Time : 3 Hours **Marks: 80**

Note :

- **Question No.1 is compulsory.**
- Solve **ANY THREE** questions from the **remaining** questions.
- Figure to the right indicates full marks.

			Marks
Q. 1		Solve **ANY FOUR** questions from following. (Each question carries 5 marks)	**20**
	a)	Explain the basic movements in vehicle driving.	
	b)	Explain the AC and DC characteristics of motors used in EV/HEV.	
	c)	Give the importance of flywheels used in EV/ HEV	
	d)	Explain Rule based energy management strategy.	
	e)	Give the drawbacks of the batteries used in EV/HEV	
Q. 2	**a)**	Explain the series-parallel architecture with neat diagram. Also explain the power flow stages at each stage.	**10**
	b)	Explain why hybridization of energy sources is important for EV/HEV.	**10**
Q.3	**a)**	Explain the power characteristics of ICE and motors used in EV/HEV ?	**10**
	b)	Explain the working of ulteracapacitors with neat diagram. Compare it with other energy sources used in EV/HEV	**10**
Q4.	**a)**	(i)Derive the expression of power output for the series motor ?	**05**
		(ii) Define SOC, DOD, Specific energy of battery. Calculate peukart capacity of lead acid battery discharge time of 20 hours having current carrying capacity 5A (k = 1.5)	**05**
	b)	Explain with neat diagram V2G concept? Also mention the advantages and disadvantages.	**10**
Q5.	**a)**	Classify the DC and AC chargers used in EV and HEV as per the standard rating. Draw a neat diagram and give applications of the vehicles.	**10**
	b)	Explain the working of SRM motor used in EV/HEV.	**10**
Q6.	**a)**	Explain the fuel efficiency of anyone drive train in EV/HEV.	**10**
	b)	Explain working of converters. Draw and explain two quadrant DC-DC choppers.	**10**
