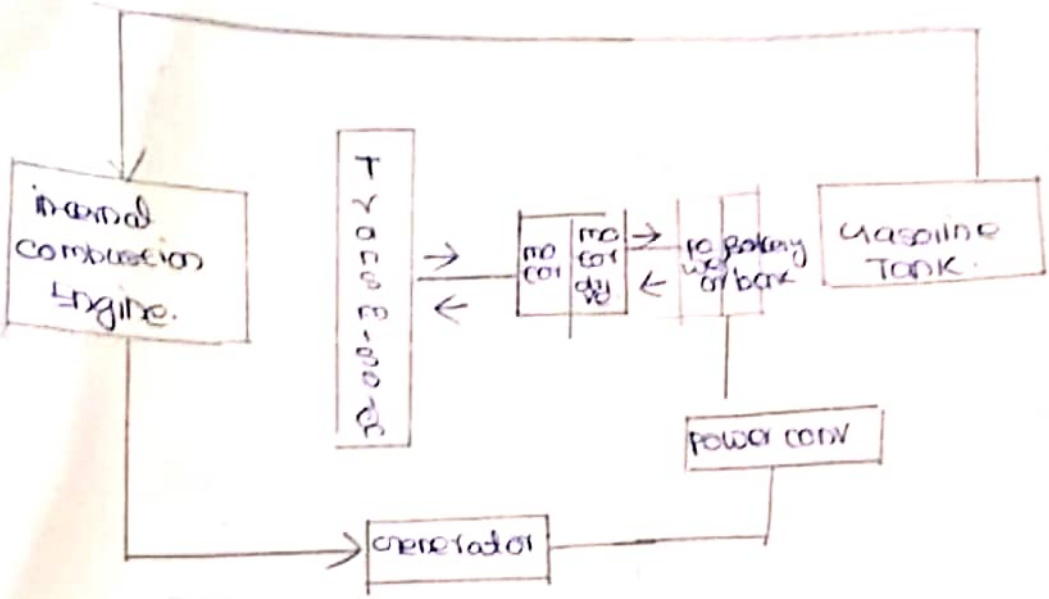
Explain and Draw the Layout of following Hybrid Electric Vehicle with their advantages, Disadvantages and Industrial application in automotive segment.

Ans: a) series hybrid electric vehicle.



* series Hybrid electric vehicle is an electric vehicle which assisted by an internal combustion engine and Trans mission system does not have direct connection with internal combustion engine.

→ when the EV heated extra power then the generator connected to the ICE starts producing electricity which is then used for charging battery with the help of power converter.

→ which is then converted and controlled by motor drive.

→ it has 4 case according to the driving condition.

they are:

→ normal driving,

→ Light road
→ during Braking.
→ Vehicle at stop.

