Code No: R1932241 **R19** **SET - 1**

III B. Tech II Semester Regular Examinations, June-2022

ELECTRICAL VEHICLES & HYBRID TECHNOLOGY

(Automobile Engineering)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions **ONE** Question from **Each unit**
All Questions Carry Equal Marks
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UNIT-I

1. a) Write a short note on vehicle power source characterization. [8M]
   b) Compare conventional vehicle with hybrid electric vehicle. [7M]

(OR)

2. a) Draw a general lay out of an EV and discuss the transmission characteristics. [8M]
   b) List the advantages and limitations of an electric vehicle. [7M]

UNIT-II

3. Explain the different power flow control modes of a typical parallel hybrid system with the help of block diagrams. [15M]

(OR)

4. What is meant by Constant Power Speed Ratio as applied to an electric motor? What is its typical value for Induction Motors used in HEV applications? [15M]

UNIT-III

5. Explain fuel cell and flywheel as energy source elements in electric and hybrid electric vehicle. [15M]

(OR)

6. Draw and explain the ideal traction power plant characteristic and various power source characteristics used in electric and hybrid electric vehicles. [15M]

UNIT-IV

7. A DC separately excited motor is powered by a dc to dc converter from a 600 volts dc source. The armature resistance is 0.05 Ω. The back emf constant of the motor is 1.527 V/A rad/sec. The average armature current is 250 amps. The field current is 2.5 amps. The armature current is continuous and has negligible ripple. If the duty cycle of the converter is 60%, determine: (i) the input power from the source, (ii) the equivalent input resistance of the dc-dc converter drive, (iii) the motor speed, and (iv) the developed torque. [15M]

(OR)

8. a) Comment on the suitability of DC and AC machines for electric and hybrid electric vehicle applications. [8M]

   b) Explain briefly the electrical and mechanical constraints to be considered while sizing an electrical machine for a EV. [7M]

UNIT-V

9. a) Explain The concept of Parallel Hybridization in Energy Storages of Hybrid Electric Vehicles. [8M]

   b) What do you mean by engine down-sizing? How can one get benefits from that? [7M]

(OR)

10. a) Explain the Different Categories of Energy Management Strategies in Electric Vehicles and Hybrid Electric Vehicles? [8M]

    b) What is meant by "gradeablity'? Explain. [7M]

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