School of Engineering

B.TECH Mechanical Engineering in E-Vehicles and Autonomous Vehicles
Semester End Examination - Jun 2024

Duration : 180 Minutes
Max Marks : 100

Sem VI - G3UC603B - EV drive and Control

General Instructions
Answer to the specific question asked
Draw neat, labelled diagrams wherever necessary
Approved data hand books are allowed subject to verification by the Invigilator

1)	What is the major advantage of permanent magnet (PM) machines?	K1(2)
2)	Explain the importance of gauges in electric vehicles, highlighting the criteria for selecting suitable gauges and discussing the limitations of various gauge types.	K2(4)
3)	How does a buck converter with an RL load and filter differ from other configurations?	K2(6)
4)	Compare the steady-state analysis of PM machines operating in the 120° and 180° conduction modes, highlighting the key differences in the solution approaches and the advantages/disadvantages of each mode.	K3(9)
5)	Derive an expression for the rms value of the output voltage of a single-pulse width modulated inverter with a resistive load.	K3(9)
6)	Evaluate the significance of high-voltage and low-voltage meters in electric vehicles, analyzing their respective functions and how they contribute to monitoring battery and auxiliary battery performance.	K5(10)
7)	Assess the significance of speed controllers in electric vehicles, explaining their function and importance in ensuring efficient motor operation.	K4(12)
8)	Analyze the braking force, braking power, and braking energy characteristics on the front and rear wheels of a passenger car in an FTP 75 urban drive cycle, based on the provided figures and information.	K5(15)
9)	With the help of a block diagram, explain the control architecture of HEVs, including the roles of different ECUs and the Control Area Network (CAN).	K5(15)
10)	Explain the role and significance of power converters in the configuration of electric vehicles (EVs) and hybrid electric vehicles (HEVs), considering their impact on overall system efficiency and performance. Provide examples to illustrate key points.	K6(18)