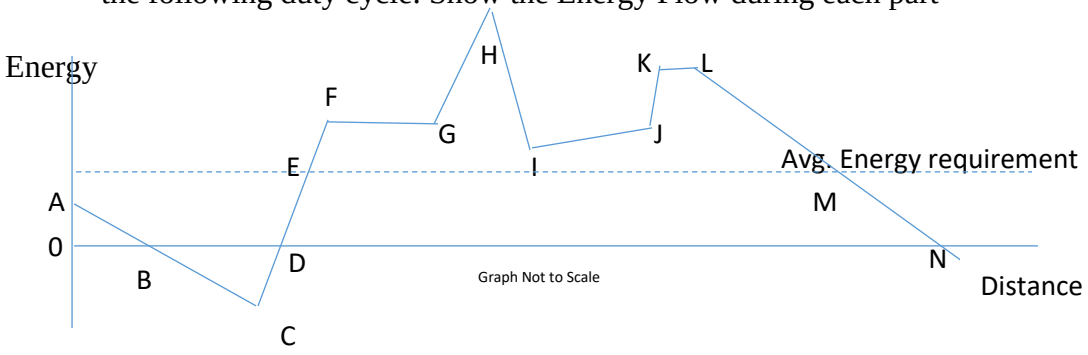
Name: **Enrolment No:**	UPES

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
Online End Sem Examination, Dec 2020

Course: Introduction to eVehicles **Semester: V**
Programme: B.Tech Electrical Engineering **Max Marks:100**
Course Code: EPEG 3017 **Duration : 3 Hrs.**

S. No.		Marks	CO
	Section A Short Answer Question. Each Question carries 5 marks		
Q.1	Fill in the Blanks: a) While running, the pollution created by eV is around _____ b) The most costliest part of high mileage eVs is _____ c) In case of eVs, IC engine of conventional vehicles is replaced by _____	**2+2+1**	**CO1**
Q.2	In an eV, the aerodynamic drag is 15 N at a speed of 50kmph. If velocity is increased to 60 kmph, what is new value of aerodynamic drag.	**5**	**CO2**
Q.3	Match the pair for conventional vehicles: A) Gear Box P) Has one set of gear tooth ratio (A) = (?) B) IC Engine Q) Power System (B) = (?) C) Clutch R) For curvature roads (C) = (?) D) Differential gear S) Different torque speed (D) = (?) E) Reverse gear T) High Friction plate (E) = (?)	**1*5**	**CO2**
Q.4	Complete sentence using correct word (P=Series, Q=Parallel, R=Series – Parallel, S=Complex, T=Hybridization) A) In _____ hybrid system power can flow from Motor to IC Engine. B) ---------- hydrid 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 E) In _____ hybrid system power can flow from IC to Motor but not vice versa (A=?, B=?, C=?, D=?,E=?)	**1*5**	**CO3**
Q.5	With respect to PE control of Electric motors mention True or False A) DC motor speed control is achieved by Flux control. B) In third quadrant, DC motor works in forward motoring mode. C) PWM based inverters produces perfectly sinusoidal waveform. D) The induction motor speed can be controlled by varying the frequency. E) In dual converters, final output voltage is perfectly DC.	**1*5**	**CO3**
Q.6	While designing eV A) The acceleration of vehicles is affected by (motor/battery) size. B) eVs will provide a larger mileage on (hard/soft) road C) PEV are type of (Series/Parallel) hybrid system D) Energy supply for passenger comfort system is (highest/lowest) priority E) In eVs (clutch/drive system) can be eliminated.	**1*5**	**CO4**

	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	With neat diagram, enumerate the ideal power drive characteristics of vehicles.	**10**	**CO2**
Q.3	Explain the architecture of Hybrid eV using Series Hybrid combination. With diagram, elucidate power flow.	**10**	**CO3**
Q.4	Describe the four-quadrant operation of DC drive and elaborate its necessity and importance for eVehicles.	**10**	**CO3**
Q.5	Illustrate the various challenges and issues associated with future of eVehicles	**10**	**CO1**
	Section 'C' **Long Answer Question (20 Marks)**		
Q 1	Develope a hybrid Battery-Ultra Capacitor Energy management system for the following duty cycle. Show the Energy Flow during each part  **OR** An electric vehicle is deigned such that, when its batteries are fully charged, gives a mileage of 120 kMs at an average speed of 60 kM/hr. Energy Requirement for various resistances & for Drag is as follows: Rolling resistance: 3.1%, Aerodynamic: 4.9%, Averaged Gravitational pull: 5.1%, Passenger comfort System: 9 %, Vehicle Lighting System: 5%, Transmission Losses: 11%, Rest is for Propulsion. The vehicle driver is driving vehicle @ 60 kM/hr, while type pressure is below standard and front windows are open. Due to open windows the Aerodynamic Drag Coefficient increased from 0.53 to 0.61 and due to incorrect tyre pressure, the coefficient of rolling resistance increased to 0.008 from 0.005. If the rest parameters remain same, calculate the change in vehicle mileage.	**20 M** **20 M**	**CO4** **CO4**