

Reg. No.																			
----------	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Question Paper Code	12606
---------------------	-------

B.E. / B.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2024

Seventh Semester

Electrical and Electronics Engineering

20EPC702 - ELECTRIC VEHICLES

Regulations - 2020

Duration: 3 Hours

Max. Marks: 100

PART - A (10 × 2 = 20 Marks)

Answer ALL Questions

	Marks	K- Level	CO
1. What are the limitations of electric vehicles when compared to petrol and diesel vehicles?	2	K2	CO1
2. What are the 4 different types of hybrid vehicles?	2	K1	CO1
3. Define PEM fuel cell.	2	K1	CO2
4. What is the use of ultra capacitors in electric vehicles?	2	K1	CO2
5. What are the advantages of PMBLDC motors?	2	K1	CO3
6. Why is the rotor position sensor essential for the operation of a switched reluctance motor?	2	K1	CO3
7. Mention any four merits of a series hybrid electric drive train.	2	K2	CO4
8. What is the difference between hybrid and plug-in hybrid?	2	K1	CO4
9. What is Z-Converter and write its primary functions in power electronics?	2	K1	CO5
10. What are the applications of isolated bidirectional DC-DC converters?	2	K1	CO5

PART - B (5 × 13 = 65 Marks)

Answer ALL Questions

11. a) With the help of a block diagram explain the major components of an electric vehicle.	13	K2	CO1
OR			
b) Enlist the different architectures of hybrid electric drive train and explain the series - parallel hybrid electric drive train.	13	K2	CO1
12. a) Explain about Lithium Based Batteries in Energy Storage System.	13	K2	CO2
OR			
b) Explain in detail about thermal management of the PEM fuel cell.	13	K2	CO2
13. a) Explain the operation of the PMBLDC motor when it is connected with star connection in a stator.	13	K2	CO3
OR			
b) With a neat block diagram, describe in detailed closed loop operation of switched reluctance motor.	13	K2	CO3

14. a) Explain the control strategy of Series Hybrid drive train with flow chart. 13 K2 CO4

OR

b) Draw and explain the architecture and power flow control of parallel HEV. 13 K2 CO4

15. a) Explain in detail about various types of battery charging methods. 13 K2 CO5

OR

b) Explain the two control strategies of Z converter topology. 13 K2 CO5

PART - C (1 × 15 = 15 Marks)

16. a) i) Draw a schematic diagram and explain the operation of a 'C' dump converter used for the control of SRM. 8 K4 CO3

ii) Describe the operating principles of a full-bridge isolated bi-directional DC-DC converter. 7 K4 CO5

OR

b) i) Explain the closed loop speed control methods of Induction motor drives used in EV. 7 K4 CO3

ii) Explain the operation of high frequency transformer based isolated charger topology. 8 K4 CO5