R22 Regulation *Subject code: 4P7BC*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech VII Semester Regular Examinations, November 2025

ELECTRIC AND HYBRID VEHICLES

(EEE)

Maximum Marks: 60 Date: 26.11.2025 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	BloomTx
1.a)	What is a Conventional Vehicle?	1M	1	1
b)	Define gear ratio in a transmission system of a conventional vehicle.	1M	1	1
c)	How HEV is different from conventional vehicles.	1M	2	1
d)	What is Regenerative breaking in HEV?	1M	2	1
e)	What is drive system efficiency of EVs?	1M	3	1
f)	List the applications of EVs	1M	3	1
g)	Name any two advantages of using lithium-ion batteries in EVs	1M	4	1
h)	List the factors which influence the sizing of a power electronic components in EVs.	1M	4	1
i)	Name any two objectives of energy management strategies in HEVs.	1M	5	1
j)	List two major components considered in the design of a BEV.	1M	5	1

Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	BloomTx
2	a) With a neat sketch explain the power source characterization of a conventional vehicle. b) Briefly explain the performance of a conventional vehicle based on forces present in a vehicle during motion.	5M 5M	1	2
	OR			
3	a) Describe the transmission characteristics of conventional vehicle. b) Explain the Significance of Rolling Resistance in movement of the vehicle.	5M 5M	1	2
4	a) Narrate the history of the Hybrid and Electric Vehicles. b) Explain the social and environmental importance of adopting hybrid and electric vehicles.	5M 5M	2	2
	OR			

5	a) Explain the architecture and power flow of series-parallel HEV with a neat block diagram. b) Describe the impact of modern electric drive-trains on fossil fuel dependency and energy supply.	5M 5M	2	2
6	a) Explain about power flow control in electric drive-train topologies. b) List and Explain the advantages and disadvantages of Electric Vehicles.	5M 5M	3	2
	OR			
7	a) Explain Configuration and control of Permanent Magnet Motor drives b) Explain v/f control of Induction Motor drives with a neat sketch.	5M 5M	3	2
8	a) Explain how hybridization of different energy storage systems can enhance vehicle performance with a neat sketch. b) List and explain the factors to be considered while selecting the energy storage technology.	5M 5M	4	2
	OR			
9	a) Briefly explain Fuel cell energy storage system operation with a neat sketch. b) Discuss the factors that need to be considered while sizing the propulsion motor in an electric vehicle.	5M 5M	4	2
10	a) Explain the importance of energy management strategies in hybrid and electric vehicles. b) Discuss the implementation issues involved in real-time energy management in HEVs.	5M 5M	5	2
	OR			
11	a) Describe the design considerations for a Battery Electric Vehicle (BEV). b) Compare different Energy management strategies.	5M 5M	5	2