



## End Semester Examination – Nov/Dec – 2016

Code : **14EE3029**  
Sub. Name : **Electric and Hybrid Vehicles**

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.	What impact will Electric and Hybrid vehicles make on modern transportation?	CO1	10
	b.	Discuss the basic parameters for vehicle performance.	CO1	10
(OR)				
2.	a.	Explain with neat diagram various configurations of Hybrid Electric Vehicle. List down few advantages and disadvantages.	CO1	20
3.	a.	With a block diagram, describe the working of a Fuel Cell Electric Vehicle. Explain the control strategy for FCEV.	CO3	20
(OR)				
4.	a.	Explain various technologies by which ultracapacitors are used to store energy in EV and HEV.	CO3	10
	b.	Discuss the basic parameters for vehicle performance.	CO1	10
5.	a.	Draw and explain the functional block diagram of Electric Propulsion System in electric and hybrid vehicles.	CO2	20
(OR)				
6.	a.	Design the size of traction motor for an EV with following specification <u>Parameters:</u> Vehicle total mass, $M$ :1500kg Rolling resistance coefficient, $f_r$ :0.01 Aerodynamic drag coefficient, $C_D$ :0.4 Front area, $A_f$ :2.0m <sup>2</sup> Transmission efficiency(single gear):0.9 Speed ratio, $x$ =6 <u>Performance specification:</u> Acceleration time (from 0 to 100km/h), $t_a$ :10 s Maximum gradeability:>30% at low speed and >5% at 100km/h. Maximum speed: 160km/h Assume air density as 1.202kg/m <sup>3</sup>	CO2	10
	b.	Briefly about the principle and chemical reaction of Lead acid batteries and its use in hybrid vehicles.	CO3	10
7.	a.	Explain with neat diagram, the Parallel Hybrid Brake system in electric and hybrid vehicles with ABS.	CO3	20
(OR)				
8.	a.	Explain the basic operation of induction motor. Also explain in detail the constant Volt/Hertz control for traction applications.	CO3	20
<b><u>Compulsory:</u></b>				
9.	a.	Describe the operation of Flywheel. Explain the various flywheel technologies that could be used in Electric and Hybrid Vehicles.	CO2	20