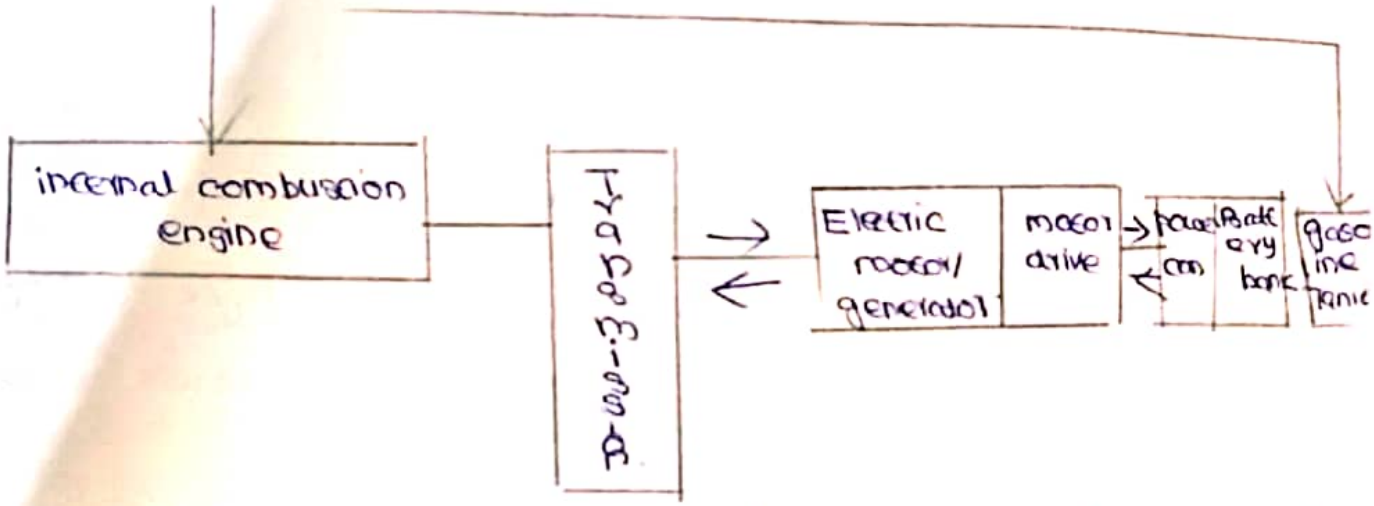
Advantages:

* The internal combustion engine has to operate in its narrow optimal region and it has nearly ideal torque-speed characteristics.

Disadvantages

The efficiency recalled due to multiple conversion of electrical mechanical energy and two electric machine are needed and a big traction motor is required.

b) Parallel Hybrid Vehicle.



* Here both ICE and Electric motor has connection with transmission system makes it works parallely.

* it has 5 modes.

mode 1: when ICE works motor will be generating energy in the isc mode.

* The electric drive mode where ICE not working and hybrid where both works and Low battery mode where engine is in charging < drive mode. and regenerative braking

regenerative braking where motor generates electricity and stores in battery while braking. 3

Advantages:

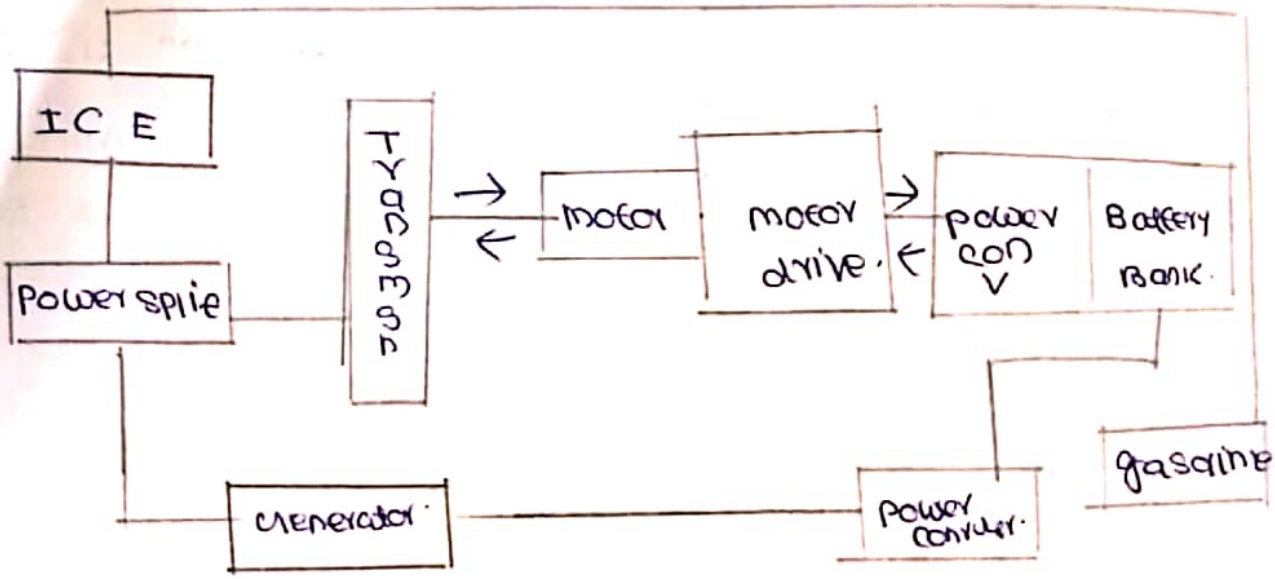
→ Low energy loss from conversion and compactness.

