R18 Regulation Subject code:2E7E5

# TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

## B.Tech VII Semester Supplementary Examinations, May 2025

## HYBRID ELECTRIC VEHICLES

*(EEE)*

Maximum Marks: 70 Date: 29.05.2025 Duration: 3 hours

Note: 1. This question paper contains two parts A and B.
2. Part A is compulsory which carries 20 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 as sub questions.

### Part-A

All the following questions carry equal marks 10X2M=20 Marks

| | | Marks | CO | BTL |
|---|---|---|---|---|
| 1 | Define Hybrid Electric Vehicles? | 2M | 1 | L1 |
| 2 | What are disadvantages of conventional vehicles? | 2M | 1 | L1 |
| 3 | Define Electric Traction? | 2M | 2 | L1 |
| 4 | What is Hybrid Electric Drive Train? | 2M | 2 | L1 |
| 5 | Define Torque? | 2M | 3 | L1 |
| 6 | Write the Induction Motor principle? | 2M | 3 | L1 |
| 7 | Define Lithium battery? | 2M | 4 | L1 |
| 8 | Define Energy Storage or Storage in Hybrid Electric Vehicles? | 2M | 4 | L1 |
| 9 | Write the Definition of Energy Management Strategies? | 2M | 5 | L1 |
| 10 | Define CAN Control Area Network | 2M | 5 | L1 |

### Part-B

Answer All the following questions. (5X10M=50Marks)

| | | Marks | CO | BTL |
|---|---|---|---|---|
| 11 | Explain the term rolling resistance and aerodynamic drag in vehicles and derive the Expression for vehicle translational motion from fundamentals. | 10M | 1 | L2 |
| | OR | | | |
| 12 | a) Write the difference between conventional and electrical vehicle used in transportation. | 5M | 1 | L2 |
| | b) Write the advantages and disadvantages of electrical vehicles. | 5M | | |
| 13 | Explain the impact of different transportation technologies on environment and energy | 10M | 2 | L2 |
| | OR | | | |
| 14 | Explain about various hybrid drive-train topologies | 10M | 2 | L2 |
| 15 | a) Explain about speed control of induction motor. | 5M | 3 | L2 |
| | b) Write a note on motors used in traction system | 5M | | |
| | OR | | | |
| 16 | a) Explain Configuration and control of DC Motor drives. | 5M | 3 | L2 |
| | b) Write a short note on control system used in drives. | 5M | | |
| 17 | Explain about Switched Reluctance motor based energy storage and its analysis | 10M | 4 | L2 |
| | OR | | | |
| 18 | a) Discuss Different types of batteries used in hybrid electric vehicles | 5M | 4 | L2 |
| | b) Write the applications of batteries. | 5M | | |
| 19 | Explain construction of different energy management control strategies. | 5M | 5 | L2 |

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|---|---|---|---|---|
| | b) Write the applications of energy management systems. | 5M | | |
| | OR | | | |
| 20 | a) Define Energy management strategies<br>b) Write advantages of energy management in hybrid electric vehicles . | 5M<br>5M | 5 | L2 |