R22 Regulation *Subject code:4P7BC*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A+' Grade)

B.Tech VII Semester Regular/Supplementary Examinations, October 2026

ELECTRIC AND HYBRID VEHICLES

(EEE)

Maximum Marks: 60 Date: 28.10.2026 Duration: 3 hours

Note: **1.This question paper contains two parts A and B.**
2. Part A is compulsory which carries 10 marks. Answer all questions in Part A.
3. Part B consists of 5 Units. Answer any one full question from each unit.
4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

All the following questions carry equal marks (10X1M=10 Marks)		Marks	CO	BTL
1.a)	Give the classification of various electric vehicles?	1M	1	1
b)	What is a conventional vehicle?	1M	1	1
c)	Give the basic concept of hybrid traction?	1M	2	1
d)	What are the social impacts of Hybrid Electric Vehicles?	1M	2	1
e)	What is a drive train? Give its need in EVs?	1M	3	1
f)	Explain the concept of electric traction?	1M	3	1
g)	What is propulsion motor?	1M	4	1
h)	What are the different types of supporting subsystems used in EV?	1M	4	2
i)	List various energy management strategies?	1M	5	1
j)	Explain need of energy management strategies?	1M	5	1

Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	BTL
2	a) Explain about the vehicle power source characteristics. b) Explain the mathematical models to describe the vehicle performance.	5M 5M	1	2
	OR			
3	a) Briefly explain design and working comparison of hybrid electric vehicle with conventional vehicles. b) Explain the occurrence of the Global Warming due to Conventional Vehicles.	5M 5M	1	2
4	a) Explain different architectures of hybrid electric drive trains. b) Explain the series hybrid electric drive train.	5M 5M	2	2
	OR			
5	a) Explain modern drive trains impact on energy supplies. b) Draw the Block diagram of Control Architecture of Hybrid Electric Vehicles and Analyze each part of the block diagram.	5M 5M	2	1

6	a) Explain in detail about the Configuration and controlling of permanent magnet motor drive. b) Conduct a detailed analysis of drive system efficiency in electric trains.	5M 5M	3	1
	OR			
7	a) Explain the Series - Parallel Configurations of Electric Drive train with Neat Diagram. b) Explain the electric vehicle drive train alternatives based on drive train configuration.	5M 5M	3	2
8	a) Explain the working principle of Battery based energy storage and its analysis. b) Describe the basic principle of Super Capacitors based Energy Storage System in Hybrid Electric Vehicles	5M 5M	4	2
	OR			
9	a) Explain the Sizing System of Electrical machines in Hybrid Electric Vehicles. b) Explain Fuel Cell based energy storage and its analysis with neat explanation.	5M 5M	4	2
10	a) Classify and explain the basic principle of Rule based energy management system. Elaborate on any one of the Rule based energy management system. b) Evaluate the performance, efficiency, and feasibility of the designed BEV solution.	5M 5M	5	2
	OR			
11	a) Elaborate energy management system and issues of energy management strategies of EHV. b) How many batteries (12 V, 20 Ah) are required to fulfill the requirements of 108V, 60 Ah for EV. Provide connection diagram?	7M 3M	5	2