Electrical Engineering Department
EEL404/EEL894 Flexible AC Transmission System
Major Test

Time allowed- 2 hour | Maximum Marks- 40

Answer all questions

Q.1

i. Draw the phasor diagram of a type-1 converter system and explain how we can regulate both magnitude and phase angle of the output voltage.

ii. In case of a Type-2 converters based SSSC the magnitude of voltage injection is varied by making the voltage injection angle with respect to the line current
a. $=90^0$ b. $\neq 90^0$ (in a small range) c. 0^0 d. None of these.

iii. Will a SSSC be SSR neutral even when the DC capacitor voltage fluctuates?
a. Yes b. No

iv. An UPFC can regulate_____ flow in the transmission line.
a. real power b. reactive power c. both real and reactive power

v. PLL is used for measuring _____.

vi. In case of a STATCOM supplying reactive power to the bus, the maximum power occurs at what power angle (δ)?
a. $>90^0$ b. $<90^0$ c. 90^0 d. can occur at any angle

vii. Transport delay for a 12 pulse converter is _____ when the time period is "T".

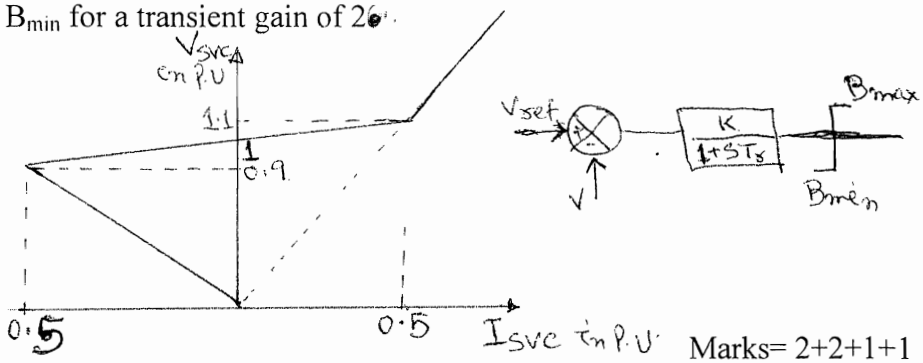
viii. If the ESCR of the system at the SVC bus is increased then the response time of SVC will
a. decrease b. increase c. remains same

ix. In case of a TCSC the susceptance of reactance is_____ capacitance.
a. greater then b. less then c. equal d. can not be predicted

x. The effective capacitance for a STATCOM with a capacitor 'C' is
a. C/k^2 b. k^2C c. kC d. C/k

Marks = 10

Q.2 The steady state SVC characteristics and the corresponding voltage control loop are given below. Find out 'K', 'T_r', B_{max} and B_{min} for a transient gain of 26.



Marks= 2+2+1+1

Q.3 Draw the control block diagram of a Type-2 SSSC. Explain how we can regulate the magnitude of injected voltage. If the injected voltage is increased by 1% what will be the phase difference between the line current and the injected voltage at steady state. Marks= 4+2+1

Q.4 Derive from the basic the load injection model of an UPFC. Marks = 7

Q.5 A SSSC is used for regulating the real power flow in a transmission line. Compute the value of transmitted real power, current and rating of SSSC for $V_S=V_R=1$ pu; X=1.05pu and $V_q=0.85$ pu for a power angle (δ) of 45°. Marks = 5+3+2