Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/M.Tech (EE-NEW)/SEM-2/EDPM-201/2011

2011

EHV AC POWER TRANSMISSION

Time Allotted : 3 Hours *Full Marks :* 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

Answer any *five* questions. 5 × 14 = 70

1. a) Explain the needs of EHV transmission. 3

   b) What are the limitations of EHV AC power transmission ? 5

   c) Deduce the "telephonists equations" of a loss-less transmission line. 6

2. a) What do you understand by surge impedance and natural loading of transmission line ? 4

   b) What is Ferranti effect ? 2

c) Show that the reactive power requirements of an uncompensated symmetrical line under load are related to the mid-point voltage. 4

d) What is steady state stability limit ? Draw the power *vs* transmission angle characteristics of an uncompensated transmission line and hence explain the steady state stability limit. 1 + 3

3. a) What is reactive power compensation ? 2

b) What do you understand by series compensation ? 3

c) With the help of phasor diagram and simplified equivalent circuit explain power transfer characteristics and maximum transmissible power in series compensated line. 9

4. Explain the working principle of a single-phase thyristor controlled reactor (TCR) with simple schematic diagram. Draw the voltage and current waveform across the thyristor and the reactor for firing angle of 150°. What are the harmonics present in 3-phase TCR and how are they eliminated ? 6 + 4 + 4

5. Draw the schematic diagram of UPFC system and explain the working principle. Write one disadvantage of series compensation. What is sub-synchronous resonance ? Explain briefly. 7 + 3 + 4

6. Give some examples of FACTs controllers for enhancing power system control. What are benefits of such control ? Explain the V-I and V-Q characteristics of SVC with necessary diagram. 2 + 4 + 8

7. Deduce the relation between the reactive power and system voltage. Explain load compensation and system compensation scheme for controlling voltage in a short transmission line with diagram. 4 + 10