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 Name of Examination : **Winter 2020** - (Preview)

 Course Code & Course Name : **EE302 - Power System Analysis**

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 Maximum Marks : **60**

 Duration : **3 Hrs**
[Edit](#) [Print](#) [View Answer Key](#) [Close](#) **Answer Key Submission Type:** Marking scheme with model answers and solutions of numerical

Instructions:

1. Attempt any five questions.
2. Illustrate your answer with suitable figures/sketches wherever necessary.
3. Assume suitable additional data; if required.
4. Use of logarithmic table, drawing instruments and non programmable calculators is allowed.
5. Figures to the right indicate full marks.

**1) Solve all sub-questions.**

- a) Write Short notes on the following [06]
  - i. Proximity effect
  - ii. Effect of earth on the capacitance of a transmission line
  - iii. Transposition of Conductors
- b) Derive the expression for capacitance of an unsymmetrical transposed 3-phase transmission line? [06]

**2) Solve all sub-questions.**

- a) Derive the A, B, C, D constant of medium length transmission line and draw the phasor diagram assuming a pie configuration. [06]
- b) What is farranti effect? Explain it with the help of phasor diagram. [06]

**3) Solve all sub-questions.**

- a) A 3-phase transmission has constants  $B = 141.0 \angle 82^\circ \Omega$  and  $C = 0.00073 \angle 80.19^\circ$ . A synchronous phase modifier, connected at the receiving end of the line maintains the receiving end at 275 kV. Compute graphically, the output of the phase modifier (i) at no load and (ii) for receiving end load of 200 MVA at 0.85 power factor lag. [06]
- b) i. What are the step by step procedure to be followed to find the p. u. impedance diagram of a power system? [03]
- ii. One generator is rated as follow [03]
 
$$G_1 : 50 \text{ MVA}, 20 \text{ kV}, \text{ reactance } x'' = 10\%$$
 Determine the reactance of the generator corresponding to the base values of 200 MVA, 30 kV.

**4) Solve all sub-questions.**

- a) Explain the short circuit of a synchronous machine on no load. [06]
- b) write the all assumptions while doing short circuit analysis modeling. [06]

**5) Solve any two sub-questions.**

- a) Derive the expression for fault current in double line to ground fault on and unloaded generator in terms of symmetrical components. [06]
- b) A salient pole generator is rated 30 MVA, 13.2 kV and has a sub-transient reactance of 0.15 p. u. The negative and zero sequence reactance are 0.65 and 0.25 p.u. respectively. Determine the fault current and the line to line voltage at the fault when line to line fault occurs at the terminals of the alternator. [06]
- c) Write the formulas for the fault current in LG, LL, LLG fault. [06]

**6) Solve all sub-questions.**

- a) Explain clearly the algorithmic steps for solving the load flow equations using Gauss- Seidel method. [06]
- b) Compare the Gauss Seidel and Newton Raphson method of load flow analysis. [06]

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