PARUL UNIVERSITY
FACULTY OF ENGINEERING & TECHNOLOGY
M.Tech., Winter 2017 – 18 Examination

Semester: 1   Date: 28/12/2017
Subject Code: 03203102   Time: 02:00PM to 04:30PM
Subject Name: FACTS & HVDC   Total Marks: 60

Instructions:
1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

Q.1 A) What is the requirement of reactive power in a transmission system? Compare series and shunt **(05)**
compensation.

B) Explain about the classification of DC links using neat diagrams. **(05)**

C) List out the various components of HVDC converter station with its applications. **(05)**

Q.2 **Answer the following questions**. (Attempt any three) (Each five mark) **(15)**

A) List out the various practical problems associated with Series compensation

B) Derive the voltage current relationship for a Graetz bridge circuit and draw the equivalent circuit.

C) Write a short note on causes and consequences of harmonics in HVDC system.

D) Discuss the basic concept of DC circuit interruption. What are the limitations of DC circuit breakers?

Q.3 A) Explain in detail, the working of STATCOM with schematic diagram. **(07)**

B) Derive the expressions for voltage, current and power at midpoint of a symmetrical long **(08)**
transmission line.

OR

B) An SSSC is connected at the midpoint of the lossless 400kV, 50 Hz, 600 km long symmetrical **(08)**
line. At the operating angle of $\delta = 30^0$, the current in the line (at the midpoint) is same as the
current in the line when a series capacitor C = 11.1 nf / km is connected.
(a) Compute the reactive voltage V_r injected.
(b) With the V_r calculated in (a) what is the maximum power flow in the line? What is the value of
δ at which this occurs.
(c) Compute the power flow at $\delta = 0^0$; what are the line voltages at the 2 terminals of the SSSC

Q.4 A) Give schematic diagram of 12 pulse converter. Explain different conduction modes with the help **(07)**
of figures.

OR

A) Differentiate between classical HVDC and HVDC-VSC systems. **(07)**

B) Explain extinction angle control? What are its limitations under asymmetrical fault? **(08)**