

**BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)**

**CLASS: BTECH
BRANCH: EEE**

**SEMESTER : VII/ADD
SESSION : MO/2024**

SUBJECT: EE535 HVDC AND FACTS

TIME: 3 Hours

FULL MARKS: 50

INSTRUCTIONS:

1. The question paper contains 5 questions each of 10 marks and total 50 marks.
 2. Attempt all questions.
 3. The missing data, if any, may be assumed suitably.
 4. Before attempting the question paper, be sure that you have got the correct question paper.
 5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.
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		CO	BL
Q.1(a)	Explain the difference in the power flow through an AC link and an HVDC Link.	[2] 1	2
Q.1(b)	Summarize the advantage and disadvantage of HVDC transmission system as compared to EHV AC System.	[3] 1	1
Q.1(c)	With a neat diagram, explain different types of DC links. Explain the merits of back-to-back HVDC link.	[5] 1	3
Q.2(a)	Summarize the methods used for reactive power support on an HVDC converter station.	[2] 2	2
Q.2(b)	In brief, explain the advantage of bridge converter over other types of converters for utilizing in HVDC converter station.	[3] 2	3
Q.2(c)	Draw the firing angle sequence and output waveforms for three-phase 6 pulse converter and derive the expression for output DC voltage, Input AC Current and Power Factor.	[5] 2	4
Q.3(a)	Explain the terms characteristic harmonics and non-characteristic harmonics present in HVDC system.	[2] 3	2,3
Q.3(b)	In brief, explain the harmful effects of AC side and DC Side harmonics.	[3] 3	2,3
Q.3(b)	Draw and explain the various configurations of Passive AC Filter. Find the impedance offered by a damped filter and draw the variation of impedance with respect to h/h_r .	[5] 3	3,4
Q.4(a)	Explain why FACTS devices are necessary in the power transmission system.	[2] 4	2
Q.4(b)	With the help of neat sketch, explain various types of FACTS devices.	[3] 4	3
Q.4(c)	With the help of a neat sketch, explain the operation of SVC in both inductive and capacitive mode. Also draw the SVC characteristic in both the operating regions.	[5] 4	3,4
Q.5(a)	With a neat diagram explain the functioning of STATCOM. Also, explain, the characteristic of STATCOM in different operating modes.	[5] 5	3,4
Q.5(b)	With the help of block diagram, explain the functioning of each component of STATCOM control circuit.	[5] 5	4,5

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