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Question Paper Code : 60491

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2016.

Eighth Semester

Electrical and Electronics Engineering

EE 2032/EE 805/10133 EEE 35 — HIGH VOLTAGE DIRECT CURRENT
TRANSMISSION

(Regulations 2008/2010)

(Common to PTEE 2032/10133 EEE 35 – High Voltage Direct Current Transmission
for B.E. (Part-Time) – Seventh Semester – EEE – Regulations 2009/2010)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. State any two applications of HVDC transmission.
2. Draw the different configurations for asynchronous interconnection between two adjacent AC systems.
3. Write the expression for converter valve utilization factor.
4. Give the assumptions made for the fast steady state solution of HVDC converter equation.
5. What is meant by 'Compounding a converter'?
6. What is the need for transformer tap changer control of the HVDC converter?
7. List the causes of non-characteristics harmonics in HVDC system.
8. How to protect AC filters?
9. Mention the advantages of DQ modeling.
10. Give any four tools employed for dynamic system simulation.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Give the comparison of AC and DC transmission based on economics of transmission and reliability. (8)
- (ii) With neat diagrams, explain the types of HVDC links. (8)

Or

- (b) (i) Mention the various components of a HVDC converter station and state the applications of HVDC converters. (8)
- (ii) Explain the various considerations to be taken into account in the planning for HVDC transmission. (8)
12. (a) (i) Derive the expression for the average direct voltage of a six pulse converter operating in two and three valve conduction mode and draw the equivalent circuit of the six pulse bridge rectifier. (8 + 2)
- (ii) Describe the inverter characteristics of a six pulse converter bridge. (6)

Or

- (b) (i) Obtain the valve utilization factor for different six pulse converter configurations. (6)
- (ii) Explain the development of the method for fast steady state analysis of a HVDC converter by clearly stating the assumptions made. (10)
13. (a) (i) What is 'Compounding a converter'? Explain how inverter compounding is carried out. (2 + 8)
- (ii) Describe the transmission characteristics in the rectifier and inverter compounding. (6)

Or

- (b) By means of tap changing arrangement for the converter transformers, describe how current regulation can be carried out from the inverter side of HVDC system. (16)
14. (a) (i) Why are harmonics generated in HVDC converters? What are the problems associated with the harmonics. (8)
- (ii) Distinguish between characteristic and non characteristic harmonics. (8)

Or

- (b) (i) Explain in detail various types of filters used in HVDC systems. (8)
- (ii) Discuss briefly the design of single tuned filters in HVDC systems. (8)

15. (a) (i) Explain how the valves are modeled to realize the switching action that can be used in dynamic simulation of a HVDC system. (6)
- (ii) Explain in detail the modeling of DC network used in HVDC transmission. (10)

Or

- (b) (i) What are the advantages of parity simulator? (6)
- (ii) What are the advantages and disadvantages of digital simulation? (10)
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