Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 20744

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2023.

Fifth Semester

Mechanical Engineering

CME 380 — AUTOMOBILE ENGINEERING

(Common to : Mechanical Engineering (Sandwich)/Mechanical and Automation Engineering/Mechatronics Engineering and Robotics and Automation)

(Also common to Minor Degree)

(Regulations 2021)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is the purpose of crumple zones in vehicle structures?
2. What is the purpose of the crankshaft in an engine?
3. What is the role of the engine's air intake system?
4. What is the function of the engine lubrication system?
5. What is the purpose of a clutch in a manual transmission system?
6. What is the term "gear ratio" in the context of transmission systems?
7. What is the function of the master cylinder in a hydraulic brake system?
8. Differentiate between power steering and manual steering.
9. What is regenerative braking in the context of electric and hybrid vehicles?
10. List three common types of alternative fuels other than gasoline and diesel.

PART B — (5 × 13 = 65 marks)

11. (a) Analyze the intricate relationship between structural integrity and vehicle performance.

Or

(b) Elaborate on the working principles of Variable Valve Timing and Lift systems.

12. (a) Examine the complexities of the engine's emission control system.

Or

(b) Outline the concept of forced induction in engines. How do turbochargers and superchargers work?

13. (a) Explain the impact of transmission systems on vehicle fuel efficiency and performance.

Or

(b) Explain the concept of torque vectoring in transmission systems. How does it enhance vehicle handling and cornering abilities?

14. (a) How does ABS contribute to improved vehicle maneuverability, especially during emergency maneuvers? Explain in detail.

Or

(b) Discuss the concept of scrub radius in steering geometry. How does it affect tire wear, steering effort, and vehicle stability?

15. (a) How does hydrogen production, storage, and distribution impact its viability as a mainstream alternative fuel? Discuss in detail.

Or

(b) Examine the challenges and innovations in thermal management systems for electric and hybrid vehicles.

PART C — ($1 \times 15 = 15$ marks)

16. (a) Examine the design and engineering challenges in developing transmission systems for high-performance sports cars.

Or

(b) Examine the engineering challenges involved in developing active suspension systems. How do they adapt to different road conditions in real-time?

———————