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**Question Paper Code : 20818**

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2018.

Sixth Semester

Mechanical Engineering

ME 6602 — AUTOMOBILE ENGINEERING

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

(Regulations 2013)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. List down the various aerodynamic forces and moments acting on a vehicle in motion.
2. Write the need of using I - Cross section in connecting rod design.
3. Write the expansion of WGT type turbocharger and write the significance of it.
4. Compare the differences between MPFI and GDI systems. (Any four points)
5. Mention the need of using an overdrive in two wheelers.
6. Write down the importance of using slip joints in the driveline of a vehicle.
7. Differentiate between passive and semi-active suspension systems.
8. Enumerate any two merits of using full floating front axle.
9. Define "Bio-fuel" with any one example.
10. Sketch the layout of a parallel - configured electric vehicle.

PART B — (5 × 13 = 65 marks)

11. (a) With indicative sketches, describe about the chassis layout used in front Engine Front Drive vehicles. (13)

Or

- (b) Explain about the construction and operation of a variable valve timing mechanism adopted in an IC engine. (13)

12. (a) Elaborate about the working of a Rotary Distributor type Diesel Injection system with a neat sketch. (13)

Or

- (b) (i) With the aid of a cutaway sketch, explain about the working of a three-way catalytic converter used in vehicles. (9)  
(ii) Write down the various chemical reactions relevant to emission control in a three-way catalytic converter. (4)

13. (a) (i) Enumerate the need of a transmission system in an automobile (Any four points). (4)  
(ii) Write short notes on any one positive displacement type clutch used in vehicles. (9)

Or

- (b) Enumerate the components used and brief about their functions in a Torque Tube drive configuration. Write a neat sketch. (13)

14. (a) With relevant sketches brief about the construction of the following steering gear boxes.  
(i) Recirculating Ball type. (7)  
(ii) Rack and Pinion type. (6)

Or

- (b) With a simple block diagram, analyze the working of a typical traction control system used in passenger cars. (13)

15. (a) Discuss about the challenges faced in production and storage of Hydrogen gas. (13)

Or

- (b) With aid of a simple sketch, discuss about the working of a Solid Oxide fuel cell. (13)

PART C — (1 × 15 = 15 marks)

16. (a) The aerodynamic drag coefficient of a car at the design conditions of 90 km/h is to be determined experimentally in a large wind tunnel in a full-scale test. The height and width of the car are 1.40 m and 1.65 m respectively. If the horizontal force acting on the car is measured to be 350 N, evaluate the total aerodynamic drag coefficient of the car. Take density of air as  $1.2 \text{ kg/m}^3$ . (15)

Or

- (b) Express the technical specifications of any one electric car available in India. Describe the working principle of it and comment on the suitability to adopt EV's in India. (15)