

62

Exam.Code:1018
Sub. Code: 7785

1108
M.E. Electrical Engineering (Power Systems)
Second Semester
EE-8202: EHV AC Transmission

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt any five questions.

x-x-x

- I. a) List at least ten important problems encountered in EHV transmission which may or may not be important at voltages of 220 kV and lower.
- b) What are the effects of resistance on EHV ac lines? Briefly explain the skin effect resistance in round conductors. (2x5)
- II. A 400-kV line in India uses a 2-conductor bundle with $dm = 0.0318$ m for each conductor. The phase current is 1000 Amps (500 Amps per conductor). The area of each conductor is 515.7 mm^2 , $r_a = 2.7 \times 10^{-8} \text{ ohm-m}$ at 20°C , $\alpha = 0.0045 \text{ ohm}/^\circ\text{C}$ at 20° . Take the ambient temperature $t_a = 40^\circ\text{C}$, atmospheric pressure $p = 1$, wind velocity $v_m = 1 \text{ m/s}$, $e = 0.5$ and neglect solar irradiation. Calculate the final temperature of conductor due only to I^2R heating. (10)
- III. A 735-kV line has $N = 4$, $r = 0.0176$ m, $B = 0.4572$ m for the bundled conductor of each phase. The line height and phase spacing in horizontal configuration are $H=15$, $S=15$ m. Calculate the maximum surface voltage gradients on the centre phase and outer phases using Mangoldt formula (10)
- IV. a) Describe the behavior of space-charge effects inside a corona envelope and discuss. Why load current cannot flow in a conductor inside this envelope even though it is a conducting zone.
- b) Justify that a positive corona pulse yields much higher noise level than a negative corona pulse, (2x5)
- V. Derive the generalized equations for switching-surge calculation on 3-phase systems. Explain the terms (a) terminal fault, (b) short-line fault, (c) 2-parameter definition of recovery voltage, and (d) 4-parameter definition of recovery voltage. (10)
- VI. What is the reason for the existence of SSR in the steady state and transient conditions in series-capacitor compensated lines? Give the limitations of series capacitor compensation on long lines. (10)

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(2)

- VII. a) Explain the use of series compensation for increasing transmission line loadability and also compare the effect of compensation at receiving end, sending end and at both ends.
- b) How the reactive power affects power system operation. What are the challenges to voltage control and security in power systems? (2x5)
- VIII. Write note on following:-
- a) Day Night equivalent Noise Level
- b) Reduction of Switching surges on EHV systems (2x5)

x-x-x