PAPER ID-311277

Subject Code: BOE301

Roll No: | | | | | | | | | | | | | |

BTECH
(SEM III) THEORY EXAMINATION 2023-24
ELECTRIC AND HYBRID VEHICLES

TIME: 3HRS **M.MARKS: 70**

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. **2 x 7 = 14**

Q no.	Question	Marks	CO
a.	Describe the basic layout of an automobile, including the arrangement of major components such as the engine, transmission, suspension, and steering system.	2	1
b.	Define the term "automobile" and discuss its significance in modern society, highlighting its role in transportation and personal mobility.	2	1
c.	What are two environmental advantages of electric and hybrid vehicles compared to traditional internal combustion engine vehicles?	2	2
d.	Discuss one major advantage and one major disadvantage of electric vehicles compared to traditional combustion engine vehicles in terms of their impact on the environment.	2	2
e.	What are the key electric components commonly utilized in hybrid and electric vehicles?	2	3
f.	What is the primary function of a controller in hybrid and electric vehicles?	2	4
g.	What are the key components of an Electric Vehicle (EV) charger and how do they function together to charge an electric vehicle efficiently?	2	5

SECTION B

2. Attempt any *three* of the following: **7 x 3 = 21**

a.	Explain the significance of the chassis in an automobile's structure and performance. How does it contribute to the overall stability and handling of the vehicle?	7	1
b.	What is a potential disadvantage or challenge in the infrastructure supporting electric and hybrid vehicles, particularly regarding charging stations?	7	2
c.	How does the configuration and control of permanent magnet motor drives differ from other motor types in electric vehicle propulsion systems?	7	3
d.	How does fuel cell-based energy storage differ from battery-based systems in hybrid and electric vehicles, and what are its advantages and limitations?	7	4
e.	Explain the different types of charging methods available for electric vehicles and their respective advantages and limitations.	7	5

SECTION C

3. Attempt any *one* part of the following: **7 x 1 = 7**

a.	Compare and contrast the functions of the engine and the gearbox in an automobile. How do they work together to provide optimal power delivery and speed control?	7	1

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b.	Discuss the significance of the ignition system in starting the engine of a vehicle. What are the key components involved, and how do they work together to initiate combustion?	7	1

4. Attempt any *one* part of the following: 7 x 1 = 7

a.	Describe the construction and working principles of the major components of electric and hybrid vehicles, focusing on the battery, controller, and motor.	7	2
b.	Outline the working principles of key components such as the motor and controller in electric and hybrid vehicles.	7	2

5. Attempt any *one* part of the following: 7 x 1 = 7

a.	Discuss the importance of properly sizing the propulsion motor in an electric vehicle, considering factors such as performance, range, and energy consumption.	7	3
b.	What are some common challenges encountered in the configuration and control of induction motor drives for electric vehicles, and how are they typically addressed?	7	3

6. Attempt any *one* part of the following: 7 x 1 = 7

a.	What are the key factors involved in analyzing battery-based energy storage systems for hybrid and electric vehicles, and how do they impact vehicle performance?	7	4
b.	What are the unique characteristics of supercapacitor-based energy storage technology, and how does it compare to traditional battery systems in hybrid and electric vehicles?	7	4

7. Attempt any *one* part of the following: 7 x 1 = 7

a.	When it comes to repair and maintenance of electric vehicles, what are some common issues that owners may encounter, and how can they be addressed effectively?	7	5
b.	What are the essential steps involved in setting up a startup focused on electric vehicle technology, and what factors should entrepreneurs consider in this process?	7	5