B. Tech.
(SEM. VIII) EXAMINATION. 2006-07
EHV AC & DC TRANSMISSION

Time : 3 Hours] [Total Marks : 100

Note : Attempt all questions. All questions carry equal marks.

1 Attempt any four of the following : 5×4=20

(a) What is the need of EHV-AC transmission? Explain.

(b) Compare EHV-AC and HVDC in the following aspects:
   (i) Corona
   (ii) Stability
   (iii) Reactive power compensation
   (iv) Skin effect.

(c) Derive an expression for sag. What are the parameters affecting sag? Explain.

(d) Explain the advantages of double ckt. EHV-AC lines over EHV-AC single ckt. lines.

(e) Why does switching operation produce over voltages? Define overvoltage factor. Find its value for 400 kV system.

V–2033] 1 [Contd...
(f) Discuss the phenomenon of ferroresonance. Explain its impact.

2 Attempt any four parts of the following: \[ 5 \times 4 = 20 \]

(a) Derive an expression for corona inception voltage. List disadvantages and advantages of corona.

(b) Derive an expression for potential distribution over a string insulator. Why is string efficiency less than one.

(c) Switching surges play an important role for design of line insulation in EHV-AC system why? Draw a standard switching impulse wave.

(d) Derive A,B,C,D parameters for EHV long lines using travelling wave theory.

(e) A 500 kV, 3-Φ transmission line is 250 kM long. Series impedance and shunt admittance per phase per km are \( Z = 0.045 + j0.04 \ \Omega \) and \( y = j \ 4 \times 10^{-6} \ \mu \). Evaluate equivalent model.

(f) A long transmission line has the following parameters per phase, series impedance \( Z = 0.997 \angle 79.27^\circ \ \Omega/km \) and shunt admittance \( Y = 4.52 \times 10^{-6} \angle 90^\circ \ \mu/km \) Calculate:
   (i) propagation constant \( \gamma \)
   (ii) attenuation constant \( \alpha \)
   (iii) phase constant \( \beta \)
   (iv) Wave length \( \lambda \)
   (v) velocity of propagation.

V-2033] 2   [Contd...
3 Attempt any two parts of the following: 10×2=20
(a) Discuss problems associated with long EHV-AC lines. Why is line compensation required? Explain series compensation of line, its advantages and disadvantages.
(b) Why is voltage control required in EHV-AC networks? Explain synchronous condensers and shunt capacitors for voltage control. What are the advantages of a synchronous condensor?
(c) What is Flexible AC Transmission systems? What are important devices in FACTS? Explain the role of any one FACTS controller.

4 Attempt any two of the following: 10×2=20
(a) Derive an expression for rectifier voltage six pulse bridge ckt. with phase control and load current/overlap angle rectifier mode.
(b) Discuss the method of reversal of power in HVDC link. Why is this feature needed?
(c) What are the various types of HVDC links? Explain briefly.

5 Attempt any two of the following: 10×2=20
(a) What are the harmonics on DC side of the converter? Explain DC harmonic filters.
(b) Explain the configuration of a parallel tapping multi-terminal HVDC system and its switching arrangement.
(c) List the basic objectives of HVDC control system. Explain constant extinction angle control.