Unit 8 - Week 7

Course outline

How does an NPTEL online course work?

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- Shunt Active Power Filter III
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Week 8

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Assignment 7

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

Due on 2020-03-18, 23:59 IST.

1) A three-phase three-wire DSTATCOM is employed at a 400 V, 50 Hz system to provide reactive power compensation for unity power factor of a three-phase delta connected 20kW induction motor operating at 0.8 lagging power factor. Calculate equivalent per-phase resistance (in ohms) of the compensated load, where the switching frequency is 2.5 kHz and DC bus voltage is 700V and it has to be controlled within 8% range and ripple current in the inductor is 15%. *1 point*

- 7.56 Ω.
- 7.76 Ω
- 8.00 Ω.
- 8.16 Ω.

No, the answer is incorrect.
Score: 0
Accepted Answers:
8.00 Ω.

2) In above question (A7Q1) calculates the DSTATCOM currents, *1 point*

- 14.999 kVA.
- 15.199 kVA.
- 15.338 kVA
- 15.538 kVA.

No, the answer is incorrect.
Score: 0
Accepted Answers:
14.999 kVA.

3) A single-phase active hybrid filter (consisting of a three-branch passive shunt filter and a series APF using VSC with a bus capacitor used in the hybrid filter to provide harmonic and reactive power compensation for unity power factor at the AC mains) is designed for a critical load of a 220 V, 50 Hz single-phase thyristor bridge with constant DC current of 20A at 60° firing angle of its thyristors. Calculate element values of the passive shunt filter (L_3). (Quality factor low pass filter is 20 and high pass filter is 1) *1 point*

- 14.37 mH
- 14.57mH
- 14.77 mH
- 14.97 mH

No, the answer is incorrect.
Score: 0
Accepted Answers:
14.97 mH

4) In above question (A7Q3) calculates the passive element L_5 *1 point*

- 5.19 mH
- 5.39 mH
- 5.59 mH
- 5.79 mH

No, the answer is incorrect.
Score: 0
Accepted Answers:
5.39 mH

5) In above question (A7Q3) calculates the passive element R_{41} *1 point*

- 5.84 ohm
- 6.04 ohm
- 6.24 ohm
- 6.44 ohm

No, the answer is incorrect.
Score: 0
Accepted Answers:
6.04 ohm

6) In above question (A7Q3) calculates the voltage ratings of the series APF. *1 point*

- 29.728 V
- 30.728 V
- 31.728 V
- 33.728 V

No, the answer is incorrect.
Score: 0
Accepted Answers:
31.728 V

7) A three-phase series active filter connected in series with a three-branch shunt passive filter (fifth, seventh, and high-pass filters) is used for harmonic current and reactive power compensation in a three-phase 400 V, 50 Hz system to reduce the THD of the supply current and to improve the displacement factor to unity. It has a load of a three-phase thyristor bridge converter operating at 30° firing angle drawing constant 75A DC current. Calculate the designed values of passive filter Components L5, Consider the switching frequency of 20 kHz and the DC bus voltage has to be controlled within 8% range and ripple current in the inductor is 15%. The turn's ratio of the injection transformer is 1:10. Consider the quality factor for the low pass filter is 20 and high pass filter is 2. Modulation index is 0.9 and overload factor is 1 *0 points*

- 3.84 mH
- 3.48 mH
- 4.04 mH
- 4.24 mH

No, the answer is incorrect.
Score: 0
Accepted Answers:
3.48 mH

8) In above question (A7Q7) calculates the passive element L_7, *1 point*

- 1.37 mH
- 1.57 mH
- 1.77 mH
- 1.97 mH

No, the answer is incorrect.
Score: 0
Accepted Answers:
1.57 mH

9) In above question (A6Q7) calculates the VA rating of the APF, *0 points*

- 1011.73 VA
- 1031.73 VA
- 1086.35 VA
- 1121.73 VA

No, the answer is incorrect.
Score: 0
Accepted Answers:
1086.35 VA

10) In above question (A6Q7) calculates DC bus voltage of the APF *1 point*

- 364.03 V
- 382.03 V
- 404.03 V
- 424.03 V

No, the answer is incorrect.
Score: 0
Accepted Answers:
382.03 V

11) In above question (A7Q7) calculates the AC inductor value of the APF *1 point*

- 5.58 mH
- 5.78 mH
- 5.98 mH
- 6.18 mH

No, the answer is incorrect.
Score: 0
Accepted Answers:
5.58 mH