

Reg.No.:



VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN

[AUTONOMOUS INSTITUTION AFFILIATED TO ANNA UNIVERSITY, CHENNAI]

Elayampalayam – 637 205, Tiruchengode, Namakkal Dt., Tamil Nadu.

Question Paper Code: 8022

M.E. / M.Tech. DEGREE END-SEMESTER EXAMINATIONS – JUNE / JULY 2024

Second Semester

Power Systems Engineering

P23PS207 – HVDC TRANSMISSION SYSTEMS

(Regulation 2023)

Time: Three Hours

Maximum: 100 Marks

Answer ALL the questions

Knowledge Levels (KL)	K1 – Remembering	K3 – Applying	K5 - Evaluating
	K2 – Understanding	K4 – Analyzing	K6 - Creating

PART – A

(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	State the importance of planning of HVDC transmission.	2	K1	CO1
2.	What are the advantages of HVDC system over EHVAC system?	2	K2	CO1
3.	In a 'p' pulse converter, if there are 'q' valves in a basic commutation group and r of these are connected in parallel and 's' of them are connected in series, and the valves are supplied current by a transformer, then Derive the expression of transformer utilization factor.	2	K3	CO2
4.	Mention the advantages of twelve pulse converter.	2	K2	CO2
5.	What is the principle of DC link control?	2	K4	CO3
6.	List the advantages of Pulse phase control over pulse frequency control.	2	K2	CO3
7.	Sketch the circuit of double tuned AC filter.	2	K1	CO4
8.	What is telephone influence factor?	2	K1	CO4
9.	What are the effects of harmonics in a HVDC system?	2	K2	CO5
10.	Why are filters not needed on the DC side with HVDC voltage source converter schemes?	2	K2	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.	Questions	Marks	KL	CO
11.	a) Compare HVAC and HVDC transmission system on the basis of economics, technical performance and reliability. (OR)	13	K2	CO1
	b) Draw the typical layout of HVDC transmission system and explain each part.	13	K2	CO1
12.	a) Derive the expression of average DC voltage and power factor angle during operation of a Graetz circuit without overlap in the commutation angle. (OR)	13	K3	CO2
	b) Derive the expression of average DC voltage and power factor angle during the two and three valve conduction mode operation of a Graetz circuit with overlap in the commutation angle	13	K3	CO2
13.	a) Explain the basic principle of DC link control, starting and stopping of DC link control with neat sketch. Explain about the converter control characteristics of the same. (OR)	13	K2	CO3
	b) What are different schemes of Equidistant pulse control (EPC)? Discuss its disadvantages.	13	K2	CO3
14.	a) Discuss the modifications of current margin control to facilitate the operation of MTDC systems even in the presence of commutation failure. (OR)	13	K2	CO4
	b) Describe the operation of series and parallel MTDC systems, and bring out the difference between them.	13	K2	CO4
15.	a) Describe commutation failure and misfire in HVDC converter systems. (OR)	13	K3	CO5
	b) Why overvoltage occur in HVDC systems? Explain the principle of overvoltage protection by surge arrester in an HVDC system.	13	K3	CO5

PART – C

(1 x 15 = 15 Marks)

Q.No.	Questions	Marks	KL	CO
16. a)	Explain the twelve pulse converter with its operating principle, advantages, disadvantages and applications in detail.	15	K4	CO2
	(OR)			
b) i.	Explain the procedural steps and factors to be considered for designing a single tuned filter for a HVDC system.	8	K3	CO4
ii.	Explain the procedural steps and factors to be considered for designing a high pass filter for HVDC system.	7	K3	CO4