R18

Code No: 157BK

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech IV Year I Semester Examinations, February - 2025
ELECTRICAL AND HYBRID VEHICLES
(Electrical and Electronics Engineering)

Time: 3 Hours **Max.Marks:75**

Note: i) Question paper consists of Part A, Part B.
ii) Part A is compulsory, which carries 25 marks. In Part A, Answer all questions.
iii) In Part B, Answer any one question from each unit. Each question carries 10 marks and may have a, b as sub questions.

PART – A

(25 Marks)

1.a)	What are conventional vehicles?	[2]
b)	What are the advantages of conventional vehicles?	[3]
c)	Define Hybrid Electric vehicles.	[2]
d)	What are the advantages of Hybrid Electric Vehicles?	[3]
e)	List out the power control strategies of electric drive train.	[2]
f)	What are the benefits of Induction motors used in Hybrid Electric Vehicles?	[3]
g)	What is super capacitor based energy storage?	[2]
h)	What are the advantages of battery energy storage based system in Hybrid Electric Vehicles?	[3]
i)	Classify energy management strategies.	[2]
j)	What are the advantages of CAN (Control Area Network) in Energy Management Systems of Hybrid Electric Vehicles?	[3]

PART – B

(50 Marks)

2.a) How would you explain the transmission characteristics of conventional vehicles with an example?
b) Contrast between hybrid electric vehicles and conventional vehicles with suitable examples. [5+5]

OR

3.a) Infer some of the challenges facing by conventional vehicles in terms of improving fuel efficiency and reducing emissions.
b) Explain about petroleum resources of conventional Vehicles. Determine the mathematical model vehicle performance. [5+5]

4.a) Explain the energy consumption pattern of parallel hybrid electric vehicle. List the advantages of hybrid electric vehicle.
b) Discuss in detail about the instruction cycle. Explain the impact of modern drive trains on energy supplies. [5+5]

OR

5.a) Describe series hybrid electric vehicle configuration with a block diagram.
b) Interpret the power flow control in series hybrid electric vehicle drive train for acceleration and braking. [5+5]

6.a) Explain the series - parallel configurations of electric drive train with neat diagram.

b) Describe the principle for field oriented control of induction motor drives in hybrid electric vehicles. [5+5]

OR

7.a) Explain fuel efficiency analysis of electric drive trains.

b) Explain sensor less techniques of switch reluctance motor in hybrid electric vehicles and list the benefits of switch reluctance motor. [5+5]

8.a) Explain the concept of parallel hybridization in energy storages of Hybrid Electric Vehicles.

b) Describe the basic principle of super capacitors based energy storage system in hybrid electric vehicles. [5+5]

OR

9.a) Explain the sizing system of power electronics in Hybrid Electric Vehicles.

b) Explain the operation and principle of flywheel based energy storage system in electric vehicles. [5+5]

10.a) List different types of energy management systems. Describe about the battery management system in hybrid electric vehicles.

b) Explain about the battery management system in Hybrid Electric Vehicle. [5+5]

OR

11.a) How would you compare the different energy management strategies?

b) Draw the block diagram of control architecture of Battery Electric Vehicles (BEV) and analyze the each part of the block diagram. [5+5]

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