

# Unit 10 - Week-8

## Course outline

### How to access the portal?

#### Week 0

#### Week-1

#### Week-2

#### Week-3

#### Week-4

#### Week-5

#### Week-6

#### Week-7

#### Week-8

- Lecture 36: Trapezoidal permanent magnet AC motor, Derivation of power and torque, Closed-loop control of trapezoidal BLDC motor, Introduction to switched reluctance motor
- Lecture 37: Construction and operating principle of switched reluctance motor
- Lecture 38: Current/ voltage control for switched reluctance motor, operating modes of switched reluctance motor, Introduction to traction drives
- Lecture 39: Current collector for mainline trains, Nature of traction load, Duty cycle of traction drives
- Lecture 40: Duty cycle of traction drives, Distance between two stops, Calculation of total tractive effort and drive rating

#### Quiz : Assignment 8

#### Feedback For Week 8

#### Assignment-8 Solutions

### Live Session

### Lecture Notes

## Assignment 8

The due date for submitting this assignment has passed.  
As per our records you have not submitted this assignment.

**Due on 2019-09-25, 23:59 IST.**

- 1) A trapezoidal permanent magnet AC motor is fed by a quasi rectangular current of  $120^\circ$  pulse width, such that the current pulse is located in the region where the induced voltage is constant and maximum. The torque produced by the motor is proportional to **1 point**
- the dc link current  
 the square of dc link current  
 the cube of dc link current  
 the square root of dc link current
- No, the answer is incorrect.**  
**Score: 0**  
**Accepted Answers:**  
*the dc link current*
- 2) The torque ripple for the motor in Q1 is ideally **1 point**
- Finite at  $6f$  frequency  
 Finite at  $3f$  frequency  
 Finite at  $2f$  frequency  
 Zero
- No, the answer is incorrect.**  
**Score: 0**  
**Accepted Answers:**  
*Zero*
- 3) The torque of a switched reluctance motor with current switched at +ve  $dL/d\theta$  is **1 point**
- proportional to the stator current  
 proportional to the square of the stator current  
 proportional to the cube of the stator current  
 proportional to the square root of the stator current
- No, the answer is incorrect.**  
**Score: 0**  
**Accepted Answers:**  
*proportional to the square of the stator current*
- 4) The operating mode for switched reluctance motor for speed less than the base speed is **1 point**
- current chopping mode  
 constant power mode  
 angle control mode  
  $T\omega_m^2 = \text{constant}$  mode
- No, the answer is incorrect.**  
**Score: 0**  
**Accepted Answers:**  
*current chopping mode*
- 5) Which of the following wires should be almost horizontal in overhead traction transmission line? **1 point**
- catenary wire  
 contact wire  
 dropper wire  
 supporting wire
- No, the answer is incorrect.**  
**Score: 0**  
**Accepted Answers:**  
*contact wire*
- 6) Coefficient of adhesion does not depend on **1 point**
- the speed of the locomotive  
 the weight of the locomotive  
 the type of motor torque speed characteristics  
 the type of motor connection
- No, the answer is incorrect.**  
**Score: 0**  
**Accepted Answers:**  
*the weight of the locomotive*
- 7) Coasting of a locomotive refers to **1 point**
- Operation when the input power is finite and constant  
 Operation when the motor torque is finite and constant  
 Operation when the input power is zero  
 Operation when the motor torque is -ve
- No, the answer is incorrect.**  
**Score: 0**  
**Accepted Answers:**  
*Operation when the input power is zero*
- 8) A train starts from a station at constant acceleration,  $\alpha$ , 5 km/h/s and reaches a free running speed of 100 km/h. It brakes at a constant deceleration,  $\beta$ , 4 km/h/s for coming to stop at the next station. If the travel time between the two stations is 10 minutes, what is the distance in km between the two stations? **3 points**
- 11 km  
 13 km  
 16 km  
 19 km
- No, the answer is incorrect.**  
**Score: 0**  
**Accepted Answers:**  
*16 km*
- 9) A locomotive starts from rest with a constant acceleration of 6 km/h/s and runs at constant acceleration for 18 sec. The speed of the locomotive at the end of 18 sec is **2 points**
- 54 km/h  
 68 km/h  
 90 km/h  
 108 km/h
- No, the answer is incorrect.**  
**Score: 0**  
**Accepted Answers:**  
*108 km/h*
- 10) The locomotive in Q9 has a mass of 500 tonne. If rotational mass account for 10% of the mass of the locomotive, calculate the tractive effort (in Newton) required for acceleration on a levelled track neglecting the train resistance. **3 points**
- 916.6 kN  
 828.5 kN  
 755.3 kN  
 500 kN
- No, the answer is incorrect.**  
**Score: 0**  
**Accepted Answers:**  
*916.6 kN*
- 11) A locomotive has a weight of 120 tonne. If the permissible weight per axle is 20 tonne, the minimum number of wheels for the locomotive is **2 points**
- 4  
 6  
 12  
 18
- No, the answer is incorrect.**  
**Score: 0**  
**Accepted Answers:**  
*12*
- 12) A locomotive weighing 110 tonne is moving at steady speed of 80 kmph on a up-gradient track with  $G=10$ . If the train resistance is 30 N/tonne, the total tractive effort required to move the train is **3 points**
- 12002 N  
 14091 N  
 15003 N  
 16053 N
- No, the answer is incorrect.**  
**Score: 0**  
**Accepted Answers:**  
*14091 N*
- 13) If the locomotive in Q12 is to be accelerated from rest with constant acceleration,  $\alpha$ , 3 km/h/s. Assume the rotational mass to be 10 % of the dead weight. The total tractive effort required for acceleration is **3 points**
- 114.924 kN  
 115.829 kN  
 117.625 kN  
 121.682 kN
- No, the answer is incorrect.**  
**Score: 0**  
**Accepted Answers:**  
*114.924 kN*
- 14) Wheel slipping can be prevented by **1 point**
- Increasing the speed  
 Increasing the power  
 Increasing the motor torque  
 Decreasing the tractive effort
- No, the answer is incorrect.**  
**Score: 0**  
**Accepted Answers:**  
*Decreasing the tractive effort*
- 15) The wear and tear of pantograph is made even by **1 point**
- lubricating the pantograph  
 using carbon collector strip  
 laterally staggering the contact wire  
 increasing the vertical inclination of the contact wire
- No, the answer is incorrect.**  
**Score: 0**  
**Accepted Answers:**  
*laterally staggering the contact wire*