**Intern’s Details**

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| **Smart Task No.** | 1 |
| **Project Topic** | Electric Vehicle – Techno-Commercial Analysis |

**Smart Task (Solution)**

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| **Task Q1 : What is EV? Its basic working principle and theory. Its types. Its operations and specifications. Other basic information.** |
| **Task Q1 Solution :**  Electric vehicles (EVs) are vehicles that utilization electric engines as a wellspring of propulsion. EVs use a locally available power stockpiling framework as a wellspring of energy and have zero tailpipe discharges. Present-day EVs have productivity of 59-62% changing electrical energy from the capacity framework over to the wheels. EVs have a driving scope of around 60-400 km before requiring re-energizing. The regular re-energize time is 4 to 8 hours relying upon the battery configuration, however can be quicker on account of a supercharger: charging a large portion of the battery shortly.  **Working Principle**  Power is moved from a battery to a controller. The regulator then, at that point sends the power to the electric engines when required. The accelerator is associated with a variable switch which advises the regulator how much power to send the electric engines. Force yield can differ from zero to full as needed.  **Types**   1. **Battery Electric Vehicles (BEVs)** : Fueled exclusively by an electric battery, without any gas motor parts. Most BEVs can do quick charging and L2 charging. Zero emissions. 2. **Plug-in Hybrid Electric Vehicles (PHEVs)** : Has a bigger battery and electric engine. Has a fuel tank and a charging port. Can charge by utilizing L2 chargers. 3. **Hybrid Electric Vehicles (HEVs)** : Low-emission vehicles utilize an electric engine to help gas-controlled motors. All energy comes from fuel.   **Operations**  The electric vehicle power source is the battery which goes about as a "fuel tank" and supplies the electric engine with the energy important to move the vehicle. At the point when the vehicle is inactive, there is no electrical flow being handled, so energy isn't being spent. The regulator goes about as a controller and controls the measure of force got from the batteries so the engine doesn't wear out. This battery controls the power of the electronic gadgets in the vehicle, very much like the battery in a gas-fueled vehicle. Since electric vehicles utilize an electric engine, the driver can exploit the engine's force when pressure is applied to the brakes. Rather than changing over all the expected energy in the engine into heat as a petroleum product-controlled vehicle does, an electric vehicle utilizes the positive progress of the engine to re-energize the battery. This cycle is called regenerative braking.  **Specifications**   * **Kilowatts(kW)** : Kilowatt or kW is a lot like the measurement of power generated by the electric motor, much like bhp or PS in an ICE (internal combustion engine). One Kilowatt is roughly equal to 1.34 horsepower. * **Kilowatt Hour (kWh) :** Kilowatt per hour is equivalent to battery size and capacity. * **State of Charge :** it refers to the meter on an EV’s instrument panel that displays the current battery level as a percentage. * **AMP :** this is a unit of electricity that refers to the steady current produced by one volt applied across a resistance of one ohm. |

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| **Task Q2 :** **How does EV save the environment? If so, then explain the detailed connection.** |
| **Task Q2 Solution :**   * Regardless of whether your vehicle was to be fuelled only by the power created by coal, EVs have a preferable outflows profile over ICE vehicles since they utilize less fuel in general. Notwithstanding, the power that powers EVs comes from numerous sources, including low-emanation sources like gaseous petrol and renewables (which are expanding every year), empowering EVs to significantly decrease outflows that cause air contamination and aiding lower ozone harming substance discharges. * The area and timing of the EVs emanations are for the most part better also. While ICE vehicles frequently radiate contamination during top driving hours in the city, the outflows from fuelling an EV, by and large, occur incidentally at power plants in distant areas. Better air quality in urban areas implies fewer medical conditions and different issues brought about via air contamination. * Electric vehicles are a lot calmer than petroleum or diesel vehicles, especially at low speed. While diminished commotion makes developed regions more charming to be in and has medical advantages for everybody, it implies there are wellbeing issues from close quiet vehicles in neighborhoods. Normally electric vehicles are intended to produce a counterfeit motor sound while driving at low paces, to assist other street clients like walkers and cyclists. * The ecological effect of building EVs is higher than ICE vehicles, due for the most part to battery creation and the uncommon earth metals utilized, however over it's anything but an EV vehicle is better for the climate. The ecological effect can be improved by mindful sourcing or creating options in contrast to uncommon earth metal and by reusing batteries, such as changing over them for home energy stockpiling. As far as ozone harming substance emanations these are presently around 25% lower than ICE vehicles, and this could ascend to 70% as more renewables enter the energy blend. There is likewise a pattern towards eco-accommodating creation and materials for EVs, with some model's bodywork and inside being made completely or in part from reused materials. |

