

END SEMESTER EXAMINATION M.TECH.(MAY-2016)

Branch/Semester: Electrical Engineering/2nd M.Tech. (PSE & PECD)

Subject: FACTS Modeling, Control and Applications

Full Mark – 70

Time - 3 Hours

(Answer Question No. 1 which is compulsory and any five from the rest)

(Figures in the right hand margin indicate the marks)

1. Answer the following questions [2x10]
 - (a) Explain the thermal capability of an overhead line.
 - (b) What is the benefit of an added storage system to the FACTS Controller?
 - (c) Compare voltage-sourced converters and current-sourced converter.
 - (d) How a shunt compensator helps in power oscillation damping?
 - (e) Explain the concept of var reserve control.
 - (f) Compare thyristor and GTO
 - (g) What are the objectives of series compensation?
 - (h) Draw the impedance versus firing angle characteristics of a TCSC
 - (i) How the series FACTS controller helps in power oscillation damping.
 - (j) What is an UPFC? List its capabilities.

2. (a) Discuss the stability issues that limit the transmission capability. [5]
(b) Explain the power flow and dynamic stability considerations of a transmission interconnection with suitable phasor diagrams. [5]

3. (a) What are the objectives of shunt compensation? Explain the midpoint voltage regulation for line segmentation. [5]
(b) Explain the working and characteristic of a thyristor controlled reactor (TCR). [5]

4. (a) Explain the working of a thyristor switched capacitor with necessary waveforms. [5]
(b) Compare SVC and STATCOM. [5]
5. (a) Explain with necessary diagrams how the transient stability can be improved with a series FACTS controller. [5]
(b) Explain the Basic Thyristor Controlled Series Capacitor scheme. [5]
6. (a) Derive the expression for transmitted power in terms of transmission angle for a system with a SSSC. [5]
(b) Discuss the capability of SSSC to provide real power compensation. [5]
7. (a) Draw the block diagram of a UPFC and discuss detailed the purpose two converters. [5]
(b) With phasor diagram, explain the different modes of operation of UPFC [5]
8. Write short notes on any two [2x5]
(a) Modeling of series FACTS controllers
(b) Application example of UPFC
(c) Voltage and phase angle regulators