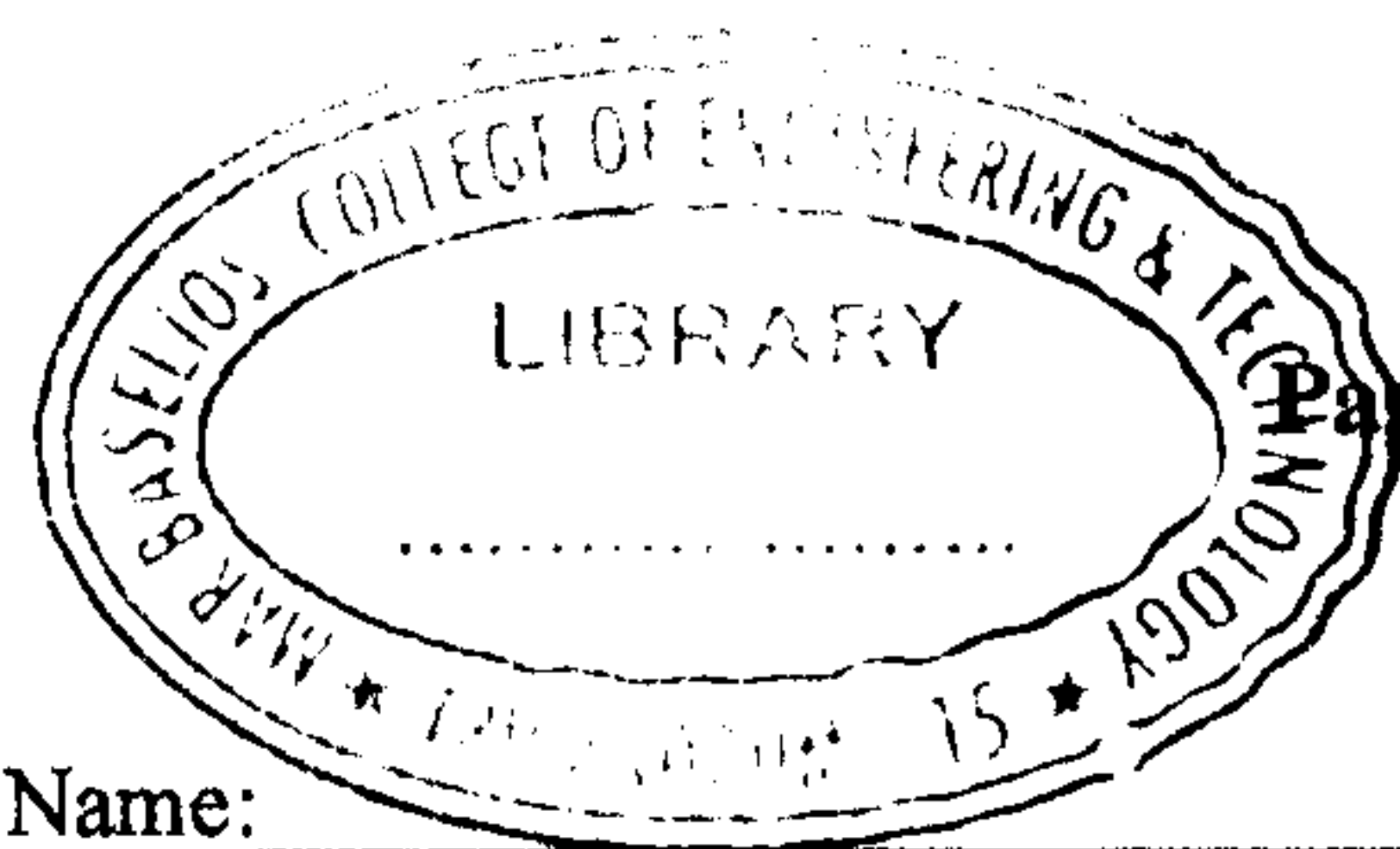


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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
SEVENTH SEMESTER B.TECH DEGREE EXAMINATION(R&S), DECEMBER 2019

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

- | | | |
|---|---|-----|
| 1 | Explain the vehicle power source and transmission characteristics. | (5) |
| 2 | Give the different classification of electric vehicles based on drive train configurations. | (5) |
| 3 | What are the desired features of electric motor used in electric vehicles? | (5) |
| 4 | Define the terms specific power and energy density associated with energy storage systems of electric vehicles. | (5) |
| 5 | What are the factors on which the sizing of electric motors for electric vehicle depends? | (5) |
| 6 | What are the points to be considered for selecting the energy storage technology for hybrid electric vehicle? | (5) |
| 7 | What are the supporting sub systems of hybrid electric vehicles? | (5) |
| 8 | Enlist different rule-based strategies for the energy management in hybrid vehicle. | (5) |

PART B

Answer any two full questions, each carries 10 marks.

- | | | |
|----|---|------|
| 9 | a) Compare the performance of ICE vehicles with hybrid electric vehicles. | (5) |
| | b) Give the different classification of electric vehicles based on power source configurations. | (5) |
| 10 | a) How the hybrid vehicles are classified based on the general definitions? | (5) |
| | b) Explain the dynamic modelling of a four-wheeler vehicle with necessary assumption. | (5) |
| 11 | a) Explain the general electric vehicle configuration with the help of block diagram. | (10) |

PART C

Answer any two full questions, each carries 10 marks.

- 12 a) With the help of neat diagrams explain the four-quadrant chopper-based speed control of DC motors. (6)
- b) Explain the working of fuel cell and also state its limitation. (4)
- 13 a) Draw and explain the ideal torque speed characteristics of electric drive for electric vehicles. (3)
- b) How is it possible to use fly wheel as an energy storage device for electric vehicle? (4)
- c) Give the advantages and disadvantages of super capacitors as an energy storage device in electric vehicle. (3)
- 14 a) Explain the v/f speed control of induction motors used in electric vehicle. (6)
- b) What superior characteristics of super capacitors make it more suitable for electric vehicle applications? (4)

PART D

Answer any two full questions, each carries 10 marks.

- 15 With the help of neat figure explain the epicyclic gear transmission system used in electric vehicle. (10)
- 16 a) State and explain the optimal control problem associated with hybrid vehicle. (4)
- b) With the help of block diagram explain the hierarchical power and data transmission networks of hybrid vehicles. (6)
- 17 a) With the help of block diagram explain the battery management supporting system of hybrid vehicle. (5)
- b) Enlist the factors which govern the sizing of power electronics for EHV's. (5)

