Name: Enrolment No:	UPES

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
Online End Semester/Suppl Examination, June 2020

Course: Advanced Power Transmission Systems, PSEG405 **Semester: VIII**
Programme: B.tech. – Electrical **Time: 03 hrs.**
Instructions: All questions are compulsory **Max. Marks: 100**

SECTION A (MCQ)

S. No.		Marks	CO
Q 1	If V_m is the peak voltage/phase on the AC side for a given α and μ, the reduction in output DC voltage with an overlap is $(\frac{\sqrt{3V_m}}{2} * \dots)$ (a) $Cos \propto -\cos(\propto +\mu)$ (b) $Cos \propto +\cos(\propto +\mu)$ (c) $\sqrt{2}[Cos \propto -\cos(\propto +\mu)]$ (d) $\sqrt{2}[Cos \propto +\cos(\propto +\mu)]$	5	CO3
Q.2	Mid-point power in HVDC link is given by (P_{d1} rectifier end power, P_{d2} inverter end power, and P_L line losses) (a) $P_{d1} - \frac{P_L}{2}$ (b) $P_{d1} + \frac{P_L}{2}$ (c) $P_{d2} - \frac{P_L}{2}$ (d) $P_{d2} \pm \frac{P_L}{2}$	5	CO2
Q.3	The main advantage of HVDC-VSC schemes is (a) Both active and reactive powers can be controlled (b) Does not require DC filters (c) Can be used for very high power more than 1500 MW (d) All of the above	5	CO2
Q.4	A 200 kV, 400 MW HVDC unit has rectifier and voltage 195kV and an inverter end voltage 187kV, when transmitting 1000A current. The power loss in the system is (a) 8 MW (b) 5 MW (c) 13 MW (d) 16 MW	5	CO3

Q.5	The relation between V_{do} and peak value of phase voltage on the secondary side of AC system is, V_{do} = ? (a) $\frac{3}{\pi} * V_m$ (b) $\frac{3\sqrt{3}}{\pi} * V_m$ (c) $\frac{\pi}{3} * V_m$ (d) $\frac{\pi}{3\sqrt{3}} * V_m$	**5**	**CO4**
Q.6	Peak inverse voltage in a 6-pulse converter is (a) 1.047*V_{do} (b) 4.07*Vd_o (c) $\frac{3}{\pi} * V_{d0}$ (d) $\frac{\sqrt{3}}{\pi} * V_{d0}$	**5**	**CO3**
SECTION B			
Q.7	Explain your understanding on surge impedance loading and its importance. How a voltage profile of AC line is governed by load and length of the line.	**10**	**CO1**
Q.8	What are the limitations of DC line? How have these limitations been surmounted in modern HVDC lines?	**10**	**CO1**
Q.9	Estimate the steady state stability of 1-phase AC line with sending end and receiving end voltages maintained 132 kV by a synchronous modifier, and when the sending end voltage is loading by 90^0 electrical degrees, given the reactance of the line is 10 ohm.	**10**	**CO3**
Q.10	Articulate the significance of break-even distance in HVDC transmission.	**10**	**CO2**
Q.11	What are the advantages and disadvantages of homopolar HVDC links over other types of links.	**10**	**CO2**
SECTION-C			
Q.12	A 3-phase fully-controlled bridge converter is connected to a 400 V, 50 Hz supply having a source of 0.3 ohm/phase. The converter is operating as a rectifier at a firing angle of 60^0. Determine the average load voltage and the overlap angle when the converter is supplying a steady current 100 A. **OR** (a)Present comparative characteristic of CSC (classical HVDC) and HVDC-VSC systems. (b) Discuss the effect of commutation reactance on the output voltage of converter.	**20**	**CO4**