

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)

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