Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent unit of MAHE, Manipal)

DEPARTMENT OF MECHATRONICS

VI SEMESTER B.TECH. MECHATRONICS

END SEMESTER EXAMINATIONS, MAY 2022

SUBJECT: AUTOMOBILE ENGINEERING [MTE 3251]

(14.05.2022)

Time: 3 Hours **MAX. MARKS: 50**

Instructions to Candidates:

- Answer **ALL** the questions.

Q. No		M	CO	PO	LO	BL
1A.	Discuss the role of Chassis in an automobile. Show different types of frame cross-sections mention their significance	5	1	2	1	L2
1B.	For 4 wheeler GVW of 1500kg, moving with a velocity of 80 kmph and coefficient of drag (c_D)=0.3, vehicle frontal area (A)=2.5m^2 , rolling coefficient (μ)=0.015 ,tyre radius of 0.3m calculate the aerodynamic drag, rolling resistance and gradient forces. Assume air density as 1.2 kg/m^3 and gradient of 5%	3	1	1	2	L3
1C.	Justify how feathering and center wear of tyres can be avoided	2	4	2	2	L3
2A	Discuss how the fuel efficiency of a compression ignition engine can be increased by varying the duration, timing and lift of the air intake valves	5	1	2	4	L3
2B	Clarify how a vacuum booster aids the braking force in hydraulic brake system.	3	4	2	1	L2
2C	Justify why a synchronizer is used in synchromesh gear box	2	2	2	1	L2
3A	With respect to handling, weight distribution and steering explain the benefits of front engine rear wheel drive architecture	5	1	2	2	L2
3B	Clarify how the flow of high amperage current through the contact breaker can be avoided by using transistorised ignition system	3	1	2	1	L2
3C	Justify in which situation clutch slip is beneficial	2	2	2	1	L2
4A	For rear wheel driven passenger car Show why a regenerative braking on the front wheels is more effective than on rear wheels. Justify with the help of appropriate mathematical expressions and graph. Consider an urban drive cycle	5	5	2	2	L3
4B	What are the different stages in which emissions of ICE based automobile can be controlled? Show the construction and discuss the working of a 3-way catalytic converter	3	1	2	7	L2
4C	Show a davis steering system and enumerate its parts.	2	4	2	1	L2
5A	Discuss the three phases of operation of torque converter. What is the significance of reactor and clutch in its architecture?	5	2	2	1	L3

5B	In which type of vehicles hydraulic brake system is used . Show the construction of master cylinder and brake cylinder	**3**	**3**	**2**	**1**	**L3**
5C	Describe how a vehicle fuel efficiency is calculated	**2**	**4**	**1**	**2**	**L3**

.