**MODULE 2 – Introduction To Technology Of EV**

2.1 Operation of an Electric Car and Key Parts

Practice Problems

Question 1 What does the typical Power Electronics of an EV contain?

* Two DC/DC converters, one inverter (DC/AC) and one rectifier (AC/DC)
* Two DC/DC converters
* One AC/DC converter

Ans. A

Question 2 Why is the motor drive in an electric car a bidirectional power converter?

* It is cheaper
* It is a DC-to-AC power converter
* It enables driving and regenerative braking operation

Ans. C

Question 3 You have two attempts for this question. Please match the following components of an EV to their functions.

The **components** are:

* motor
* on-board charger
* battery converter

The **functions** to choose from:

* convert electrical energy to mechanical energy to drive the wheels
* control the charging and discharging of the EV battery
* Convert power from the AC electricity grid to DC

1. Motor:

Select an option

* Convert electrical energy to mechanical energy to drive the wheels
* Control the charging and discharging of the EV battery
* Convert power from the AC electricity grid to DC

Ans. A

2. On-board charger

Select an option

* Convert electrical energy to mechanical energy to drive the wheels
* Control the charging and discharging of the EV battery
* Convert power from the AC electricity grid to DC

Ans. C

3. Battery converter:

Select an option

* Convert electrical energy to mechanical energy to drive the wheels
* Control the charging and discharging of the EV battery
* Convert power from the AC electricity grid to DC

Ans. B

Renault Zoe Exercise

Question 1a Using the specification sheet on Page 34, can you identify the kWh of the battery of the Expression Nav and Dynamique Nav model?

* 41kWh for Dynamique Nav, 22kWh for expression
* 22kWh for Dynamique Nav, 41kWh for expression
* 53kWh for Dynamique Nav, 41kWh for expression

Ans. A

Question 1b If the state of charge of the Dynamique Nav battery is 20%, what is the available range based on NEDC?

* 25 miles
* 50 miles
* 75 miles
* 100 miles

Ans. B

Question 1c Based on the NEDC range, what is the Energy consumption per kilometer (D, in kWh/km) of the Dynamique Nav version? Use your calculator.

* 201.9 Wh/km
* 301.9 Wh/km
* 101.9 Wh/km

Ans. C

Question 1d Based on the winter range, what is the Energy consumption per kilometer (D, in kWh/km) of the Dynamique Nav version? Use your calculator.

* 205.4 Wh/km
* 105.4 Wh/km
* 305.4 Wh/km

Ans. A

Practice Problems

Question 1 What does the speed of an induction motor depend on?

* Frequency of the AC power supply
* Voltage of the AC power supply
* Current of the AC power supply
* None of the above

Ans. A

Question 2 Let us compare an electric motor and internal combustion engine of similar torque and power capability. Please choose an answer for the following statements and questions.

* The internal combustion engine produces usable torque and power output at high efficiency.
* Only within a limited speed range.
* Over a wide speed range.

Ans. A

b. Both the electric motor and internal combustion engine have self-start capability.

* True
* False

Ans. B

c. For what type of engine is the power to weight ratio higher?

* Electric motor
* Internal combustion engine

Ans. A

Question 3 What is the main benefit of locating the battery pack at the bottom of the car?

* Cooling of the battery pack
* Lowering the center of gravity of the vehicle and hence increasing the vehicle stability
* Increasing the available storage space

Ans. B