



Paper ID : 261592

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Subject Code:BEE064

Roll No:

BTECH
(SEM. VI) THEORY EXAMINATION 2025-26
ELECTRICAL AND HYBRID VEHICLES

TIME: 3 HRS**M.MARKS: 70****Note:** Attempt all Sections. In case of any missing data; choose suitably.**SECTION A****1. Attempt all questions in brief.****02 x 7 = 14**

Q no.	Question	CO	Level
a.	Define hybrid electric vehicle and explain its environmental importance.	1	K2
b.	List different types of hybrid drive-train topologies.	1	K1
c.	Explain the concept of electric traction	2	K2
d.	State advantages of Lithium-ion batteries over Lead-acid batteries.	3	K2
e.	Define fuel efficiency in hybrid vehicles.	1	K1
f.	What is power flow control in electric drive-trains?	2	K2
g.	List any two energy management strategies used in hybrid vehicles.	4	K1

SECTION B**2. Attempt any three of the following:****07 x 3 = 21**

Q no.	Question	CO	Level
a.	Apply the historical evolution of electric and hybrid vehicles to explain their societal impact in present-day context.	1	K2
b.	Explain the different power flow control modes of a typical parallel hybrid system with the help of block diagrams	2	K3
c.	Explain the configuration and working of induction motor drives in EV	2	K2
d.	Analyze different types of batteries used in EV	3	K4
e.	Explain briefly OSI Seven-Layer Model used in EVs, also name the classes of communication protocols used in Vehicles	4	K2

SECTION C**3. Attempt any one part of the following:****07 x 1 = 07**

Q no.	Question	CO	Level
a.	Apply vehicle performance parameters to develop and derive a mathematical model for a given vehicle system.	1	K3
b.	Analyze transmission characteristics.	1	K4

4. Attempt any one part of the following:**07 x 1 = 07**

Q no.	Question	CO	Level
a.	Analyze the sizing of power electronics in hybrid electrical vehicles.	4	K4
b.	Explain different EV drive train alternatives based on power source configuration and justify its selection for various application.	2	K5

5. Attempt any one part of the following:**07 x 1 = 07**

Q no.	Question	CO	Level
a.	Evaluate the configuration of BLDC motor drives and assess their effectiveness in electric vehicle applications.	2	K5
b.	Analyze the Amp-hr measurement method and direct measurement techniques of SOC in batteries.	3	K4



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6. Attempt any *one* part of the following:

07 x 1 = 07

Q no.	Question	CO	Level
a.	Classify different hybrid energy systems adopted in electric vehicles.	3	K4
b.	Analyze the working principle of flywheel-based energy storage systems and their role in electric vehicles.	3	K4

7. Attempt any *one* part of the following:

07 x 1 = 07

Q no.	Question	CO	Level
a.	Compare and classify energy management strategies in hybrid electrical vehicles with respect to their operational characteristics.	4	K4
b.	Classify the criteria for matching an electric machine with an internal combustion engine (ICE) in hybrid electric vehicles.	4	K4

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