

Time:3Hrs

80 Marks 3hrs

Note :

- Question No.1 is compulsory.
- Solve ANY THREE questions from the remaining five questions.
- Figure to the right indicates full marks.
- Assume suitable data wherever required, but justify the same.

- Q. 1 Solve ANY FOUR questions from following. (Each question carries 5 marks) 20
- a) Enlist the advantages and disadvantages of selecting ground as the return path.
  - b) Compare HVDC transmission with HVAC transmission
  - c) What are the causes and effect of arc back?
  - d) Draw a schematic showing all components of HVDC system and explain the need and features of smoothing reactor and filters.
  - e) What are the additional inverter side characteristics used for abnormal operations? How it helps for mode stabilization.
- Q. 2 a) Illustrate with neat diagram the different types of HVDC link, its features and applications. 10
- c) Derive the equivalent circuit of a three phase fully controlled rectifier with grid control and overlap angle less than 60 degree. Draw the equivalent circuit diagram and output voltage waveforms 10
- Q3 a) Illustrate the Individual Pulse control scheme used in HVDC system for generating triggering pulse. What is the difference between constant alpha control and cosine control? Also show how instant of firing is found out in IPC for constant current control? What are the advantages and disadvantages of IPC scheme? 10
- b) Develop the various step involved in developing the control characteristics of an HVDC system under power reversal and explain how to obtain power reversal. What is current margin and what is its impact on power reversal. 10
- Q4 a) Illustrate in detail the over current and over voltage protection methods in HVDC system 10
- b) Illustrate with neat phase voltage, line voltage and line current waveforms, the effect of single commutation failure in inverter side of HVDC system. 10
- Q5 a) Draw and Explain the working of 12 pulse converter circuit. How does the usage of 12 pulse converter helps to reduce the harmonics in AC side and DC side 10
- b) Converter consume reactive power, Justify the statement with appropriate equations. 10
- Q6 a) What are the causes and effect of Harmonics and suggest a few methods to minimize the effect of harmonics 10
- b) With the help of neat diagrams show the function of bypass valve and also with the help of phase voltage waveform explain the transfer of current from inverter to bypass valve under fault or maintenance conditions. 10

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