



K. K. Wagh Institute of Engineering Education & Research, Nashik
(An Autonomous Institute From A.Y. 2022-23)

WINTER-2025	
Exam Seat No.:	
Academic Year:2025-2026	Semester:V
Class:TY	Program:B.Tech
Branch Code:ELE	Pattern:2022
Name of Course:Electrical Mobility	Course Code:ELE223006B
Max. Marks:60	Duration:2.30 Hrs.

Instructions: Candidates should read carefully the instructions printed on the Question Paper and on the cover page of the Answer Book, which is provided for their use.

1. This question paper contains 02 page(s).
2. Answer to each new question is to be started on a new page.
3. Assume suitable data wherever required, but justify it.
4. Draw the neat labelled diagrams, wherever necessary.
5. The last columns indicates the Course Outcome and level of Blooms Taxonomy of the Question/sub-question.

Marks CO

Question No. 1

- 1a) Discuss the environmental significance of Hybrid and Electric Vehicles with suitable examples. (6) CO1

Question No. 2

- 2a) Explain the control strategies used in Series Hybrid Electric Vehicles for power flow management between engine, motor, and battery. (6) CO2

Question No. 3

- 3a) With a neat sketch, explain the construction and operation of a three-phase Induction Motor. Evaluate why induction motors are widely used in commercial EVs like buses and Tesla vehicles. (8) CO3

OR

- 3b) Compare IM motors, BLDC motors in terms of construction, working principle, torque–speed characteristics, efficiency, and suitability for EV applications. (8) CO3

- 3c) Discuss the thermal management challenges of PMSM and Induction Motors in EVs. Suggest suitable cooling techniques used in modern electric vehicles. (8) CO3

OR

- 3d) Explain the effect of motor weight, efficiency, torque ripple, and regenerative capability on the selection of motors for EVs. Assess which motor offers the best overall EV performance. (8) CO3

Question No. 4

- 4a) Explain the operating principle of a hydrogen fuel cell. List its main components and properties. (8) CO4

OR

- 4b) What are the unique characteristics of a super capacitor and how can this be used in electric vehicles? (8) CO4

- 4c) Explain how flywheels could be used as energy source in electric vehicles (8) CO4

OR

- 4d) Compare the use of ultracapacitors and batteries in hybrid vehicles. Evaluate their advantages and limitations in fast charging/discharging applications. (8) CO4

Question No. 5

- 5a) Explain the principle of Vehicle-to-Home (V2H) operation. Mention its advantages and limitations. (8) CO5

OR

- 5b) What is Vehicle-to-Vehicle (V2V) energy transfer? Explain its working principle with an example. (8) CO5

- 5c) Describe the concept of Vehicle-to-Everything (V2X). List the different domains it covers (grid, home, vehicle, infrastructure). (8) CO5

OR

- 5d) Discuss the economic benefits of V2G technology for both EV owners and utility providers. (8) CO5

..... **End of question paper**.....