

# CBCS SCHEME

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18EE735

## Seventh Semester B.E. Degree Examination, Feb./Mar. 2022 Reactive Power Control in Electric Power Systems

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

### Module-1

- 1 a. What is load compensation? Discuss briefly the three main objectives in load compensation. (10 Marks)
- b. Explain the fundamental theory of power factor correction in  $1 - \phi$  ac systems with suitable equations and phasor diagrams. (10 Marks)

OR

- 2 a. Mention few typical loads that require reactive power compensation. (05 Marks)
- b. What is an ideal compensator and mention its functions and properties. (05 Marks)
- c. Explain the fundamental theory of voltage regulation improvement in  $1 - \phi$  systems. (10 Marks)

### Module-2

- 3 a. Explain Surge Impedance Loading (SIL) of a transmission line. Draw the phasor diagram for  $\theta = 25^\circ$ . Explain the importance of SIL. (10 Marks)
- b. Sketch the voltage and current profiles for an uncompensated radial line on open circuit. Obtain the necessary equations. (10 Marks)

OR

- 4 a. Explain the different types of compensation used in transmission lines. (10 Marks)
- b. Explain the effect of line length for an uncompensated radial line on load having fixed sending end voltage. Explain the  $V_r/E_s$  versus  $P/P_0$  plot. (10 Marks)

### Module-3

- 5 a. Explain the arrangements and reactive power of
  - i) Capacitors connected in parallel and
  - ii) Capacitors connected in series. (10 Marks)
- b. Distinguish between active and passive compensators and mention their applications in power system. (10 Marks)

OR

- 6 a. Derive an expression to show that the midpoint voltage of a symmetrical line on load is related to the reactive power requirement. (12 Marks)
- b. Explain the main objectives and practical limitations of series compensation. (08 Marks)

**Module-4**

- 7 a. What do you mean by static compensation? Mention few applications and properties of static compensators in electric power systems. (10 Marks)
- b. Draw the schematic diagram of TCR type SVC and explain the working. (10 Marks)

**OR**

- 8 a. Discuss the various reinsertion schemes of series capacitors. (08 Marks)
- b. Discuss the applications of synchronous condenser in
- i) Power system voltage control and
  - ii) Emergency reactive power supply. (12 Marks)

**Module-5**

- 9 a. What are the sources of harmonics? Explain the effects of harmonics on electrical equipments. (10 Marks)
- b. Explain how does reactive power dispatching affect power system equipments? (10 Marks)

**OR**

- 10 a. Explain the transmission benefits of reactive power management in electric power systems. (12 Marks)
- b. Write brief notes on :
- i) Telephone interferences
  - ii) Zonal reactive power requirements in EHV system. (08 Marks)

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