Code No: 07A70204 **R07** **Set No. 2**

IV B.Tech I Semester Examinations,December 2011
HVDC TRANSMISSION
Electrical And Electronics Engineering

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Explain the effects of single commutation failure in converter.
   (b) Explain briefly the factors on which recovery from a commutation failure depends. [8+8]
2. (a) Explain the causes of reactive power absorbed by HVDC converter substation.
   (b) With a neat sketch, explain about Thyristor controlled Reactor. [8+8]
3. (a) Compare simultaneous and sequential methods of power flow analysis.
   (b) Draw the flow chart for AC/DC load flow. [8+8]
4. (a) Explain briefly about different types of HVDC links.
   (b) Compare the HVDC transmission HVAC transmission with reference to following factors:
      i. Economics
      ii. Technical performance
      iii. Reliability. [8+8]
5. Draw the loci of Network impedance and filter impedance and analyze the impact of network impendence or admittance on the design of single tuned filter. [16]
6. Why are harmonics generated in HVDC converter and what are the problems associated with the harmonius. Suggest some remedial measures. [16]
7. (a) With the help of a circuit diagram, analyse the operation of 3-valve conduction mode and derive the expression for the currents of the incoming and outgoing valves during commutation.
   (b) Derive the expression for DC voltage and voltage drop due to overlap and hence deduce the equivalent circuit of bridge rectifier.
   (c) Prove that the delay angle is same as the power factor angle in case of the controlled rectifier. [16]
8. (a) A HVDC link is operating with 175 KV AC line voltage at the rectifier. When the DC current is 1100 Amps, the rectifier delay angle is 10^0 and inverter extinction angle is 20^0. The resistance of the line is 23 ohms and the commutating reactances of the rectifier and inverter are 22 ohms and 21 ohms. Calculate the DC voltages at the rectifier and inverter terminals and the AC line voltage at the inverter.

(b) For a two terminal DC link, explain the complete control characteristics of rectifier and inverter stations. [8+8]

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Code No: 07A70204 **R07** **Set No. 4**

IV B.Tech I Semester Examinations,December 2011
HVDC TRANSMISSION
Electrical And Electronics Engineering

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
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1. (a) What are the desired features of control? Explain in detail.
   (b) What is equivalent pulse control? What are the advantages of equivalent pulse contur over individual phase control? [8+8]
2. (a) Analyse a bridge rectifier with overlap angle greater than 60^0. Derive the relevant equations and draw the necessary graphs.
   (b) Draw the equivalent circuit of a rectifier and mention its components. [8+8]
3. Describe the schematic diagram of a HVDC link, mentioning all the key elements. [16]
4. (a) Draw the schematic diagram of a typical HVDC link showing the major equipment at either ends.
   (b) Draw a neat diagram of a Bipolar DC link. What are its advantages? [8+8]
5. (a) Write short notes on Alternate control strategies.
   (b) Describe the various types of reactive power sources used in HVDC transmission. [8+8]
6. What are the various sources of harmonics generation in a HVDC line? Describe how a double tuned filter can be designed for a HVDC system. [16]
7. Derive the relation ship between pulse converter and harmonics generated. [16]
8. (a) Explain the fault clearing process in H.V.D.C. poles. Explain how are the H.V.D.C.equipment protected against prolonged short circuit currents though there is no H.V.D.C. circuit breaker on H.V.D.C. pole side.
   (b) Give the necessity of smoothing reactor in a HVDC system and list out main functions of it. [10+6]

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IV B.Tech I Semester Examinations,December 2011
HVDC TRANSMISSION
Electrical And Electronics Engineering

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
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1. (a) Briefly explain the different types of DC links and why homo polar links are mostly used?
   (b) Explain the importance of a HVDC converter station, in the whole scheme of HVDC transmission. [8+8]
2. How is Total Harmonic Distortion estimated in a circuit? Explain the relevance of THD to a HVDC system. [16]
3. (a) Explain the protection provided for DC line.
   (b) Discuss the various faults exist in converter station? Explain. [6+10]
4. (a) What are the limitations of manual control of a DC line operation?
   (b) Name the different types of Equidistant pulse control and explain them in detail. [8+8]
5. Three phase HVDC bridge converter is operating with firing angle and overlap angle:
   (a) Obtain the expression for average D.C voltage at converter terminals.
   (b) Find the approximate expression for power factor on the AC side of converter.
   (c) Sketch the instantaneous DC voltage waveform in inversion mode. [16]
6. What are the various types of filters that are employed in HVDC converter station? Discuss them in detail. [16]
7. Explain the AC-DC load flow with the help of flow chart. [16]
8. What is the imporatnce of Reactive power control? How ar the rectifier station and the Inverter station viewed in the analysis? [16]

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Code No: 07A70204 **R07** **Set No. 3**

IV B.Tech I Semester Examinations,December 2011
HVDC TRANSMISSION
Electrical And Electronics Engineering

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) What are non characteristic harmonics?
   (b) Explain the effect of firing angle errors on non characteristic harmonics.[6+10]
2. What do you understand by a load flow? Is the load flow chart different for a DC load flow as compared to AC load flow? [16]
3. (a) From fundamentals, deduce the basic equation of control. Also draw the equivalent circuit diagram of HVDC converter used for analyzing control concept.
   (b) What are the desired features of control? Why and explain. [8+8]
4. (a) List out basic types of faults that can occur in converters.
   (b) Explain single commutation failure in HVDC converters and why it is said to be self clearing. Draw the bridge and value voltage waveforms. [6+10]
5. (a) Give a comparison between a Bipolar HVDC system and 3 phase 3 wire AC system with respect to:
      i. Corona losses
      ii. Over voltages
      iii. Power loss and costs.

      Assume same insulation level with same power being transmitted.
   (b) List out the different components of a point to point HVDC link and give the schematic arrangement at one end. [8+8]
6. (a) Explain the conventional control strategy employed in HVDC systems.
   (b) Write a note on Alternate control strategies. [8+8]
7. With the help of state equations, derive the model for the operation of a six pulse rectifier circuit with an overlap angle of less than 60^0. Sketch the relevant output waveforms. [16]
8. Compare the schematics of a low pass filter and a high pass filter. What are the key elements common features and the dissimilarities. [16]

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