

## **DEPARTMENT OF MECHATRONICS**

## VI SEMESTER B.TECH. (MECHATRONICS) END SEMESTER EXAMINATION

Subject: Automobile Engineering

Subject Code: MTE 3251

 Time: 3 Hrs
 Date:
 / /2024
 MAX. MARKS: 50

- ✤ Answer ALL the questions.
- ✤ Make suitable assumptions if required, and clearly state them in your answer.
- ✤ Marks will be awarded for clarity, depth of understanding, and relevance of examples.

Q. No.	Questions	Μ	CO	PO	LO	BL
1A	Describe the growing challenges and requirements of automotive interior materials.	4	5	1, 2	2	2
1B	Illustrate the intricate interplay among the key components comprising an automobile's electrical system.	3	5	1, 2	2	2
1C	Describe the function of the alternator within a car's electrical framework, highlighting its distinctions from a traditional generator.	3	5	1, 2	2	2
2A	Summarize the benefits of front engine rear wheel drive architecture concerning handling, weight distribution, and steering	4	4	1, 2	2	2
2B	Explain the concept of oversteer and understeer, and how they relate to steering control.	3	4	1, 2	2	2
2C	Discuss the purpose of a control arm in a suspension system, and how it contributes to overall vehicle performance?	3	4	1, 2	2	2
3A	An automotive plate clutch consists of two pairs of contacting surfaces with asbestos friction lining. The maximum engine torque is 250 N-m. The coefficient of friction is 0.35. The inner and outer diameters of the friction lining are 175 and 250 mm respectively. The clamping force is provided by nine springs, each compressed by 5 mm to give a force of 800 N when the clutch is new. (i) Determine the factor of safety concerning slippage when the clutch is brand new. (ii) Calculate the factor of safety concerning slippage after initial wear has occurred. (iii) Determine how much wear of friction lining can take place before the clutch will slip.	4	3	1, 2	2	2
3B	Describe the working of a synchro mesh gearbox.	3	3	1, 2	2	2
3C	Compare a constant mesh gearbox with a sliding mesh with 6 characteristics.	3	3	1, 2	2	2
<b>4</b> A	Discuss the application of hydraulic brake systems in specific vehicle types while examining the construction of both the master cylinder and brake cylinder.	5	5	1, 2	2	2



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<b>4B</b>	Explain the mechanism by which a vacuum booster amplifies braking force within a hydraulic brake system.	3	5	1, 2	2	2
4C	A car of mass 800 kg is traveling at a speed of 36 Kmph. Determine the average braking force to stop the vehicle to rest at 20 meters.	2	5	1, 2	2	2
5A	For a 4-wheeler GVW of 1500kg, moving with a velocity of 80 kmph and coefficient of drag (cD)=0.3, vehicle frontal area (A)=2.5 m <sup>2</sup> , rolling coefficient ( $\mu$ )=0.015, tyre radius of 0.3m determine the aerodynamic drag, rolling resistance and gradient forces. Assume air density as 1.2 kg/m <sup>3</sup> and a gradient of 5%	4	1	1, 2	2	2
5B	Explain the terms (i) swept volume in ic engine, (ii) Knocking, (iiii) Scavenging, (iv) Cetane number.	4	1	1, 2	2	2
5C	Describe a Davis steering system and enumerate its parts.	2	4	1, 2	2	2