

Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Seventh Semester B.Tech Degree Examination (Regular and Supplementary), December 2020

Course Code: EE469**Course Name: Electric and Hybrid Vehicles**

Max. Marks: 100

Duration: 3 Hours

PART A*Answer all questions, each carries 5 marks.*

Marks

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| 1 | Explain the historical background of electric and hybrid electric vehicles. Describe the present technological trends of EV/HEV and the challenges associated with it. | (5) |
| 2 | With the help of block diagram explain the major components of an electric vehicle. | (5) |
| 3 | What is the need for gear in IC Engines? | (5) |
| 4 | Explain the significance of deep cycles and depth of discharge of batteries associated with in EV/EHVs. | (5) |
| 5 | How does DC drive is operated in regenerative braking mode? | (5) |
| 6 | What are the factors to be considered for sizing a traction motor? | (5) |
| 7 | Distinguish between rule-based strategy and optimization-based strategy for energy management in EHV's. | (5) |
| 8 | What are the various communication networks that can be used in Electric /Hybrid vehicles? | (5) |

PART B*Answer any two full questions, each carries 10 marks.*

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| 9 | a) Differentiate between parallel hybrid and series parallel hybrid configurations. | (6) |
| | b) Draw the torque -speed characteristics required for an electric/hybrid vehicle power plant. | (4) |
| 10 | Derive dynamic equation for vehicle motion. | (10) |
| 11 | With the help of block diagram explain the basic architecture of hybrid electric vehicle and specify the energy savings potentials of HEV. | (10) |

PART C*Answer any two full questions, each carries 10 marks.*

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| 12 | a) Discuss different methods of control used for DC- DC controlled drives in EV/HEV. | (5) |
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- b) Draw the block diagram of Electric Propulsion unit of electric vehicle and mention the relevance of each block. (5)
- 13 a) Explain the working of super capacitors. Give its advantages and disadvantages. (5)
- b) Explain the operation, advantage and disadvantages of Fuel cell. (5)
- 14 a) What is meant by C – rating of a battery? If a 1000Ah battery is rated 10C, what would be its discharge current? (4)
- (b) Why in EV/HEV applications field oriented controlled induction motor is preferred over v/f control? (6)

PART D

Answer any two full questions, each carries 10 marks.

- 15 a) Compare different energy management strategies used in EV/HEV. (10)
- 16 a) What is sizing of drive system? What are the factors to be considered for matching various components of drive system? (10)
- 17 a) Explain the fuzzy logic-based energy management control strategy used in EHV. (5)
- b) Enlist the sizing criteria of transmission systems used in EHV. (5)
