Week 1: Assignment 1

The due date for submitting this assignment has passed.

As per our records you have not submitted this assignment.

Due on 2021-08-18, 23:59 IST.

Que 1.1) Assume a vehicle has r_{wheel} of 0.3 m. Covert speeds of

1) 1000 rpm into kmph

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 113,114

1 point

2) 1000 rpm into m/sec

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 31.4,31.5

1 point

3) 2 m/sec into kmph

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 7.1,7.3

1 point

4) 2 m/sec into rpm

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 63.6,63.7

1 point

5) 80 kmph into m/sec

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 22.2,22.3

1 point

6) 80 kmph into rpm

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 707,708

1 point

Que 1.2) 1) A vehicle needs to run continuously at 60 kmph and should have a peak torque of 150 Nm. A motor gives peak torque of 25 NM at 3000 rpm.

7) If the gear ratio is given by the expression: "n:1", compute the value of 'n'

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Numeric) 6

1 point

8) What should be the minimum tyre radius (in m) of the vehicle?

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 0.30,0.33

1 point

Que 1.2) 2) A EV battery has a capacity of 15 kWh. Assuming effective capacity used in the beginning is 85% and end of life is 70% of capacity,

9) What is the range (km) that the vehicle (using 80 Wh/km) can support, when the battery is new?

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 155,165

1 point

10) What range (km) will it support at the end of life?

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 105,115

1 point

Que 1.2) 3) In above question 1.2.2, assume auxiliary power used is 500 W continuously and the average speed of vehicle is 40 kmph.

11) What would be the range (in km) in beginning of life of battery?

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 122,140

1 point

12) What would be the range (in km) in end of life of battery?

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 85,100

1 point

Que 1.3) A Battery is of 48V, 30Ah is designed to power an Electric two wheeler. Battery is designed to operate at 80% DoD and end of life is considered when the capacity falls to 70% of its initial capacity.

13) Compute the total energy content in the battery (in kWh).

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 1.4,1.5

1 point

14) What maximum amount of usable energy available for each cycle at beginning of life (in kWh)

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 1.1,1.2

1 point

15) What maximum amount of energy available for each cycle at end of life (in kWh)

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 0.80,0.81

1 point

Que 1.4) *Take a decent sized four-wheeler consume 15 kms per litre and Equivalent EV consume 150 Wh / km with battery cells being 250 Wh/kg and 500 Wh/l.*Petrol energy is 45 megajoules per kilogram (MJ/kg): look at web for energy conversion.

	Wh/kg	Wh/litre
Petrol	12500	9375

16) Compute the ratio of Energy Efficiency of EV Vs ICE (Internal Combustion Engine) vehicle.

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 4.1,4.3
(Type: Range) 0.22,0.25

1 point

17) Compute Ratio of Battery weight and petrol weight per km of travel by two vehicles

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 11,13

1 point

18) Compute Ratio of Battery volume and petrol volume per km

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 4.3,4.6

1 point

Que 1.5) A 2-wheeler uses 25 Wh/km. We need a battery with 80 km range.

19) Calculate the size of battery required (in kWh)

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 1.9,2.38

1 point

20) Estimate the cost of the battery in Rs (use linear interpolation when required) using data given in slide 44

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 33000,37350

1 point

Que 1.6) A 2 kWh battery costs ₹30K. The purchase is made borrowing money from bank at interest Rate (IR) of 12% per annum. The battery, charged-discharged once a day, lasts for 1825 cycles (to be depreciated over this life time).Estimate PMT as,

$$\text{PMT} = Capital\ Costs / \sum_{n=1}^{\text{terms of unit time}} [1/(1+IR)^n]$$

21) Compute interest and Depreciation payment per year as PMT

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 8320,8330

1 point

22) Assume ₹5 per kWh as electricity charge. Battery DoD is 0.85. Vehicle uses 20 Wh/km. What is the fuel cost per km?

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 0.35,0.38

1 point