

G 7151

M.E. DEGREE EXAMINATION, JANUARY 2006.

Power Systems Engineering

Elective

PS 1622 — HIGH VOLTAGE DIRECT CURRENT TRANSMISSION

(Common to M.E. Power Electronics and Drives)

(Regulation 2005)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What are the different types of DC transmission system?
2. Draw the graph showing the selection of optimum system voltage to minimize the sum of converter and line cost.
3. Draw the equivalent circuit for four valve conduction.
4. Why the use of 12 pulse converter is preferable than six pulse? What is the practical difficulty when pulse number is increased beyond 12?
5. Feedback control of power in a DC link is not desirable. Give reasons.
6. What are the basic requirements for the firing pulse generation of HVDC valves?
7. What are the causes for the non characteristic harmonics?
8. What is the necessity for PLC-RI filters?
9. What are the requirements of good simulation tool?
10. What are the problems faced in digital simulation?

PART B — (5 × 16 = 80 marks)

11. (i) What are the advantages and disadvantages of digital simulation?
(ii) Write the modelling of HVDC systems for digital dynamic simulation.

12. (a) Compare AC and DC transmission on the following factors :

- (i) Economic transmission
(ii) Technical performance
(iii) Reliability.

Or

- (b) (i) Draw the schematic diagram of a typical HVDC converter station and explain.
(ii) What are the consideration to be taken into account in the planning for HVDC transmission?

13. (a) Draw the six pulse converter Graetz and analyse the circuit with overlap for mode 1, conduction angle $\mu < 60^\circ$.

Or

- (b) Explain the converter bridge characteristics as a rectifier and as a inverter.

14. (a) Explain the individual phase control and equidistant pulse control used in HVDC.

Or

- (b) Explain the methods of starting and stopping of DC link and current and extinction angle control.

15. (a) Explain the performance indices for the design of AC filters and write the procedure for the design of single tuned and high pass filter.

Or

- (b) (i) Explain the procedure for the calculation of AC and DC voltage harmonics.
(ii) What is the effect of firing angle error in non-characteristic harmonics?