

Question 1 is compulsory. Answer one from 2 or 3 and one from 4 or 5.

	Question	Marks	Unit	CO	Cognitive Level
1.a)	What are the types of DC links?	2	I	C403.1	Understand
1.b)	What are the assumptions made to simplify the analysis of graetz circuit?	2	II	C403.2	Remember
1.c)	What is commutation voltage of valves?	2	II	C403.2	Understand
1.d)	Give any four comparisons between HVAC and HVDC Transmission system.	2	I	C403.1	Remember
1.e)	Discuss the effect of source impedance in the converter operation.	2	II	C403.2	Understand
2.	Elucidate with a neat sketch HVDC converter station and its components for HVDC transmission system.	10	I	C403.1	Understand
3.(a)	For a fixed power of transmission explain how the economic choice of voltage level is selected in D.C Transmission system.	6	I	C403.1	Understand
3.(b)	Discuss the technological development in control and protection for better performance and reliability of D.C transmission.	4	I	C403.1	Understand
5.	Draw the schematic circuit diagram of a Graetz's circuit and explain its principle of operation with necessary output waveforms.(without overlap)	10	II	C403.2	Understand, Analyse
6.	Define the following terms (a) Pulse number (b) Thyristor PIV rating (c) Valve utilization factor (d) Transformer utilization factor	10	II	C403.2	Remember

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	Question	Marks	Unit	CO	Cognitive Level
1.a)	Draw different configurations of asynchronous interconnections.	2	I	C403.1	Understand, Remember
1.b)	Define the terms ‘Transient Reliability’ and ‘Short Circuit Ratio’ (SCR) as applied to transmission lines.	2	I	C403.1	Remember
1.c)	Define twelve pulse converter with schematic diagram.	2	II	C403.2	Remember
1.d)	What are the various modes of operation of 6-pulse converter based on overlap angle duration.	2	II	C403.2	Understand, Remember
1.e)	Draw the cost Vs distance curve of AC and DC transmission.	2	I	C403.1	Understand
2	Give a detailed comparison between HVDC and HVAC transmission System provided by the system planner.	10	I	C403.1	Understand
3.a)	With a neat sketch discuss various HVDC links available Transmission system .	5	I	C403.1	Understand
3.b)	What are the advantages and disadvantages of HVDC system	5	I	C403.1	Understand, Remember
4	Elucidate the 12-pulse converter characteristic with relevant waveforms?	10	II	C403.2	Understand, Analyse
5	Analysis and explain the Graetz’s circuit with overlap under different modes of operation.	10	II	C403.2	Understand, Analyse

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Sub: HVDC Transmission

Time: 1½ Hrs.

Date: 16-02-2018

Max Marks: 30M

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	Question	Marks	Unit	CO	Cognitive Level
1.a)	Write a brief on various advances in HVDC technology.	2	I	C403.1	Remember
1.b)	Give the importance of involving the connection of capacitor commutated converters in HVDC Transmission system.	2	I	C403.1	Understand
1.c)	State the economic advantages in DC transmission?	2	I	C403.1	Remember
1.d)	Draw the diagram of Graetz bridge circuit.	2	II	C403.2	Understand
1.e)	How can you define terms (i) PIV (ii) Valve utilization factor.	2	II	C403.2	Remember
2.(a)	Prove that insulation required for a Bi-polar DC system is 0.866 times that required for 3- Φ ,3-wire AC system.	6	I	C403.1	Understand Apply
2.(b)	Discuss the technological development in control and protection for better performance and reliability of D.C transmission.	4	I	C403.1	Understand
3.	Explain in detail about the planning of HVDC transmission and explain the procedure for the selection of voltage level for a fixed power transfer.	10	I	C403.1	Understand
4.	Discuss the effect of source reactance in 6-pulse converter? And with a neat sketch explain the mode-I operation.	10	II	C403.2	Understand, Analyse
5.	Explain the choice of converter configuration for any pulse number.	10	II	C403.2	Understand

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	Question	Marks	Unit	CO	Cognitive Level
1.a)	List out various filters used in HVDC Transmission system to filter out harmonics.	2	I	C403.1	Remember
1.b)	State the comparison of AC & DC transmission system in view of voltage profile.	2	I	C403.1	Remember
1.c)	Write the equation of AC current and DC voltage harmonics.	2	II	C403.2	Understand
1.d)	Define(i)peak inverse voltage (ii)pulse number?	2	II	C403.2	Remember
1.e)	Draw the schematic diagram of three & two valve conduction mode	2	II	C403.2	Understand
2.a)	With neat sketches explain the different kinds of dc link available in Transmission system and give their applications.	4	I	C403.1	Understand
2.b)	Explain the major components of a HVDC transmission in converter station unit.	6	I	C403.1	Understand
3.	State the advantages and disadvantages of dc transmission system with following economics, reliability, and performance.	10	I	C403.1	Understand
4.	Explain with the help of neat diagram and wave forms, the operation of 6-pulse bridge converter with delay angle α and overlap angle u . Derive the expression for its dc output voltage.	10	II	C403.2	Understand, Analyse
5.	Explain the analysis of 12 pulse converter with bridge rectifier	10	II	C403.2	Understand, Analyse

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