Q. Code: 570928

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

B.E. / B.TECH. DEGREE EXAMINATIONS, MAY 2024

Fifth Semester

ME18001 – AUTOMOBILE ENGINEERING

(Mechanical Engineering)

(Regulation 2018 / 2018A)

TIME: 3 HOURS **MAX. MARKS: 100**

COURSE OUTCOMES	STATEMENT	RBT LEVEL
CO 1	The students will classify the automobiles, their construction and working of various auxiliary systems.	**2**
CO 2	The students will determine the various electronics components involved in automobile working system.	**3**
CO 3	The students will evaluate mechanical system performance along with electronics components.	**3**
CO 4	The students will design a suitable working system based on the energy sources used in an automobile.	**3**

PART- A (10 x 2 = 20 Marks)

(Answer all Questions)

		CO	RBT LEVEL
1.	List any two major factors affecting vehicle aerodynamics and their influence on fuel efficiency.	**1**	**2**
2.	Compare the applications of internal combustion engines in land and water highlighting specific design adaptations for each environment.	**1**	**2**
3.	Differentiate between Superchargers and Turbochargers.	**2**	**2**
4.	Compare the advantages of Multi-Point Fuel Injection (MPFI), and Gasoline Direct Injection (GDI) systems in spark ignition engines.	**2**	**2**
5.	Match the following:	**1**	**2**

1.Single Plate Clutch	a. Utilizes hydraulic pressure to engage and disengage gears smoothly.
2. Multi-plate Clutch	b. Transfers power from the engine to the transmission without a solid mechanical connection.
3. Hydraulic system	c. Consists of a series of friction discs interleaved with steel plates.
4. Fluid flywheel	d. Contains only one friction disc and pressure plate assembly.

6.	State the function of an overdrive in a vehicle transmission system.	**1**	**2**

7.	Explain the advantages of power steering systems over traditional manual steering systems.	**3**		**2**
8.	Illustrate the function of an antilock braking system (ABS).	**3**		**2**
9.	Match the following:	**4**		**2**

1. Proton Exchange Membrane Fuel Cell (PEMFC)	a. Suitable for stationary power generation in residential and commercial buildings.
2. Solid Oxide Fuel Cell (SOFC)	b. Primarily employed in large-scale power generation and industrial applications.
3. Molten Carbonate Fuel Cell (MCFC)	c. Commonly used in transportation applications, such as fuel cell vehicles.

10. i) _____ considered the most efficient and cleanest fuel for fuel cells, producing only water as a byproduct. **4** **2**

ii) _____can be reformed to produce hydrogen for fuel cells but may require additional processing.

PART- B (5 x 14 = 70 Marks)

		Marks	CO	RBT LEVEL
11. (a)	Discuss the evolution of automobile chassis design, highlighting the transition from body-on-frame to unibody construction. Analyze the advantages and disadvantages of each design approach in terms of structural integrity, weight distribution, and manufacturing complexity.	**(14)**	**1**	**3**
	(OR)			
(b)	Explore the importance and advantages of variable valve timing (VVT) in internal combustion engines. Analyze how VVT technology improves engine performance, fuel efficiency, and emissions control.	**(14)**	**1**	**3**
12. (a)	Assess the effectiveness of electronically controlled diesel injection systems in enhancing diesel engine performance and efficiency, as well as reducing emissions.	**(14)**	**2**	**3**
	(OR)			
(b)	Explore the application of engine emission control technologies, including Three-Way Catalytic Converter system, Selective Catalytic Reduction	**(14)**	**2**	**3**

(SCR) system, and Exhaust Gas Recirculation (EGR) system.

13. (a)	Compare and contrast the design and functionality of manual and automatic gear shift mechanisms.	**(14)**	**1**	**2**
	(OR)			
(b)	Examine the differential and rear axle systems' structure and functioning. Discuss their roles in transmitting power to the wheels, managing wheel speed differentials, and optimizing vehicle stability and handling.	**(14)**	**1**	**2**
14. (a)	Discuss how EBD optimizes brake force distribution to improve vehicle stability and control during braking maneuvers. Provide examples of situations where EBD is particularly beneficial.	**(14)**	**3**	**3**
	(OR)			
(b)	Discuss how traction control systems mitigate wheel slippage and improve traction in various driving conditions, such as slippery roads or off-road terrain.	**(14)**	**3**	**3**
15. (a)	Discuss how these regulations (Euro and BS Standards) drive technological innovation and influence the adoption of alternative fuels and advanced emissions control systems.	**(14)**	**4**	**3**
	(OR)			
(b)	Describe the construction and working principle of hybrid electric vehicle.	**(14)**	**4**	**3**

PART- C (1 x 10 = 10 Marks)

(Q.No.16 is compulsory)

		Marks	CO	RBT LEVEL
16.	Analyze a feasibility study comparing electric, hybrid, and fuel cell vehicles for a specific urban area. Consider factors such as charging/fueling infrastructure, vehicle range, emissions, cost of ownership, and consumer acceptance. Present your findings and recommend the most suitable options.	**(10)**	**4**	**4**

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