

Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
B.Tech Degree S8 (R,S)(FT/PT) Examinations April 2026 (2019 Scheme)



Course Code: EET418

Course Name: ELECTRIC AND HYBRID VEHICLES

Max. Marks: 100

Duration: 3 Hours

PART A

Answer all questions, each carries 3 marks.

Marks

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| 1 | What are the advantages & disadvantages of Hybrid Vehicles? | (3) |
| 2 | Explain the reasons which led to the introduction of Electric Vehicles. | (3) |
| 3 | Draw the block diagram of a Parallel Hybrid Electric Vehicle. | (3) |
| 4 | What are the advantages of Plug – in Hybrid Vehicles? | (3) |
| 5 | Explain with a block diagram the major components of a hybrid electric vehicle. | (3) |
| 6 | What is the significance of FOC for EV Motors. | (3) |
| 7 | Define C-rating of a battery. If a 100Ah battery is rated C20, what would be its discharge current expressed as 0.5C20 | (3) |
| 8 | With pin diagrams explain the GB/T standard connectors used in EV charging. | (3) |
| 9 | Enlist the factors which govern the sizing of power electronics for EHV's | (3) |
| 10 | What is the significance of a communication protocols in electric/hybrid vehicles? | (3) |

PART B

Answer any one full question from each module, each carries 14 marks.

Module I

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|----|---|-----|
| 11 | a) Explain how IC engine-based automobiles contribute to global warming and what is the significance of EVs in the new world. | (8) |
| | b) What are the levels of automation in autonomous vehicles. | (6) |

OR

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| 12 | a) Derive the dynamic equation of vehicle movement considering the resistive forces acting on it. | (9) |
| | b) Explain why gear system is necessary in IC engine-based automobiles and how EVs solve this issue in their drive trains. | (5) |

Module II

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|----|--|-----|
| 13 | a) Explain with block diagram how power flow is controlled in series hybrid electric vehicle. | (8) |
| | b) Draw and explain drive train alternatives based on power source configuration in electric vehicle | (6) |

OR

- 14 a) Draw & explain the block diagram representation of series hybrid Electric Vehicle. (8)
b) Identify the energy saving possibilities of hybrid drive trains in long distance travel. (6)

Module III

- 15 a) Explain in detail about the energy source & drive components used in HEV. (6)
b) Describe the advantages of independent control of flux and torque in separately excited DC Motor. (8)

OR

- 16 a) Explain the armature voltage control and field weakening mode control of DC separately excited motor drive system. (8)
b) Explain how forward motoring and forward braking control is done in a DC motor with a single chopper. (6)

Module IV

- 17 a) Enumerate factors affecting the performance of batteries used in EVs? (8)
b) Explain the operation of a grid to EV on board charger. (6)

OR

- 18 a) Explain the operation, advantage and disadvantages of ultracapacitor as an EV energy storage. (8)
b) Explain the significance of C rating of an EV battery with respect to range & performance. (6)

Module V

- 19 a) Using a speed vs. time graph, illustrate and explain the different operating modes of an Electric vehicle. Discuss how these regimes influence the selection and sizing of the drivetrain components, including the power source and energy storage system. (8)
b) What is the need of communication protocols in E & HVs? What does CP and PP pins denote in connectors and explain its functions. (6)

OR

- 20 a) Explain the role of drive cycle for a passenger car in designing the size of energy storage for electric vehicle. (8)
b) Draw and explain the FLEXRAY communication systems used in EV. (6)

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