# 315376

**12526**

**3 Hours / 70 Marks** Seat No. | | | | | | | | |

*Instructions* – (1) All Questions are *Compulsory.*

(2) Answer each next main Question on a new page.

(3) Illustrate your answers with neat sketches wherever necessary.

(4) Figures to the right indicate full marks.

(5) Assume suitable data, if necessary.

(6) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

**Marks**

**1. Attempt any FIVE of the following :** **10**

a) State the concept of Hybrid Electric Vehicle (HEV).

b) List two features of Hybrid Electric Vehicle.

c) List the types of batteries used in electric vehicles (EV).

d) State two requirements of high speed charging of a two-wheeler.

e) State the types of HEV powertrain.

f) List two benefits of Active Cylinder management.

g) State two factors affecting ride comfort.

**Marks**

**2. Attempt any THREE of the following :** **12**

a) Explain regenerative braking with the help of block diagram.

b) Compare Electric Vehicle and Fuel Cell Vehicle based on Vehicle range, battery capacity, performance and efficiency.

c) Describe battery electric vehicle propulsion system of a car with help of block diagram.

d) Justify the use of Battery Management System in Electric Vehicles.

**3. Attempt any THREE of the following :** **12**

a) Justify the use of compressed Natural Gas in two-wheeler vehicles.

b) Draw simplified sketch of Proton Exchange Membrane fuel cell and justify its use in vehicles.

c) Compare Lithium Ion Battery and Lead acid battery on the basis of capacity and weight.

d) Differentiate powertrains of mild hybrid vehicle and full hybrid vehicle : on the basis of torque and efficiency.

**4. Attempt any THREE of the following :** **12**

a) Compare BS IV and BS VI emission standards.

b) Explain the concept of a downsized engine and state two benefits of downsizing.

c) Illustrate the working of Electronic Stability Control with sketch.

d) Explain four benefits of Electronic Stability Control.

e) Justify the need for Traction Control System under the following conditions :

i) driving on a wet road

ii) during sudden acceleration

**Marks**

**5. Attempt any TWO of the following :** **12**

a) Explain the key characteristics of mild, medium and full hybrid vehicles affect their suitability for CITY DRIVING. Justify your answer for each type.

b) Classify and briefly describe the EV charging systems on the basis of

i) Charging station and

ii) Charging technology

c) Compare EV propulsion systems using dual motor and all-wheel drive : on the basis of

i) Power source

ii) Torque Delivery and

iii) Energy efficiency

**6. Attempt any TWO of the following :** **12**

a) Explain the working of Intelligent Manual Transmission System with a sketch.

b) Describe the working of start - stop system at a cross-road signal with help of sketch.

c) Explain the working of the Collision Avoidance System with help of a sketch.

---