

Total No. of Questions : 8]

SEAT No. :

**P 476**

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**[6003] 584**

**T.E. (Mechanical/Automobile) (Honors)**  
**ELECTRIC VEHICLES**  
**E-Vehicle System Design**  
**(2019 Pattern) (Semester - II) (302033 MJ)**

*Time : 2½ Hours]*

*[Max. Marks : 70*

*Instructions to the candidates:*

- 1) Solve Q.No.1 or Q.No.2, Q.No.3 or Q.No.4, Q.No.5 or Q.No.6, Q.No.7 or Q.No.8.
- 2) Figures to the right indicate full marks.
- 3) Draw the neat sketch wherever necessary.

- Q1)** a) Explain electronic breaking system with its features and benefits in electric vehicles? **[4]**
- b) Explain in short steel wheel and alloy wheels and Differentiate between steel wheel and alloy wheels on basis of, **[8]**
- i) Cost and durability
  - ii) Environmental working conditions
  - iii) Area of applications
  - iv) Effect on suspension system
- c) Explain the need for Capacitor Banks or Ultra Capacitors in regenerative breaking on electric vehicles. **[8]**

**OR**

- Q2)** a) List out various defects in tires? **[4]**
- b) Elaborate the factors affecting on following while design the vehicles? **[8]**
- i) Driver
  - ii) Environment
  - iii) Load
  - iv) Type of Vehicle
- c) What do you mean by traction motor? Explain its significance with neat sketch in electric vehicles? **[8]**

**P.T.O.**

- Q3) a)** Explain the following terms (any two) [8]
- i) The open differential
  - ii) Torsen Differential
  - iii) Active differential
  - iv) Welded/Spool Differential

- b) Explain the significance of transmission component system design in detail? Explain the role of case, a drive part and a shift control device in transmission system? [8]

OR

- Q4) a)** Classify different types of transmission system used in automobiles? Explain hybrid electric vehicle transmission in detail? [8]
- b) Explain the Influence of effective case depth on bending fatigue strength and shot peening strengthening and residual compressive stress on tooth surface? [8]

- Q5) a)** What do you mean by battery layout? Explain lead acid battery layout with neat sketch? [8]

- b) Explain Constructional details of cell design related to Batteries? [8]

OR

- Q6) a)** Explain the process of degradation modeling and analysis? [8]

- b) Explain Battery Compartment Design for Crashworthiness and Cooling? [8]

- Q7) a)** Explain Ergonomics based Roll-cage/Frame design with neat sketches? [10]

- b) Explain Structural Design aspect of Roll-cage/Body-Frame? [8]

OR

- Q8) a)** Explain the importance and process involved in Impact/Crash Analysis? [8]

- b) What do you mean by vehicle dynamics? Explain the components of vehicle dynamics with? [10]

