

Code No: 07A70204

**R07****Set No. 2**

IV B.Tech I Semester Examinations, May 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. With the help of neat sketches, analyze a six pulse rectifier bridge circuit with an overlap angle less than  $60^\circ$ . Deduce the relevant equations and draw the necessary graphs. [16]
2. How do you design a low pass filter? What precautions do you take? [16]
3. 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]
4. (a) Explain the different factors that decide the adoption HVDC link over a E.H.V.A.C link.  
(b) Give a comparison between 3 phase, 3 wire AC system and Bipolar DC system for power transfer of bulk loads. [8+8]
5. It is required to eliminate harmonics of order 10 and below 10 other than fundamental in a 12 pulse converter. Suggest a suitable transformer configuration and derive an equation for primary current of transformer. [8+8]
6. (a) What are the requirements of reactive power in steady state?  
(b) What is a Static VAR system? How many types of SVS schemes are present and what are they? [8+8]
7. (a) Differentiate between the two start-up procedures based upon the pulse.  
(b) Describe about starting and stopping of DC link. [8+8]
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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**R07****Set No. 4****IV B.Tech I Semester Examinations, May 2011****HVDC TRANSMISSION****Electrical And Electronics Engineering****Time: 3 hours****Max Marks: 80**

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1. Describe the schematic diagram of a HVDC link, mentioning all the key elements. [16]
2. (a) What is meant by Reactive power control and also give different sources of reactive power.  
 (b) With a neat sketch, explain about Thyristor Switched Capacitor. [8+8]
3. (a) What is meant by Peak Inverse Voltage (PIV), pulse number, valve rating and transformer rating?  
 (b) Explain how power reversal takes place? Give relevant waveforms. [8+8]
4. (a) What is the necessity of having constant ignition angle, constant current and constant extinction angle controllers at each converter station?  
 (b) Explain the working of working basic power controller using VDCOL (Voltage Dependent Current Order Limiter). [8+8]
5. (a) Explain about arc through fault at inverter station.  
 (b) Explain about short circuit in a converter bridge. Draw bridge voltage and current waveforms. [8+8]
6. (a) Give neat sketches of different types of HVDC lines that are generally used and compare their merits and demerits.  
 (b) A double circuit 3-phase line is converted into 3 circuit D.C homo polar line by bundling the conductors in the later. Compare the power transfer capacity of each circuit. Assume that the insulation levels and percentage line losses are same in both the circuits. [8+8]
7. What are the factors which help in deciding the number of pulse converters used in a systems. Classify them as economic, technical and describe. [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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**R07****Set No. 1**

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Electrical And Electronics Engineering

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1. (a) How is the effect of corona neglected in a HVDC system? Compare this with corona effect of a HVDC system.  
(b) What are the advantages of HVDC system over AC system? [8+8]
2. (a) What are non characteristic harmonics?  
(b) Explain the effect of firing angle errors on non characteristic harmonics. [6+10]
3. (a) Discuss the relative features of different reactive power control schemes in HVAC and HVDC systems.  
(b) Give in detail the different sources of reactive power? [8+8]
4. (a) What is meant by pulse number, Extinction angle, Delay angle?  
(b) Determine the following quantities for a 3 phase half wave rectifier unit:
  - i. Peak to peak ripple
  - ii. Valve number
  - iii. VA rating of a valve.
 (c) Obtain expression for the output voltage and direct current of a converter working as a rectifier with delay angle ' $\alpha$ ' and commutation angle ' $\mu$ '. [16]
5. What are the various types of filters that are employed in HVDC converter station? Discuss them in detail. [16]
6. Draw the schematic of a HVDC line presently being used in our country and provide a suitable model for the same. [16]
7. With the help of general schematic arrangement of a HVDC circuit breaker, Explain in detail the sequence of operations after a trip signal is given to the breaker. Draw the current and voltage waveforms. [4+8+4]
8. (a) Explain how frequency control can be used for DC power modulation?  
(b) Explain the necessity of VDCOL control used in HVDC systems. [8+8]

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**R07****Set No. 3**

IV B.Tech I Semester Examinations, May 2011

HVDC TRANSMISSION

Electrical And Electronics Engineering

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Answer any FIVE Questions  
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1. Briefly explain the criterions which we have to keep in mind while designing a filter in HVDC system. [16]
2. Write a short notes on:
  - (a) Modeling of H.V.D.C. links
  - (b) P.U. system for d.c. quantities. [8+8]
3. (a) Explain by means of a schematic diagram and with theoretical expression, how power flow through HVDC link, is controlled?  
 (b) Briefly explain the desired control features in a DC transmission line. [8+8]
4. (a) What are the basic principles of over current protection.  
 (b) Discuss how protection of DC line differs from AC line protection. [8+8]
5. (a) Describe the method of compensation of reactive power in HVDC substation.  
 (b) Draw simple single line schematics for each. [8+8]
6. What is the reason for using star-star and star-delta transformer configurations for 12 pulse converter. Derive an equation for primary current using fourier analysis. [6+10]
7. With the help of neat sketches, analyze a six pulse rectifier bridge circuit with an overlap angle greater than  $60^\circ$ . Deduce the relevant equations and draw the necessary graphs. [16]
8. (a) Discuss the relative merits and demerits of using E.H.V.A.C transmission and HVDC transmission for bulk power transmission over long distances.  
 (b) What are the different types of HVDC links used. Why is bipolar link a better choice? [8+8]

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