Reg.No. _____

Karunya UNIVERSITY

(Karunya Institute of Technology & Sciences)
(Declared as Deemed-to-be University under Sec.3 of the UGC Act, 1956)

End Semester Examination – Nov/Dec – 2016

Code : 14EE3030
Sub. Name : MODELLING AND DESIGN OF ELECTRIC AND HYBRID VEHICLE

Semester : 2016-17 ODD
Duration : 3hrs
Max. marks : 100

ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)

Q. No.	Sub Div.	Questions	Course Outcome	Marks
1.	a.	Discuss the Important of Hybrid Electric Vehicle	CO1	5
	b.	Derive the Mathematical modelling of Tractive Effort on the Wheels of an Electric Vehicle and draw the block diagram to implement the same in Matlab/Simulink	CO2	15
		(OR)		
2.	a.	Model the Range of Battery operated electric scooter for the following specifications, Mass of the vehicle with passenger – 200kg Drag Co-efficient C_d – 0.75 Frontal area of vehicle – 0.6 m^2 Air density - 0.625 $kg.m^{-3}$ Co-efficient of rolling resistance – 0.007 Gear ratio - 10, radius of the wheel – 0.21m 18V DC motor, Motor speed – 70 rpm/V Armature resistance – 0.016 Ω	CO2	20
3.	a.	How does the fuel cell Electric Vehicles differ from battery operated electric vehicles? Explain the Range modeling of Fuel cell Electric Vehicle.	CO2	15
	b.	Discuss the necessity of battery modelling.	CO1	5
		(OR)		
4.	a.	Compare the driving cycles, used for modelling the Range of Electric Vehicle.	CO1	10
	b.	Derive the mathematical model of Boost Converter and Rectifier with switching resistance losses for EV and HEV applications.	CO2	10
5.	a.	Write the modeling equation to find out the battery power for an electric vehicle.	CO2	10
	b.	Draw the flowchart for the design of battery operated electric vehicle and explain.	CO1	10
		(OR)		
6.	a.	Derive the Mathematical model of an Inverter with switching resistance losses for EV and HEV applications.	CO2	5
	b.	Explain the Multi-quadrant control of Chopper Fed DC Motor Drive used for EVs and HEVs.	CO1	15
7.	a.	Investigate the different type Converters for Switched Reluctance Motor Drive for EV and HEV applications.	CO3	10
	b.	Explain the general design strategy for the Switched Reluctance Motor Drive.	CO1	10
		(OR)		
8.	a.	Discuss the methods used to control the BLDC motor by Sensing Back emf.	CO3	15
	b.	Explain the method to extend the speed of EVs and HEVs?	CO3	5

		Compulsory:		
9.	a.	With the help of Mathematical model of Permanent Magnet BLDC motor, Explain the method to obtain the Desired torque and speed at a given load.	CO3	**15**
	b.	How does the Permanent magnet BLDC motor perform well when compared to the conventional motors for EVs and HEVs?	CO3	**5**

ALL THE BEST