UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, May 2021

Course: Advanced Power Transmission systems   Semester: VIII
Program: B. Tech. Electrical   Time 03 hrs.
Course Code: EPEG 4004   Max. Marks: 100

SECTION A
1. **Each Question will carry 5 Marks**
2. **Instruction: Complete the statement / Select the correct answer(s)**

S. No.	Question	CO
Q 1	Harmonic in case of AC current is of order of a. np b. np ± 2 c. np ± 1 d. None	CO4
Q2	In which HVDC coupling system no DC transmission line required but the rectification and inversion is done in same substation. a. Homopolar HVDC b. Bipolar HVDC c. Multiterminal HVDC d. Back to back	CO2
Q3	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) $\sqrt{2}[Cos \propto + \cos(\propto +\mu)]$	CO3
Q4	The cost of transmission _____with the increase in transmission voltage.	CO1
Q5	12-pulse converters are used in modern converters because of (a) Reduced current (b) Reduced ripple (c) Increased voltage and reduced harmonics (d) Both (b) and (c)	CO3
Q6	In HVDC converter ratio reactive power needed for proportional active power transmission at full -load (a) 1.0 (b) 0.9 (c) 0.6 (d)0.25	CO1

SECTION B		
1. **Each question will carry 10 marks**		
2. **Instruction: Write short / brief notes**		
Q 7	What do you understand by the terms (a) Commutating voltage (b) Commutation reactance Discuss the effect of the later term on the output voltage of the converter.	**CO4**
Q 8	Define the following terms (i) Peak Inverse Voltage (ii) HVDC coupling system (iii) Peak to peak ripple (iv) Volt-ampere rating of a valve	**CO1**
Q 9	A transformer secondary line voltage to a 3-phase bridge rectifier is 345 kV. Calculate the DC voltage output with $\mu = 15^0$, when $\alpha = 0^0$, 15^0 and 30^0.	**CO5**
Q 10	Illustrate the objective of FACTS and also its applications.	**CO4**
Q 11	Why is reversed of power through an HVDC link needed? Explain the method of reversal of power.	**CO5**
Section C		
1. **Each Question carries 20 Marks.**		
2. **Instruction: Write long answer.**		
Q12	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 Describe the methods of compensation of reactive power in HVDC substation. Draw single line schematics for each.	**CO3**