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22ELP317N

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc DEGREE EXAMINATION DECEMBER 2025
(Third Semester)

Branch- **APPLIED ELECTRONICS**

HYBRID ELECTRIC VEHICLE

Time: Three Hours Maximum: 75 Marks

SECTION-A (10 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks (10 × 1 = 10)

Module No.	Question No.	Question	K Level	CO
1	1	What is the primary energy source for electric vehicles ? a) Gasoline b) Electricity stored in batteries c) Diesel fuel d) Hydrogen	K1	CO1
	2	Find in a fuel cell what process converts hydrogen and oxygen into electricity. a) Combustion b) Electrolysis c) Electrochemical reaction d) Fermentation	K2	CO1
2	3	What is the impact of modern drive technologies on vehicle maintenance? a) Increased frequency of maintenance b) Higher costs for parts c) More complex systems d) Lower maintenance requirements due to fewer moving parts	K1	CO2
	4	Classify which charging technique allows a hybrid vehicle to charge its battery while driving. a) Regenerative braking b) Inductive charging c) Plug-in charging d) Fast charging	K2	CO2
3	5	Select, what is electric traction primarily used for? a) Heating residential buildings b) Powering electric vehicles and trains c) Operating household appliances d) Generating renewable energy	K1	CO3
	6	Show in a typical DC motor drive, what does the armature control primarily affect? a) Direction of rotation b) Power factor c) Efficiency d) Torque output	K2	CO3
4	7	Select in hybrid energy storage systems, supercapacitors are often paired with: a) Lithium-ion batteries b) Flywheels c) Diesel generators d) Solar panels	K1	CO4
	8	Tell about what is the primary factor to consider when sizing a drive system for a specific application. a) Aesthetic design b) Load characteristics c) Color of components d) Manufacturer brand	K2	CO4
5	9	Relate about the primary factor influencing the range of a battery electric vehicle (BEV). a) Color of the vehicle b) Interior design c) Battery capacity d) Tire brand	K1	CO5
	10	Infer the primary factor that determines the range of a fuel cell electric vehicle (FCEV). a) Fuel cell efficiency b) Battery size c) Vehicle color d) Tire pressure	K2	CO5

Cont...

SECTION - B (35 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** Marks (5 × 7 = 35)

Module No.	Question No.	Question	K Level	CO
1	11.a.	Infer in details about the history of electric vehicles.	K2	CO1
		(OR)		
	11.b.	Explain the working principle of fuel Cell EV.		
2	12.a.	Develop about the social and environmental importance of electric vehicles.	K3	CO2
		(OR)		
	12.b.	Plan and explain the list on the classification of different energy management strategies.		
3	13.a.	Analyze the concepts of train topologies.	K4	CO3
		(OR)		
	13.b.	Discover about the configuration and control of DC motor drives.		
4	14.a.	Assume the process of battery-based energy storage and its analysis.	K4	CO4
		(OR)		
	14.b.	Survey about working details of selecting the energy storage technology.		
5	15.a.	Categorize about types of driving cycles.	K4	CO5
		(OR)		
	15.b.	Dissect the operation of range modeling for battery electric vehicle.		

SECTION -C (30 Marks)

Answer **ANY THREE** questions

ALL questions carry **EQUAL** Marks (3 × 10 = 30)

Module No.	Question No.	Question	K Level	CO
1	16	Examine the role of solar-powered vehicles with these applications.	K4	CO1
2	17	Interpret various charging techniques in hybrid systems and implementation issues of energy management strategies.	K5	CO2
3	18	Judge the principle configuration and control of switch reluctance motor drives.	K5	CO3
4	19	Identify the effects of fuel cell-based energy storage and its analysis.	K3	CO4
5	20	Assess the process of solar-powered vehicles with advantages and disadvantages.	K5	CO5

Z-Z-Z END