

## 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

- Lecture 58 - Torque Production - Part 1

- Lecture 59 - Torque Production - Part 2

- Lecture 60 - Torque Production - Part 3

- Lecture 61 - Speed and Back EMF

- Lecture 62 - The d-q Equivalent circuit - Part 1

- Lecture 63 - The d-q Equivalent circuit - Part 2

- Lecture 64 - Field-oriented Control

- Lecture 65 - Three phase AC - Part 1

- Lecture 66 - Three phase AC - Part 2

- Lecture 67 - Thermal Design - Part 1

- Lecture 68 - Thermal Design - Part 2

- Lecture 69 - Thermal Design - Part 3

- Lecture 70 - Engineering Considerations - Part 1

- Lecture 71 - Engineering Considerations - Part 2

- Lecture 72 - Future Frontiers

- Quiz: Week 8: Assignment 1

- Quiz: Week 8: Assignment 2

- Quiz: Week 8: Assignment 3

- Quiz: Week 8: Assignment 4**

- Week 8: Feedback form: Electric Vehicles and Renewable Energy

- Week 8: Lecture notes

- Week 8: Solutions

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 8: Assignment 4

The due date for submitting this assignment has passed.

Due on 2021-09-22, 23:59 IST.

As per our records you have not submitted this assignment.

 1) The airspeed measured on a motor surface is 3 m/s. If convection area is  $0.2 \text{ m}^2$ , what is the heat transfer coefficient in  $\text{W}/(\text{m}^2\text{K})$ ? (Choose the nearest value) **1 point**

- 5.2  
 26  
 29  
 10

 No, the answer is incorrect.  
 Score: 0

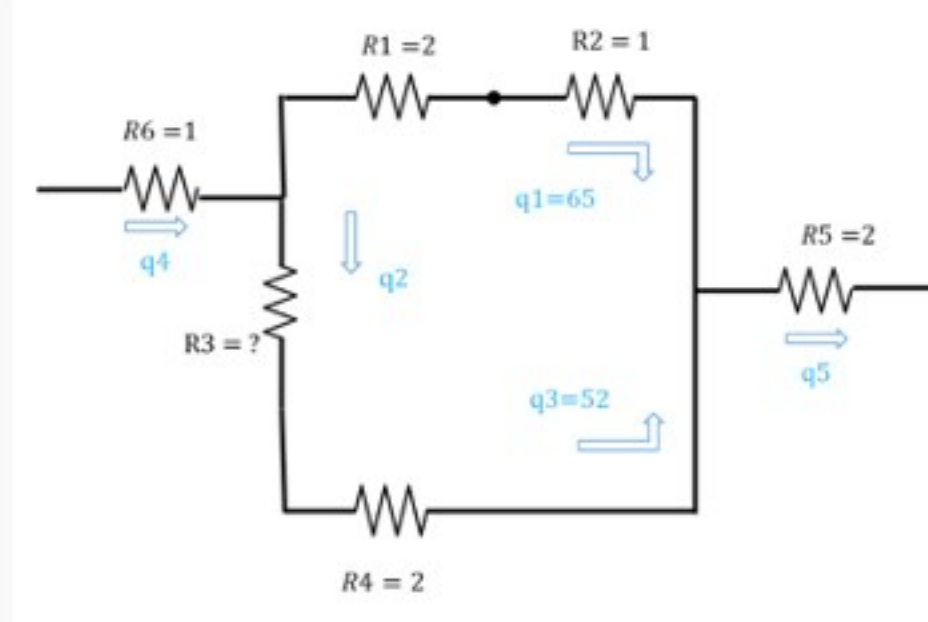
 Accepted Answers:  
 29

 2) What is the air thermal resistance in  $\text{K}/\text{W}$ ? **1 point**

- 0.97  
 0.2  
 0.04  
 0.17

 No, the answer is incorrect.  
 Score: 0

 Accepted Answers:  
 0.17

 3) Find the thermal resistance  $R_3$ . **1 point**


- 0  
 2  
 1.75  
 1

 No, the answer is incorrect.  
 Score: 0

 Accepted Answers:  
 1.75

 4) A high current carrying trace of width  $w$  and thickness  $t$  has to be redesigned using a lower cost alloy of half the electrical conductivity. If the thickness is unchanged, what will be the new trace width? **1 point**

- $2w$   
  $1.4w$   
  $0.5w$   
  $w$

 No, the answer is incorrect.  
 Score: 0

 Accepted Answers:  
 $1.4w$ 

 5) A shunt of  $1 \text{ m}\Omega$  is used to measure a current of  $100 \text{ A}$ . If two such shunts are used in parallel, the contact heat flux at the shunt-PCB interface) would reduce by a factor **1 point**

- 0.5  
 0.25  
 2  
 1

 No, the answer is incorrect.  
 Score: 0

 Accepted Answers:  
 0.25

 For a given steel grade at  $200 \text{ Hz}$ , the hysteresis loss is  $10 \text{ W}$  and the eddy current loss is  $20 \text{ W}$ .

 6) What is the hysteresis loss at  $100 \text{ Hz}$ ? **1 point**

- $5 \text{ W}$   
  $-2.5 \text{ W}$   
  $20 \text{ W}$   
  $+2.5 \text{ W}$

 No, the answer is incorrect.  
 Score: 0

 Accepted Answers:  
 $5 \text{ W}$ 

 7) What is the eddy current loss at  $400 \text{ Hz}$ ? **1 point**

- $400 \text{ W}$   
  $80 \text{ W}$   
  $40 \text{ W}$   
 None of the above

 No, the answer is incorrect.  
 Score: 0

 Accepted Answers:  
 $80 \text{ W}$ 

 8) Which of the following does NOT have a direct effect on cogging torque? **1 point**

- Eccentricity  
 Pole displacement  
 The direct current  $I_d$   
 Slot-pole combination

 No, the answer is incorrect.  
 Score: 0

 Accepted Answers:  
 The direct current  $I_d$ 

 9) Which of the following affects torque ripple? **1 point**

- $I_d$   
  $I_q$   
 Both a and b  
 None of the above

 No, the answer is incorrect.  
 Score: 0

 Accepted Answers:  
 Both a and b

 10) Calculate the length of a resin block ( $\lambda = 3 \text{ W}/\text{mK}$ ) of cross-sectional area  $1 \text{ m}^2$  for the thermal resistance across the block to be  $0.3 \text{ K}/\text{W}$  **1 point**

 No, the answer is incorrect.  
 Score: 0

 Accepted Answers:  
 The direct current  $I_d$ 

 9) Which of the following affects torque ripple? **1 point**

- $I_d$   
  $I_q$   
 Both a and b  
 None of the above

 No, the answer is incorrect.  
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 Accepted Answers:  
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- $0.3 \text{ m}$   
  $0.6 \text{ m}$   
  $1.8 \text{ m}$   
  $0.9 \text{ m}$

 No, the answer is incorrect.  
 Score: 0

 Accepted Answers:  
 $0.9 \text{ m}$