Code No: M0224/R07

Set No. 1

IV B.Tech I Semester Supplementary Examinations, March 2013
HVDC TRANSMISSION
(Electrical & 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 the different applications of D.C. transmission system? Explain them in detail. [8]
   (b) With neat sketches explain the different kinds of D.C. links available. [8]
2. With the help of neat circuit diagram, discuss the operation of a six pulse rectifier circuit with an overlap angle of less than 60^0. Sketch the relevant output wave forms. [16]
3. Write short notes on the following [8+8=16]
   (a) Constant Alpha control
   (b) Inverse cosine control.
4. Discuss the various sources of reactive power for HVDC converters. [16]
5. (a) Classify the solution methodology for AC-DC load flow and explain. [8]
   (b) Explain the per unit system for DC quantities. [8]
6. Write a short notes on
   (a) Over current protection [5]
   (b) Smoothing reactor [5]
   (c) D.C. breakers [6]
7. How do you estimate the harmonic order based upon pulse number of HVDC converter station? Give a detailed harmonic analysis of a 12 pulse converter for characteristic harmonics. [16]
8. Mention the configurations and impedance characteristics of various types of filters. Give design aspects of single tuned filter. [16]

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Set No. 2

IV B.Tech I Semester Supplementary Examinations, March 2013
HVDC TRANSMISSION
(Electrical & Electronics Engineering)

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

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Discuss the problems arises in A.C. interconnection. How these problems are overcome in D.C. transmission? [8+8]
   (b) What is the effect of ground impedance in A.C. transmission system? How ground impedance is not posing any problems in D.C. transmission system.
2. (a) Show that the approximate value of the power factor of a converter is [8]

   $\frac{\cos\alpha+\cos(\alpha+\gamma)}{2}$

   (b) For a 3- ϕ bridge circuit, the secondary line voltage is 400 KV r.m.s. with a reactance per phases of 40 ohms. Find the d.c. output voltage and the commutation overlap angle if the output current is 2000A. Assume the delay angle (firing angle) $\alpha = 15^0$. [8]
3. Write a detailed notes on the following. [8+8=16]
   (a) Predictive commutation margin control
   (b) Equidistant firing control.
4. (a) Explain why the inverter end requires higher reactive power supply than the rectifier end? [8]
   (b) On what factors is the reactive power requirement of a converter system depend? [8]
5. (a) Compare simultaneous and sequential methods of power flow analysis. [8]
   (b) Draw the flow chart for AC/DC load flow. [8]
6. (a) Explain the sequence of converter control actions and bipolar to mono polar transfers during D.C. line fault clearing in a bipolar H.V.D.C. system. [8+8]
   (b) State the various abnormal operating conditions in a thyristor converter value.
7. 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. [16]
8. What are the various types of filters that are employed in HVDC converter station? Discuss them in detail. [16]

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Code No: M0224/R07

Set No. 3

IV B.Tech I Semester Supplementary Examinations, March 2013
HVDC TRANSMISSION
(Electrical & Electronics Engineering)

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

Answer any FIVE Questions
All Questions carry equal marks

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1. Draw a schematic diagram of a typical HVDC converter station and explain the functions of various components available. [16]

2. (a) Draw the connection diagram of two, 3ϕ converter transformers to a 12 pulse converter bridge. [8]
   (b) What is meant by (i) firingle angle delay and commutation delay ? Draw the waveforms for voltage and current in a 6 pulse Gractz circuit with $\alpha = 30^0$ and $\mu = 15^0$. [8]

3. With block diagram ,explain the principle of operation of a current controller.[16]

4. Explain the causes of reactive power absorbed by HVDC converter substation.[16]

5. Write a short notes on
   (a) Modelling of H.V.D.C. links [8]
   (b) P.U. system for d.c. quantities [8]

6. Explain the difference between A.C. circuit breaker and H.V.D.C. circuit breaker. State the principle of artificial current zero employed in H.V.D.C. circuit breakers. State the events occurring in the entire fault clearing process using such a breaker. [16]

7. Give reasons for selecting star-star and star-delta transformer configuration instead of two star-star configurations for 12 pulse converter. Derive an equation for primary current. [16]

8. Give a detailed account of design aspects of the following filters: [8+8=16]
   (a) Single tuned filter
   (b) Double tuned filter.

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Code No: M0224/R07

Set No. 4

IV B.Tech I Semester Supplementary Examinations, March 2013
HVDC TRANSMISSION
(Electrical & Electronics Engineering)

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

Answer any FIVE Questions
All Questions carry equal marks

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1. Compare the performance of A.C. and D.C. transmission system based on the following factors.
   (a) Stability limit [5]
   (b) Voltage control [6]
   (c) Line compensation. [5]
2. Draw the schematic diagram of a typical HVDC converter station with 2 six pulse converter units and explain the function of each component. [16]
3. With block diagram, explain the hierarchical control structure for a DC link. [16]
4. Describe the method of Compensation of reactive power in HVDC substation .Draw simple single line schematics for each. [16]
5. Deduce and explain AC/DC load flow equation problem using the sequential method. [16]
6. (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. [10]
   (b) Explain the protection provided for DC line . [6]
7. How do you estimate the harmonic order based upon pulse number of HVDC converter station? Give a detailed harmonic analysis of a 12 pulse converter for characteristic harmonics. [16]
8. Discuss the following filters: [8+8=16]
   (a) Doubled Tuned filter
   (b) High pass C type filter.

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