

## Course outline

How does an NPTEL online course work?

Module 1 - Overview of Electric Vehicles in India

Module 2 - Vehicle Dynamics

Module 2 and 3 - Vehicle Dynamics and EV Subsystems

Module 4 - Storage for EVs

- Lecture 21 - Introduction to Battery Parameters -Part 1

- Lecture 22 - Introduction to Battery Parameters - Part 2

- Lecture 23 - Why Lithium Ion Battery? - Part 1

- Lecture 24 - Why Lithium Ion Battery? - Part 2

- Lecture 25 - Batteries in Future

- Lecture 26 - Li-Ion Battery Cells

- Quiz: Week 4: Assignment 1

- Quiz: Week 4: Assignment 2**

- Quiz: Week 4: Assignment 3

- Quiz: Week 4: Assignment 4

- Week 4 - Lecture notes

- Week 4 - Feedback form: Electric Vehicles and Renewable Energy

- Week 4: Solutions

Module 4 - Storage for EVs (contd)

Module 5 - Fundamentals of battery pack design

Module 5 and 6 - Battery Pack Design, Motors and Controllers

Module 6 - EV Motors and Controllers

Module 7&amp;8 - Battery Charging and Swapping, Analytics

Module 9: Renewable Energy - Introduction

Module 10: Renewable Energy - Solar and Wind Energy

Module 11: Renewable Energy

Live Session

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# Week 4: Assignment 2

The due date for submitting this assignment has passed.

**Due on 2021-09-01, 23:59 IST.**
**As per our records you have not submitted this assignment.**

Suppose a Battery Life is defined as 2000 cycles when used in standard conditions. The standard conditions are "charged at 0.5C, discharged at 1 C at 25°C with 0.85 DoD". Assume that one cycle is counted as 1+x, whenever standard operating conditions are violated. Assume

- (i) x is 0.25 for every degree variation in temperature from 25°C
- (ii) x is 0.5 for every 0.01 increment of DoD from 0.85 and
- (iii) x is 0.1 for every % increment of charge rate from 0.5C and
- (iv) x is 0.05 for every % increment of discharge rate from 1C.

Build a spread sheet to compute life of the battery, when usage is (a) 85% case in standard condition, (b) 10% case at charge rate c1, discharge rate d1, temperature t1 and DoD equal to h1 and (c) 5% case at charge rate c2, discharge rate d2, temperature t2 and DoD equal to h2. Make conditions in (i) to (iv) variables in spreadsheet.

Using above, determine the life-cycle of battery, when only changes are

- (i)c1 and c2 are 1C keeping all other parameters at standard operating conditions.

Life cycles = \_\_\_\_\_

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
(Type: Range) 1725,1730

**0.5 points**

- (ii)d1 and d2 are 2C keeping all other parameters at standard operating conditions.

Life cycles = \_\_\_\_\_

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
(Type: Range) 1747,1752

**0.5 points**

- (iii)t1 and t2 are 35°C keeping all other parameters at standard operating conditions.

Life cycles = \_\_\_\_\_

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
(Type: Range) 1783,1789

**0.5 points**

- (iv)h1 and h2 is 0.90 keeping all other parameters at standard operating conditions.

Life cycles = \_\_\_\_\_

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
(Type: Range) 1783,1789

**0.5 points**

- The following changes are combined:

- 1.c1 and c2 are 1C
- 2.d1 and d2 are 2C
- 3.t1 and t2 are 35°C
- 4.h1 and h2 is 0.90

(keeping all other parameters (if any) at standard operating conditions.)

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
(Type: Range) 1709,1718

**0.5 points**

- The following changes are combined:

- 1.c1 is 1C and c2 is 1.5C
- 2.d1 is 2C and d2 is 3C
- 3.t1 is 35°C and t2 is 45°C
- 4.h1 is 0.90 and h2 is 0.95

(keeping all other parameters (if any) at standard operating conditions.)

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
(Type: Range) 1708,1715

**0.5 points**

- Useable Capacity of a battery depends on three parameters. Name them.

- Rated Battery Capacity
- State of Health or SoH
- Depth of Discharge or DoD
- Rate of charge/discharge
- State of charge (SoC)

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
Rated Battery Capacity  
State of Health or SoH  
Depth of Discharge or DoD

**1 point**

State True and False

- Li Ion Battery does not work at 45 °C

- True
- False

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
False

**0.5 points**

- Best temperature for Li Ion Battery is 35°C

State True and False

- Li Ion Battery does not work at 45 °C

- True
- False

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
False

**0.5 points**

- Best temperature for Li Ion Battery is 35°C

- True
- False

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
False

**0.5 points**

- Charge Rate of 2C visavis charge rate of 1C hurts battery life for all Li Ion batteries

- True
- False

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
True

**0.5 points**

- DoD of 85% is the best value to maximise battery life

**0.5 points**