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Question Paper Code	13959
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B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2025

Fifth Semester

Mechanical Engineering

20MEPC501 - AUTOMOTIVE SYSTEMS

Regulations - 2020

Duration: 3 Hours

Max. Marks: 100

PART - A (MCQ) (10 × 1 = 10 Marks)

Answer ALL Questions

	Marks	K- Level	CO
1. Identify the primary function of the chassis frame in an automobile. (a) Improve fuel efficiency (b) Support the vehicle body and components (c) Reduce aerodynamic drag (d) Increase ignition timing	1	K1	CO1
2. Which layout places the engine at the front and drives the rear wheels? (a) FWD (b) FR layout (c) Mid-engine layout (d) Four-wheel steering	1	K1	CO1
3. Select the correct function of the Common Rail Direct Injection (CRDI) system. (a) Controls exhaust gases (b) Supplies high-pressure fuel to injectors electronically (c) Regulates engine lubrication (d) Mixes air and fuel mechanically	1	K1	CO2
4. Which ignition system uses a capacitor to store and discharge energy to the spark plug? (a) Magneto ignition system (b) Transistorized coil ignition (c) Capacitive discharge ignition (CDI) (d) Mechanical breaker ignition	1	K1	CO2
5. Determine which component transmits power from the gearbox to the differential. (a) Clutch plate (b) Torque converter (c) Propeller shaft (d) Flywheel	1	K1	CO3
6. Which of the following is used in automatic transmission to transmit torque using fluid motion? (a) Dry clutch (b) Torque converter (c) Spur gear (d) Transfer box	1	K1	CO3
7. Analyze which system prevents wheel lock during sudden braking. (a) EBD (b) ABS (c) Power steering (d) MacPherson suspension	1	K1	CO4
8. Identify the component that corrects front wheel alignment and directional stability. (a) Leaf spring (b) Steering geometry (caster, camber, toe-in) (c) Propeller shaft (d) Differential gear	1	K1	CO4
9. Which alternative fuel is produced from vegetable oils or animal fats? (a) Biodiesel (b) LPG (c) Hydrogen gas (d) Gasohol	1	K1	CO5
10. Which device reduces CO, HC, and NOx emissions in automobiles? (a) Turbocharger (b) Three-way catalytic converter (c) Intercooler (d) EGR cooler	1	K1	CO6

PART - B (12 × 2 = 24 Marks)

Answer ALL Questions

11. Write notes on the principle of transmissibility of forces using a suitable example.	2	K2	CO1
12. Classify different automobile chassis layouts.	2	K2	CO1
13. List down the advantages of MPFI.	2	K2	CO2
14. Mention the merits of Capacitive Discharge Ignition (CDI) system.	2	K2	CO2
15. What are all the functions of a single plate clutch in the transmission system?	2	K1	CO3
16. Define Gear Ratio.	2	K1	CO3
17. List out the different types of Steering gear box used.	2	K2	CO4
18. How the Anti-lock Braking System (ABS) improves vehicle safety?	2	K1	CO4
19. List any four alternative fuels used in automobiles.	2	K1	CO5

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create

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| 20. Justify the need for using hydrogen as a future automobile fuel. | 2 | K2 | CO5 |
| 21. Write the function of a three-way catalytic converter in emission control. | 2 | K1 | CO6 |
| 22. Mention some of the pollutants exhausted out of an IC engine. | 2 | K2 | CO6 |

PART - C (6 × 11 = 66 Marks)

Answer ALL Questions

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| 23. a) Briefly describe the functions of basic IC Engine components with suitable sketch. | 11 | K3 | CO1 |
| OR | | | |
| b) Illustrate different types of automobile body designs used in the industry. | 11 | K3 | CO1 |
| 24. a) Describe the working of Common Rail Direct Injection (CRDI) system with a block diagram. | 11 | K2 | CO2 |
| OR | | | |
| b) Compare electronically controlled gasoline injection and diesel injection systems with suitable examples. | 11 | K2 | CO2 |
| 25. a) Explain the construction and working of a sliding mesh gearbox. | 11 | K3 | CO3 |
| OR | | | |
| b) Discuss the working principle of a torque converter and summarize the key differences between a torque converter and a fluid flywheel based on their operation and functionality in the transmission system. | 11 | K3 | CO3 |
| 26. a) Using the steering geometry parameters such as caster, camber, toe-in, and toe-out, and explain how each of these influences vehicle stability and handling performance. | 11 | K3 | CO4 |
| OR | | | |
| b) Explain the construction and working of a hydraulic braking system. | 11 | K3 | CO4 |
| 27. a) Discuss the use of LPG, CNG, and Hydrogen as alternative automotive fuels – advantages, limitations, and required engine modifications. | 11 | K2 | CO5 |
| OR | | | |
| b) Describe the working principle of hybrid electric vehicles and classify different types of hybrid configurations. | 11 | K2 | CO5 |
| 28. a) Explain the formation of pollutants (CO, NO _x , HC, PM) in SI and CI engines and outline BS6 or Euro emission standards. | 11 | K2 | CO6 |
| OR | | | |
| b) Describe the working of a Turbocharger (VGT/WGT) and summarize how it improves engine efficiency and reduces emissions. | 11 | K2 | CO6 |