

## 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

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&8 - Battery Charging and Swapping, Analytics

Module 9: Renewable Energy - Introduction

Module 10: Renewable Energy - Solar and Wind Energy

Module 11: Renewable Energy

Storage Options for Energy - Part 1

Storage Options for Energy - Part 2

Storage Options for Energy - Part 3

Storage Options for Energy - Part 4

The EV Ecosystem - Part 1

The EV Ecosystem - Part 2

Quiz: Week 12: Assignment 12

Week 12: Feedback form: Electric Vehicles and Renewable Energy

Week 12: Lecture notes

Week 12: Solutions

Live Session

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# Week 12: Assignment 12

The due date for submitting this assignment has passed.

**Due on 2021-10-20, 23:59 IST.**

As per our records you have not submitted this assignment.

1) Thermal energy storage finds application in

1 point

- Solar thermal power plants  
 Refrigeration and air-conditioning  
 Building energy storage  
 All of the above

No, the answer is incorrect.

Score: 0

Accepted Answers:

All of the above

2) Assume no pumping or any other losses, how much energy can be stored by 1000 kg of water raised by 100-m in a pumped hydro installation? Take density of water to be 1000 kg/m<sup>3</sup> and g = 9.81 m/s<sup>2</sup>. Total Energy = mgh

1 point

- 1.96 MJ  
 1.47 MJ  
 0.98 MJ  
 0.5 MJ

No, the answer is incorrect.

Score: 0

Accepted Answers:

0.98 MJ

3) If pumped hydro system which is not a source of loss

1 point

- Leakage of fluid from pipes and equipment  
 Evaporation during storage  
 Water addition due to rain  
 Turbine losses

No, the answer is incorrect.

Score: 0

Accepted Answers:

Water addition due to rain

4) In a Superconducting Magnetic Energy Storage (SMES):

1 point

- Magnetic energy is converted to electrical energy  
 Magnetic Energy can be stored indefinitely  
 Electrical resistance of the coil drops to zero  
 All of the above

No, the answer is incorrect.

Score: 0

Accepted Answers:

All of the above

5) A flywheel of uniform density of 2000kg/m<sup>3</sup> is shaped in the form of a disc. Diameter of the disc being 5-m and thickness being 2-m, flywheel is rotated at  $\omega = 300$  rad/sec. It is made of a material with a uniform density of 2000 kg/m<sup>3</sup>. Calculate the energy stored in the flywheel.

1 point

$$E = \frac{1}{2} I \omega^2 ; \text{ where } I = 1/2 M R^2 (\text{in Kg. m}^2), \text{ and } \omega = \text{angular velocity of the flywheel (in Rad/sec)}$$

- 11 MJ  
 11 GJ  
 22 GJ  
 22 MJ

No, the answer is incorrect.

Score: 0

Accepted Answers:

11 GJ

6) If the flywheel in previous is slowed down to 100rad/sec, how much energy is recovered from flywheel?

1 point

- 13.2 MJ  
 3.1 GJ  
 6.3 MJ  
 9.8 GJ

No, the answer is incorrect.

Score: 0

Accepted Answers:

9.8 GJ

7) A flywheel's energy storage can be increased by

1 point

- Locating more mass at the circumference  
 Reducing frictional losses  
 Choosing material with high tensile strength  
 All of the above

No, the answer is incorrect.

Score: 0

Accepted Answers:

All of the above

8) What is the main objective of energy storage?

1 point

- Offset adverse effect of fluctuating demand  
 Assure steady output from existing plants  
 Meet peak demand on short notice  
 All of the above

No, the answer is incorrect.

Score: 0

Accepted Answers:

All of the above

9) Why is the compressed air in a storage system cooled before storage?

1 point

- Prevent heat loss during storage  
 Improve turn around efficiency  
 Reduces storage volume  
 Help in a hybrid system

No, the answer is incorrect.

Score: 0

Accepted Answers:

Reduces storage volume