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| **Task Q3 : Why is EV still expensive for many individuals? What can be done to reduce its price?** |
| **Task Q3 Solution :**  **Reasons for expensiveness of EV**   * It's a basic instance of financial matters, the innovation is moderately new and vehicle organizations have needed to put billions of dollars in innovative work over a brief timeframe only for EVs to turn it into a practical reality. * They are precisely less complex than an ignition engine powertrain, electric engines, and battery packs work extraordinarily and have required a remarkable testing measure that requires enormous designing groups to comprehend their subtleties and tune them appropriately while likewise guaranteeing they are safe to drive and convey long term dependability. * Just a small bunch of companies, including LG Chem for South Korea, Panasonic in Japan, and CATL in China, are creating batteries for EVs, and are in this manner limited in their production yield and control the market cost, and so EV are expensive. * **Batteries** : Electric vehicles are substantially more proficient than fuel-burners, yet they require heaps of energy. Batteries, which should be enormous and substantial to give an EV a decent driving range, do the work … however at an excessive cost. While the electric engines in EVs, and their transmissions, are moderately basic and cheap, lithium-ion battery cells are expensive. * Costly yet fundamental metals, like cobalt, are one of the variables that make batteries so expensive. Batteries likewise require complex sensors and programming to control cell voltage, charge and discharge rates, and temperature, making it more costly.   **Methods to reduce its price**   * Promoting and boosting local assembling of EV batteries should help cut down the battery costs in the long term. * Creating battery plans and testing norms should empower battery producers to focus on quality. Normalization will likewise help makers increase creation. * Improvement of subordinate industries for different parts that go into a battery will diminish the overall cost of the creation of batteries. It will likewise help with combination and production network management. * In Budget 2020, it can help if the government Incentivizes organizations to offer opposite strategic administrations like reusing of batteries, recovery of basic materials from utilized batteries, hence lowering the cost. * Setting up a devoted organization for innovative work of new battery advancements should help make EV batteries more economical later on. * Boosting organizations to offer Battery as a Service should help diminish the cost of ownership while producing income from new business lines. * Public vehicle frameworks offer a broad use case for EVs as it's anything but an enormous fragment of the population. This can increase the general interest for EV batteries, and cut down costs ultimately. |

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| **Task Q4 : How is EV Car design different from conventional diesel car design?** |
| **Task Q4 Solution :**   * The diesel tank stores the synthetic energy needed to drive the vehicle while in electric vehicles it is replaced by a battery which is utilized to store the electrical energy which can be additionally changed over into mechanical ability to drive the vehicle. * The Diesel motor gives the power needed to drive a vehicle, which is exceptionally high because of its application in large equipment while in the electric vehicle it is supplanted by an electric engine which is adequate for the headway up to around 40-50 km and is effective for little use purposes. * An alternator is put in a diesel motor to give capacity to the embellishments joined to the motor and vehicle. To turn on the lights, for beginning, for other extra extras appended to a vehicle the force needed by them is accessible by this alternator though in the electric vehicle it is supplanted by DC/DC converter because the hardware utilized in electric vehicles are low flow gadgets and has low force rating so they require the lesser force that is the reason DC/DC converter is utilized who convert high ampere flow to low ampere flow and those gadgets can be utilized. * A diesel pump is being utilized to supplant the energy and to pump the fuel into the motor. In electric vehicles, it is supplanted by the charger which is utilized to charge the battery when and where needed at a specific measure of cost. * Governor is the gear which is utilized to differ the measure of fuel passed to the motor under fluctuating burden conditions which at last control the speed increase and deceleration of the vehicle and the speed of the vehicle by changing the heap in speed increase pedal in electric it is supplanted by a regulator which controls the electric energy to be given to electric engine and manages the speed of the electric vehicle. * In a diesel engine, there is no prerequisite of AC power as all gadget in diesel motor chips away at DC voltage while some electric vehicle use AC engine to drive the wheel so that sort of electric vehicle use DC/AC converter which changes over the put-away DC energy into AC energy and the electric engine turns overworking. * Diesel after burning in an IC motor produce poisonous gases which then, at that point fumes the climate which expands the CO2, CO, NO2, SO2 fixation in the climate. The filtration of   these gases is required so diesel vehicles have some exhaust cloud control strategies while in the electric vehicle no such brown haze is delivered as there is no utilization of non-renewable energy source and required no exhaust cloud control techniques. |

