

M.E DEGREE EXAMINATIONS: JANUARY 2009

First Semester

POWER ELECTRONICS AND DRIVES

P07 PEE 05 Flexible AC Transmission Systems

Time: Three Hours**Maximum Marks: 100****Answer ALL Questions:-****PART A (20 × 1 = 20 Marks)**

1. The peak stability limits of the power system, through the use of generation scheduling, the occasional changing of
 - (A) power transformer taps and the switching of shunt reactors and capacitors
 - (B) switching of shunt reactors
 - (C) switching of capacitors
 - (D) power transformer taps
2. Many transmission lines are not suitable for loading much above their surge impedance loading value because of the problems of
 - (A) power and voltage instability
 - (B) thermal limits
 - (C) shunt reactors and capacitors
 - (D) weather and time differences
3. Power flow through a system depends on transmission line
 - (A) resistance
 - (B) capacitance
 - (C) impedance
 - (D) inductance
4. The effectiveness of power and stability control depends on the ability to control
 - (A) phase angle only
 - (B) impedance only
 - (C) system voltage.
 - (D) impedance or phase angle
5. In the vernier mode of TCSC operation, continuous variation in compensation are obtained by circulating current through the
 - (A) shunt connected capacitor
 - (B) switch and commutating inductance
 - (C) series connected inductance
 - (D) switch and series connected capacitor
6. Series capacitive compensation can also be used to reduce the series reactive impedance to minimize the
 - (A) sending-end voltage variation
 - (B) receiving-end voltage variation and the voltage collapse.
 - (C) power loss
 - (D) oscillation
7. For increasing the voltage stability limit of overhead transmission line, series compensation is much more effective than shunt compensation of the same
 - (A) KVA rating
 - (B) MVA rating
 - (C) Voltage rating
 - (D) current rating
8. Sustained oscillation below the fundamental system frequency can be caused by
 - (A) shunt capacitive compensation
 - (B) inductance in parallel
 - (C) series with inductance
 - (D) series capacitive compensation

9. The TCR provides continuously controllable reactive power in
- (A) unity power-factor only
 - (B) the leading power-factor range only
 - (C) the lagging power-factor range only
 - (D) both leading and lagging power-factor range only
10. Var compensation is used to prevent the
- (A) voltage instability and dynamic voltage control
 - (B) fault current
 - (C) oscillations
 - (D) active power flow
11. The ability of the STATCOM to maintain full capacitive output current at low system voltage also make it more effective than the SVC in
- (A) improving the dynamic stability
 - (B) reducing the fault current
 - (C) improving the transient stability
 - (D) reducing the power loss
12. The reverse parallel connected thyristor pairs in TSC-TCR is
- (A) to cancel 3rd harmonics
 - (B) to improve current rating
 - (C) to provide enough voltage rating
 - (D) to reduce reactive power
13. The second group of controllers has the inherent capability, like a synchronous machine, to exchange
- (A) voltage
 - (B) real power only
 - (C) reactive power only
 - (D) both real and reactive power
14. With suitable electronic control, the UPFC can cause the series-injection voltage vector to vary
- (A) continuously in magnitude only
 - (B) continuously in angle only
 - (C) rapidly and continuously in magnitude and/or angle
 - (D) in phase and magnitude
15. The UPFC has the encompassing capabilities of
- (A) voltage regulation , series compensation and phase shifting
 - (B) phase shifting only
 - (C) shunt compensation and voltage limiter
 - (D) voltage regulation and limiter
16. IPFC scheme consisting of two back-to-back dc-to-ac converters, each compensating a transmission line by
- (A) shunt voltage injection
 - (B) series voltage injection
 - (C) Series current injection
 - (D) both series and shunt voltage injection
17. Sub synchronous resonance causes failure of
- (A) Circuit Breaker
 - (B) cables and insulators
 - (C) series capacitors
 - (D) power converters

18. The control attribute for TCBR is
- (A) transient and dynamic voltage limit
 - (B) damping oscillations, transient and dynamic stability
 - (C) voltage control, VAR compensation and voltage stability
 - (D) reactive power and voltage control
19. Thyristor controlled voltage regulator is achieved by
- (A) load angle
 - (B) separate AVRs
 - (C) phase angle of thyristor valves
 - (D) incorporating capacitor compensators
20. The tap-changer based voltage regulator cannot supply or absorb
- (A) real power
 - (B) reactive power
 - (C) apparent power
 - (D) both real and reactive power

PART B (5 × 16 = 80 Marks)

21. a. Explain the steady state stability, transient state stability limits of transmission lines.
(OR)
b. Explain the factors that affect the performance of the transmission line.
22. a. With a neat block diagram, explain the different modes of operation of TCSC
(OR)
b. Explain the need of compensation and merits of series compensating method.
23. a. (i) Explain about the performance of SVC in controlling voltage in a power system. (8)
(ii) What are the advantages of slope in the dynamic characteristics of SVC? (8)
(OR)
b. (i) Explain the operation of STAT COM with an aid of block diagram. (8)
(ii) Describe the V-I characteristics of STATCOM. (8)
24. a. (i) Explain the modeling procedure of UPFC for power flow studies. (10)
(ii) What are the various recent advancement in the UPFC design? (6)
(OR)
b. With a neat diagram, explain the operation of an Interline Power Flow Controller scheme with two-converters.
25. a. Explain the working principle of NGH-SSR damper.
(OR)
b. Explain the functioning of thyristor controlled voltage and current limiter.