Disadvantages:

→ The engine operating points cannot be fixed in a narrow speed region.

→ The mechanical configuration and the control strategy are complex compared to series hybrid drive train.

c. Series parallel Hybrid electric vehicle.

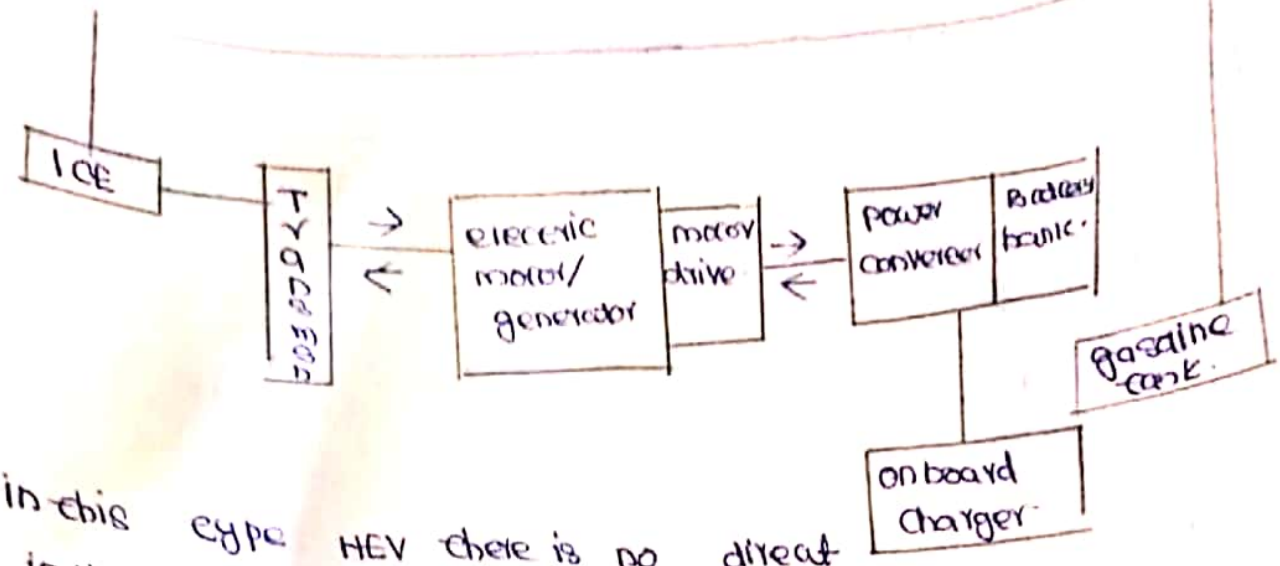


* Here A power split is used to connect ICE with E-transmission and generator at same time and have features of both series and parallel hybrid toyota prius is the first model.

Advantages:

