Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S8 (R,S) Exam April 2025 (2019 Scheme)

Course Code: EET466
Course Name: HVDC AND FACTS

Max. Marks: 100 **Duration: 3 Hours**

PART A

Answer all questions, each carries 3 marks. Marks

1		What is pulse number of a converter? What is its significance?	(3)
2		Differentiate between voltage sourced and current sourced converters.	(3)
3		Distinguish between delay in firing angle and extinction angle of an HVDC converter.	(3)
4		Discuss the current control strategy of the rectifier station in an HVDC transmission system.	(3)
5		What are the key differences between transient stability and steady-state stability in power systems?	(3)
6		What is power quality, and why is it important in electrical systems?	(3)
7		Explain different losses that are encountered with FC – TCR arrangement.	(3)
8		Explain the effect of initial charge of the capacitor in TSC.	(3)
9		Differentiate clearly between an UPFC & IPFC	(3)
10		State the objectives of voltage and phase angle regulators.	(3)

PART B

Answer any one full question from each module, each carries 14 marks.

Module I

11	a)	Derive the expression for average value of output voltage for a Graetz circuit with an overlap angle less than 60 degree	(10)
	b)	State the merits of HVDC transmission over EHVAC transmission for bulk power transmission.	(4)

OR

12	a)	Explain voltage source converter with AC Current control with a neat control schematic.	(8)
	b)	What are the different types of HVDC links? Discuss them with necessary diagrams.	(6)

Module II

13		Explain the hierarchy of control in a detailed manner using a relevant block diagram.	(14)

OR

14	a)	Explain the static Vd-Id characteristics of HVDC system. Also explain the different modes of Rectifier and Inverter Station.	(10)
	b)	Explain inverter extinction angle control.	(4)

Module III

15	a)	Derive the expression for active and reactive power for series compensation using a neat circuit diagram.	(10)
	b)	Discuss various limitations on the loading of a transmission line.	(4)

OR

16	a)	Explain the effect of phase angle compensation with neat diagrams.	(8)
	b)	What are the benefits of FACTS controllers? List different types of FACTS controllers?	(6)

Module IV

17	a)	Explain the working and characteristic of Thyristor Controlled Reactor.	(8)
	b)	Differentiate between TSR andTCR.	(6)

OR

18	a)	Discuss the operation of STATCOM with a neat diagram and characteristics.	(10)
	b)	What are the key advantages of a Static Synchronous Compensator?	(4)

Module V

19	a)	How an UPFC scheme can be implemented using two back to back voltage source converters.	(10)
	b)	What are the key applications of a Unified Power Flow Controller (UPFC) in modern power systems?	(4)

OR

20	a)	Explain principle of operation of IPFC with neat diagram. Discuss its applications.	(14)

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