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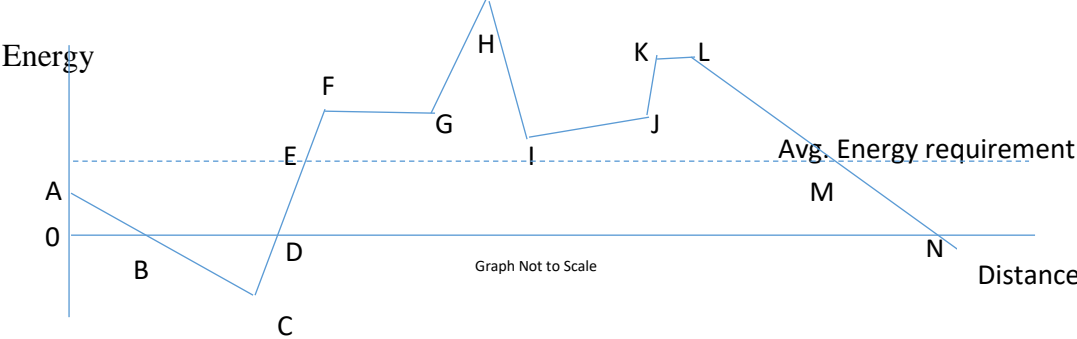


UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Sem Examination, Dec 2021

Course: Introduction to eVehicles
Programme: B.Tech Electrical Engineering
Course Code: EPEG 3017

Semester: V
Max Marks:100
Duration : 3 Hrs.

S. No.		Marks	CO
	Section A		
	Short Answer Question. Each Question carries 4 marks		
Q.1	Fill in the Blanks: a) While running, the pollution created by Conventional Vehicles is around ____ b) To increase the range of eVs the size/capacity of _____increases c) In case of eVs, Engine Control Unit of conventional vehicles is replaced by __	2+1+1	CO1
Q.2	Match the pair for Conventional vehicles & eVs A) Gear Box P) Battery (A) = (?) B) IC Engine Q) Electric Motors (B) = (?) C) Fuel Tank R) Not Required (C) = (?) D) Carburetor S) Can be eliminated (D) = (?)	1*4	CO2
Q.3	Complete sentence using correct word (P=Series, Q=Parallel, R=Series – Parallel, S=Hybridization) A) In _____ hybrid system power can flow from Motor to IC Engine. B) ----- hybrid system is most simples one. C) The performance of HEV can be improved by _____ D) In _____ hybrid system, both power system fed power to wheels (A=?, B=?, C=?, D=?)	1*4	CO3
Q.4	While designing eV A) The acceleration of vehicles is affected by (motor/battery) size. B) Mileage of eVs can damage due to (cement/tar) road C) PEV are type of (Series/Parallel) hybrid system D) As per BMS Energy supply for motor has (highest/lowest) priority	1*4	CO4
Q. 5	In an eV, the aerodynamic drag is 20 N at a speed of 60kmph. If velocity is increased to 80 kmph, what is new value of aerodynamic drag.	4	CO2
	Section B		
	Each Question carries 10 marks		
Q.1	Discuss in brief bout the various parameters consideration while selecting Battery Bank for eVehicles. How aspiration V/S reality can be balanced in modern days.	10	CO1
Q.2	Explain the architecture of Hybrid eV using Parallel Hybrid combination. With diagram, elucidate power flow.	10	CO3
Q.3	Describe the PWM method of speed control for IM. Draw Associated waveforms. OR Describe the T-S characteristics of Sq. Cage IM and also explain associated modifications recommended in characteristics so that Sq. IM can be used for eVs.	10	CO3

Q.4	Illustrate the various challenges and issues associated with future of eVehicles	10	CO1
Section 'C'			
Long Answer Question (20 Marks)			
Q 1	<p>Develop a hybrid Battery-Ultra Capacitor Energy management system for the following duty cycle. Show the Energy Flow during each part</p>  <p style="text-align: center;">Graph Not to Scale</p>	20 M	CO4
	<p style="text-align: center;">OR</p> <p>An electric vehicle is designed such that, when its batteries are fully charged, gives a mileage of 220 kMs at an average speed of 70 km/hr. Energy Requirement for various resistances & for Drag is as follows: Rolling resistance: 2.8%, Aerodynamic: 5.1%, Averaged Gravitational pull: 7.8%, Passenger comfort System: 8 %, Vehicle Lighting System: 3%, Transmission Losses: 12%, Rest is for Propulsion. The vehicle driver is driving vehicle @ 70 km/hr, while tyre pressure is below standard and front windows are open. Due to open windows the Aerodynamic Drag Coefficient increased from 0.46 to 0.49 and due to incorrect tyre pressure, the coefficient of rolling resistance increased to 0.015 from 0.02. If the rest parameters remain same, calculate the change in vehicle mileage.</p>		
Q. 2	a. In a PHEV, a 30 kwh battery provides a mileage of 240 kms @ an average speed of 80 kmph. If the mileage (Range) is to be increased to 320 kms at the same average speed suggest the size of DG set.	7	CO2
	b. With neat diagram, enumerate the IC engine characteristics.	5	
	c. Explain the following terms related to Energy storage and their importance in reference to eVs i) State of Charge ii) Specific Energy (Energy Density)	8	