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| **Task Q5 : How to do marketing for any new economic EV just launched?** |
| **Task Q5 Solution :**   * **Convey Successfully :** As an advertiser, you ought to clarify the genuine advantages of utilizing an EV successfully. Maybe then giving general data about the EVs, offer explicit insights regarding these items.   Clients love tests as a component of the learning interaction. Everybody wishes to drive an EV to know its advantages. Along these lines, it's insightful to advance various test-drive meetings**.**   * **Keep away from overselling :** Engaging, definite clarifications about an item don't mix well with business pressures. EVs ought to be sold with a less-selling approach. The customary vehicle retail industry centers around business pressing factors, for example, deals missions and motivations.   The ‘agency’ concept with ‘Product Genius’ is a perfect option for Electric Vehicles.   * **Going social is likewise powerful** : The utilization of web-based media stages and blogger effort to get before an intended interest group without any problem. EV advertisers can utilize text, recordings, and pictures to draw in their crowd.   Rather than zeroing in on-brand content, the advertisers can make pertinent recordings clarifying the item. They can likewise record recordings while driving these vehicles inconspicuous streets and transfer them via web-based media stages.  Such certifiable and expert promoting via online media stages will make your intended interest group trust your image.   * **Fence your offer : Fencing implies deliberately reevaluating existing motor trim combinations. This can go from having just one trim accessible on every motor to offering each trim for every accessible motor. Fencing can be an approach to upsell to clients by eliminating a low trim on an amazing motor.** * **Characterize the right value structure** : Streamlining price distances among trims and motors is a vital assignment for this progression. Shrewdly changing these distances can prompt better take-rate dissemination: By boosting clients to buy trims or motors with higher edges, producers can guarantee higher benefits, for example bringing down the cost of the mid-level trim may prompt huge additions in benefit, because of the client changing from low trim to medium trim. Once more, information is significant – both of client worth and client eagerness to pay. * **Pick the right content** : Guarantee client esteem increments quicker than hardware costs do. Realizing the specific client worth and cost for each piece of gear permits organizations to supplant low client esteem things with high client esteem ones, in a perfect world at a similar expense level.   Because of this information, trim lines can be constructed that both increment consumer loyalty and lead to higher take rates and benefit for producers. |

**Task Q6 Solution :**

* **Top Up Charging** : The practice of plugging in your electric vehicle whenever you park while out and about, making use of the time your car is not in use to add charge to your battery.
* **Home Charging** : Connecting your electric vehicle to charge while it is left at home, regularly overnight.
* **En-route Charging** : En-route charging regularly requires powerful fast chargers, that put >100 miles into your electric vehicle in the time it takes to grab a coffee, a bite, and utilize the offices.
* **Range per hour (RPH)** : Miles of range per hour of charge.

**Task Q6 : Write down a list of 20 new terms you studied and learned in this module.**

* **ICEd :** When a ChargePoint is involved by a vehicle with an inner burning motor (ICE), keeping an EV from charging.
* **RFID Cards :** Utilizing a similar innovation utilized openly transport travel cards, these cards are utilized by numerous more seasoned charge points to permit admittance to EV charging.
* **The Pod Point Network :** On the Pod Point Network, you can charge your EV without RFID cards or participation. Essentially utilize the Pod Point application to discover a ChargePoint and start your charge.
* **Contactless Payment :** Accessible on some quick chargers, it is feasible to begin and pay for your accusing meeting with the tap of your contactless credit/check card.
* **Range Anxiety :** The term given to a fear of running out of charge while driving a plug-in electric vehicle.
* **Kilowatt hour (kWh) :** A unit of energy equivalent to the energy transferred in one hour by one thousand watts of power.
* **Smart charging :** this refers to things like load balancing, energy monitoring and “managed charging”.
* **Vehicle to Grid (V2G) :** The concept of using your electric car battery to release power back through the charger.
* **Single-phase Power :** It is a two wire alternating current (AC) power circuit.
* **Three-phase Power :** this provides three alternating currents and allows for 22kW AC charging.
* **The Rapid Charge Paradox :** The counter-intuitive realisation that it is only at the fastest chargers where EV drivers typically spend time waiting to charge.
* **NEDC** : The New European Driving Cycle (NEDC) was designed to assess the emission levels of car engines and fuel economy in passenger cars.
* **WLTP :** The Worldwide harmonized Light vehicles Test Procedure (WLTP) is the more thorough emissions and efficiency testing regime that has broadly superseded the NEDC.
* **EPA :** The USA’s Environmental Protection Agency (EPA) has established its testing methodology for the electric range which is arguably the toughest, and thus closest to the real-world performance of the available metrics.
* **Manufacturer’s Claimed Range and Efficiency :** This has traditionally been the most optimistic measure, achievable in specific circumstances. Often the manufacturers would use numbers derived from the “NEDC” cycle.
* **Combined Charging System (CCS) :** This connector combines two DC pins arranged below the Type 2 AC connector and uses 3 of the Type 2s pins.