Roll No…….. **Total No. of Printed Pages: 1**

Total No. of Questions: [09]

B. Tech EE (Semester – 7th)

ELECTRICAL AND HYBRID VEHICLES

Subject Code: BELED1712

Paper ID: [18111543]

Time: 03 Hours **Maximum Marks: 60**

Instruction for candidates:

1. Section A is compulsory. It consists of 10 parts of two marks each.
2. Section B consist of 5 questions of 5 marks each. The student has to attempt any 4 questions out of it.
3. Section C consist of 3 questions of 10 marks each. The student has to attempt any 2 questions.

Section – A **(2 marks each)**

Q1. Attempt the following:

a. Define hybrid vehicles
b. What is principle of operation of DC motor drives?
c. How can super capacitors be used to store energy?
d. What is energy management as referred to Hybrid vehicles?
e. Name the components used in Electric propulsion unit.
f. What is concept of electric traction?
g. What is principle of operation of fuel cell?
h. Where are switch reluctance motor drives used?
i. Draw the schematic showing power flow control in hybrid drive train topology.
j. What are the basic performance parameters for judging vehicle performance of conventional vehicles?

Section – B **(5 marks each)**

Q2. Derive a mathematical model to describe performance of conventional vehicles

Q3. Compare fuel efficiency of hybrid electric drive trains with electric drive trains.

Q4. Out of induction motor drives and permanent magnet motor drives, which offers better control possibilities? Explain the control topology.

Q5. How effective is flywheel based energy storage? Where can it be used?

Q6. What are the factors to be kept in mind while matching the electric machine and the internal combustion engine?

Section – C **(10 marks each)**

Q7. Give the design methodology for design of hybrid electric vehicle. What are the necessary points to be looked into while designing a hybrid electric vehicle?

Q8. How is hybridization of different energy storage devices done? What are the advantages of doing so?

Q9. What are the various hybrid train topologies available in market? Which one of them is most efficient? Why?