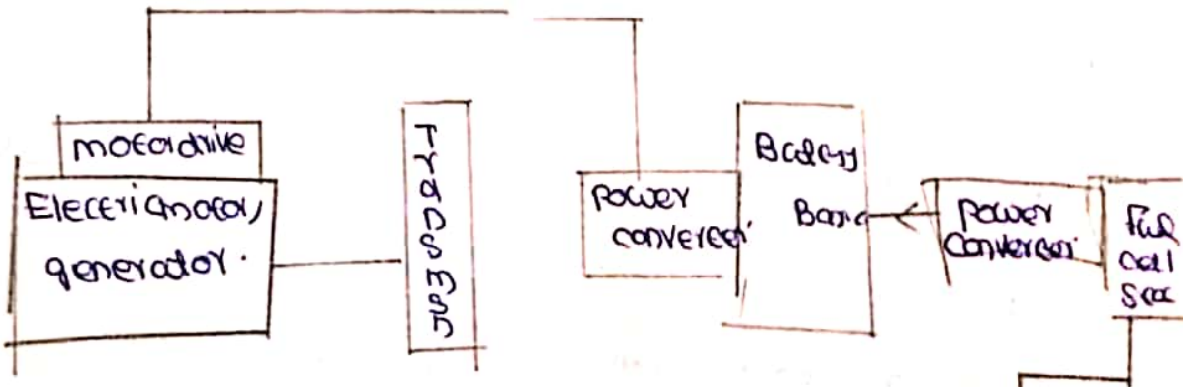
→ The electric motor can be used at low power over short distances.

d) Plug in Hybrid electric vehicle.

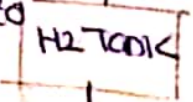


* in this type HEV there is no direct or indirect connection of ICE with motor like ICE cannot be used as a generator to charge battery. but there is an onboard charger to charge the battery TANK. The main advantages PHEV are zero emission on battery driving fuel efficiency in traffic easy to drive and disa are its relatively expensive and complex to maintain and battery life concerns.

Fuel cell Electric Vehicle.



* In FCEV H2 gas is used as an fuelcell stack to produce electricity to charge battery of running motor. here motor is only connected to Transmission and act as both motor and generator.



9 Explain the journey of Automobile with the help of flow 5
chare from the beginning of 18th century to the late century
and gives brief description on the following mileseone in
the automotive.

Ans: The journey of automobile industry seares with in the 18th with the invention of world first electric motor by Anyoderic. which is then used for his first small model car. As a continuation of this invention Automotive industry got developed and took further steps ahead. invention of crude electric carriage, small scale electric car powered by non rechanged primary cels and bulairs First known electric Automotive were the major inventions in eighteen.

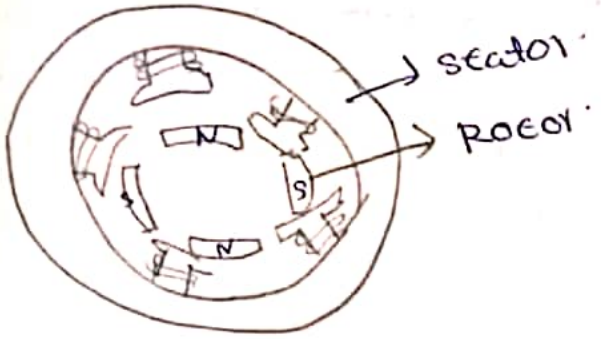
The invention of the improved Battery technology in france in 1881 by gaston plose lead to the reaching mileseone for william morrison in 1896 by building the first successful E.V with capacity. 3people including the driver at Centrum of 19th century. 40% of american cars were produced by steam 38% by electricity and 22% by petrol. commercial electric vehicle were produced primarily in Europe.

→ Then in the year of 2nd November 2003 toyota offried its RAV4-EVs and in 2004 Tesla motors secured development of Tesla roadstar model.

which is then delivered in acos.

Q) Explain with diagram the construction and working principle BLDC motor.

Ans



* 3 types of motors are being used in an EV that are BLDC (Brushless Dc motor) induction motor, pmsm (permanent magnet Synchronous motor.

* As the name says BLDC motor doesnot have Brushes thause reduces frich heat losses By brash the efficiency. range of BLDC motor is min 35% to 9500 and ie coses 3-times more and BLDC motor are known to be the lightese among them with the weight range of 0.3 – 0.40% weight. since ie is light in weight these types of motors are used in 2 wheeles and 3 wheelers.

---

mohammed Ajsal.K.