



SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY
(AUTONOMOUS)

(Approved by AICTE, New Delhi & Affiliated to JNTUA, Ananthapuramu)
(Accredited by NBA (EEE, MECH, ECE & CSE) & NAAC with 'A' Grade)
Siddharth Nagar, Narayanavanam Road, PUTTUR-517 583

QUESTION BANK (DESCRIPTIVE)

Subject with Code: HvdC Transmission Systems (19EE0230)

Course & Branch: B.Tech - EEE

Year & Sem: IV-B.Tech & I-Sem

Regulation: R19

UNIT –I

Introduction To HvdC Transmission

1		Briefly explain the technical merits and economical considerations of HVDC over HVAC transmission systems.	[L2][CO1]	[12M]
2		With neat sketches explain the different kinds of dc link available	[L2] [CO1]	[12M]
3.		Explain the major components of a hvdc transmission in converter station unit	[L2][CO1]	[12M]
4.	a	Explain the power handling capabilities of HVDC lines	[L2][CO2]	[6M]
	b	What are the factors to be considered for planning of HVDC Transmission?	[L1][CO2]	[6M]
5.		Briefly explain the principles of static conversion and static converter configuration.	[L2][CO2]	[12M]
6		Explain the break even distance of D.C transmission system. Give its range of values for D.C transmission lines.	[L2][CO1]	[12M]
7	a	Explain the application of DC transmission	[L2][CO1]	[6M]
	b	State the advantages and disadvantages in DC transmission	[L2][CO1]	[6M]
8		Give a comparison of HVAC and HVDC system based on economical and Technical performance	[L2][CO1]	[12M]
9		Derive the expression for Graetz circuit with and without overlap	[L1][CO1]	[12M]
10	a	Discuss following HVDC links (a) Mono polar (b) Bipolar	[L2][CO1]	[8M]
	b	Draw the converter station unit in hvdc transmission	[L2][CO1]	[4M]

UNIT –II**Static power converter analysis**

1		Draw the schematic circuit diagram of a 6 pulse Graetz circuit and explain its principle of operation.	[L2][CO3]	[12M]
2.		Explain the operation of a 12 pulse bridge rectifier with the help of circuit diagram. Draw the relevant voltage & current waveforms	[L2][CO3]	[12M]
3.		Explain the different types of commutation processes	[L1][CO3]	[12M]
4.		From the fundamentals, develop the equivalent circuit of HVDC link.	[L2][CO3]	[12M]
5.		Explain the individual characteristics of a rectifier and inverter with neat sketch.	[L3][CO3]	[12M]
6		Describe the operation and commutation sequence of a 3-pulse converter station.	[L2][CO3]	[12M]
7		Explain the converter station and terminal equipment	[L2][CO3]	[12M]
8		Explain the effect of overlap angle on the performance of converter circuit	[L2][CO3]	[12M]
9		Explain the analysis of two and three valve conduction mode	[L1][CO3]	[12M]
10		Explain the choice of converter configuration for any pulse number	[L2][CO3]	[12M]

UNIT –III**Control of HVDC converter systems**

1		Draw the complete converter control characteristics and explain the principle of power control in a DC link.	[L2][CO4]	[12M]
2	a	Write in brief about control of voltage source converter with neat sketch diagram.	[L2][CO4]	[6M]
	b	Enumerate the relative merits and demerits of constant current control and constant voltage control of HVDC link.	[L4][CO4]	[6M]
3		Describe the hierarchical control structures used in HVDC link control.	[L3][CO4]	[12M]
4		Explain firing angle control and briefly explain basic firing angle schemes.	[L2][CO4]	[12M]
5		Explain about Individual Phase Control(IPC) scheme for firing angle control employed in a converter. Also explain about its drawbacks	[L4][CO4]	[12M]
6		Explain about Equidistant pulse Control(EPC) scheme	[L2][CO4]	[12M]
7		Discuss about following control schemes (a) Constant α control (b) inverse cosine control	[L2][CO4]	[12M]
8		Discuss about following control schemes (a) Pulse frequency control (b) pulse period control (c) pulse phase control	[L2][CO4]	[12M]
9		Explain constant current and extinction angle control and ignition angle control methods	[L1][CO4]	[12M]
10		Explain the principle of power control in a DC link. With converter control characteristics	[L3][CO4]	[12M]

UNIT –IV
Harmonics and Filters

1		Explain in briefly about harmonic generation sources in HVDC system.	[L2][CO5]	[12M]
2		Explain why filter used in HVDC system and explain in brief of various types.	[L2][CO5]	[12M]
3		What are AC filters in DC converter stations? Explain their role in control of DC harmonics.	[L2][CO5]	[12M]
4		What are DC filters? Explain how they differ from AC filters and their design principles.	[L2][CO5]	[12M]
5		Mention the various sources of harmonic generation in HVDC systems and suggest methods to eliminate them.	[L3][CO5]	[12M]
6		What are the different types of filters used on the AC side of HVDC system? How they are located and arranged?	[L2][CO5]	[12M]
7		Give a detailed account of design aspects of following filters (a) Single tuned filter (b) Double tuned filter	[L3][CO5]	[12M]
8		Write short notes on the following: (a) Telephone influence factor (b) Harmonic distortion	[L1][CO5]	[12M]
9		Explain about high pass filter	[L2][CO5]	[12M]
10	a	Explain about Harmonics Elimination and Suppression Methods	[L3][CO5]	[6M]
	b	Write the characteristics of Harmonics	[L4][CO5]	[6M]

UNIT –V
Transients,Faults and Protection of HVDC systems

1		What are the various types of converter faults? Explain them in brief	[L2][CO6]	[12M]
2		Explain the method of protection against over voltages and draw typical arrangement of surge arrestors for a converter pole.	[L3][CO6]	[12M]
3		Describe the typical arrangement of surge arrestor for a converter pole.	[L4][CO6]	[12M]
4		Explain the types of over voltages occurred in converter stations.	[L5][CO6]	[12M]
5		Explain the method of protection against over voltage with typical arrangement.	[L3][CO6]	[12M]
6		Draw and Explain the method of protection against over currents for converter pole	[L2][CO6]	[12M]
7		Protection against faults in voltage source converter	[L2][CO6]	[12M]
8		Explain about valve group and dc line protection	[L5][CO6]	[12M]
9		Discuss about surge arresters in hvdc system	[L2][CO6]	[12M]
10		Draw and explain typical arrangement of surge arrestors for a converter pole.	[L2][CO6]	[12M]