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Code No: 157BK

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech IV Year I Semester Examinations, December-2023/January-2023
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)	Describe the disadvantages of conventional vehicles.	[2]
b)	Classify Conventional Vehicles?	[3]
c)	What is the need and importance of electric and hybrid vehicle?	[2]
d)	What are the basic techniques to improve Vehicle Fuel Economy?	[3]
e)	What are the advantages of PMDC motors?	[2]
f)	What are the desired features of electric motor used in electric vehicles?	[3]
g)	Write short note on (i) State of Charge (SOC) (ii)State of Health of a battery.	[2]
h)	Write a short note on sizing the power electronics to hybrid vehicles.	[3]
i)	Draw the CAN system of an HEV.	[2]
j)	Explain "power follower" and "modified power follower" energy management strategy in hybrid vehicles.	[3]

PART – B

(50 Marks)

2.a)	Explain about the basics of Vehicle performances.	
b)	Describe the Transmission Characteristics of Conventional Vehicles.	[5+5]
	OR	
3.a)	Explain about the induced cost of conventional Vehicles.	
b)	Explain the occurrence of the Global Warming due to Conventional Vehicles.	[5+5]
4.a)	List out electric components used in hybrid and electric vehicles and explain it.	
b)	How would you describe the fuel efficiency analysis in hybrid electric drive-trains?	[5+5]
	OR	
5.a)	Compare electric and hybrid vehicles in terms of driving range, environmental impact, operating economy and drivetrain losses.	
b)	Illustrate the power flow control in hybrid electric drive train.	[5+5]
6.a)	Explain various configuration and control of DC Motor drives.	
b)	Explain the electric vehicle drivetrain alternatives based on drivetrain configuration.	[5+5]
	OR	
7.a)	With a neat sketch,expalin the configuration of parallel hybrid electric drive train?	
b)	Explain various configuration and control of Introduction Motor drives.	[5+5]

8.a) Explain the operation of flywheel based energy storage and its analysis with neat diagram.
b) What are the factors on which the sizing of the propulsion motor used motors for electric vehicle depends? [5+5]

OR

9.a) Explain the operation of fuel cell based energy storage and its analysis with relevant chemical reaction and diagram.
b) What are the factors to be considered while selecting energy storage technology for hybrid electric vehicle? [5+5]

10.a) Explain "state machine" energy management control strategy in hybrid vehicles?
b) What is the role of an energy management system in hybrid vehicles? [5+5]

OR

11.a) Classify of different energy management strategies.
b) List the major functions of the control system in a HEV. [5+5]

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