(3)
14)	With simple sketch explain the various loading conditions experienced by the vehicle chassis?	(4)
15)	Briefly explain the different methods adopted in estimating height of vehicle's centre of gravity and also derive the expression for height of vehicle's C G in each method?	(3)

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