

Total No. of Questions : 4]

SEAT No. :

PF309

[Total No. of Pages : 2

Apr-26/TE/Insem-391

T.E. (Electrical) (Insem)

POWER SYSTEM - II

(2019 Pattern) (Semester - VI) (303148)

Time : 1 Hour]

[Max. Marks : 30

Instructions to the candidates:

- 1) Solve Q1 or Q2 and Q3 or Q4.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right side indicate full marks.
- 4) Use of calculator is allowed.
- 5) Assume suitable data if necessary.

Q1) a) Derive following equation with usual notation [7]

$$P_R = \frac{|V_S||V_R|}{|B|} \cos(\beta - \delta) - \frac{|A|}{|B|} |V_R|^2 \cos(\beta - \alpha)$$

b) For a 400kV, 250km lossless long transmission line have  $L = 1.6$  mH/km and  $C = 10$  nF/km. [8]

Find

- i) Characteristic impedance of transmission line.
- ii) Propagation constant of the transmission line.
- iii) Surge impedance loading in MW.
- iv) Surge impedance loading, if the length of line is doubled.

OR

Q2) a) Derive the formula for ABCD constants in a long transmission line. [7]

b) In 220kV transmission line has following generalized constant :

$$A = D = 0.95 \angle 2^\circ, B = 90 \angle 85^\circ \Omega, C = 0.0004 \angle 90^\circ S.$$

If both end voltage are maintained at constant voltage of 220kV and phase angle difference is  $30^\circ$ . Calculate

- i) Receiving end active power. [3]
- ii) Receiving end reactive power. [3]
- iii) Receiving end complex power. [2]

P.T.O.

- Q3) a)** State following statements are true or false with justification
- If the 50% series capacitive compensation is added in EHVAC transmission line, the power transfer capability of the line halved. [3½]
  - If a parallel line is added in EHVAC transmission line, the power transfer capability of the line doubled. [3½]
- b) In three phase overhead line the conductors have each diameter of 25mm and are arranged in the form of an equilateral triangle. Assuming fair weather conditions air density factor is 0.98 and irregularity factor 0.97. Find the minimum spacing between the conductors if the disruptive critical voltage is not to exceed 400kV between lines. Breakdown strength of air may be assumed to be 30kV per cm (peak). [8]

OR

- Q4) a)** Elaborate any five benefits and two limitations of EHVAC transmission line in details. [5+2]
- b) The average values of line parameters for 750kV transmission lines are as given below. The length of the line is 500km. [8]

System voltage (kV)	750
r ( $\Omega$ /phase/km)	0.0136
x ( $\Omega$ /phase/km)	0.272

Determine

- Maximum power transfer.
- Power transfer capability with phase angle difference of  $30^\circ$  between sending end and receiving end voltages.
- If 10000MW power is to be transferred, using this voltage level, find the number of circuits required.
- If 10000MW power is to be transferred, using this voltage level with 50% capacitive series compensation, find the number of circuits required.

**x x x**