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Question Paper Code: 35303

B.E. / B.Tech. DEGREE EXAMINATION, APRIL 2019

Fifth Semester

Electrical and Electronics Engineering

01UEE503 – POWER SYSTEM ANALYSIS

(Regulation 2013)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions.

PART A - (10 x 2 = 20 Marks)

1. Draw the equivalent circuit of a two winding transformer.
2. Represent the equations to compute diagonal and off-diagonal elements of Y bus for a 3 bus system.
3. Mention the advantages of Gauss-Seidel method of load flow analysis.
4. Give any two operating constraints imposed in load flow studies
5. What are the uses of sub-transient and transient reactance?
6. What is meant by prefault and postfault voltage/current?
7. List the types of unsymmetrical faults.
8. What are the properties of sequence operator 'a'?
9. Write down the power angle equation of a two machine system.
10. What is the use of swing curve?

PART - B (5 x 16 = 80 Marks)

11. (a) Draw the reactance diagram for the power system shown in figure 1. Neglect the resistance and use a base of 50 MVA and 13.8 kV on generator G_1 . (16)

G_1 : 20 MVA, 13.8 kV, $X'' = 20\%$

G_2 : 30 MVA, 18.0 kV, $X'' = 20\%$

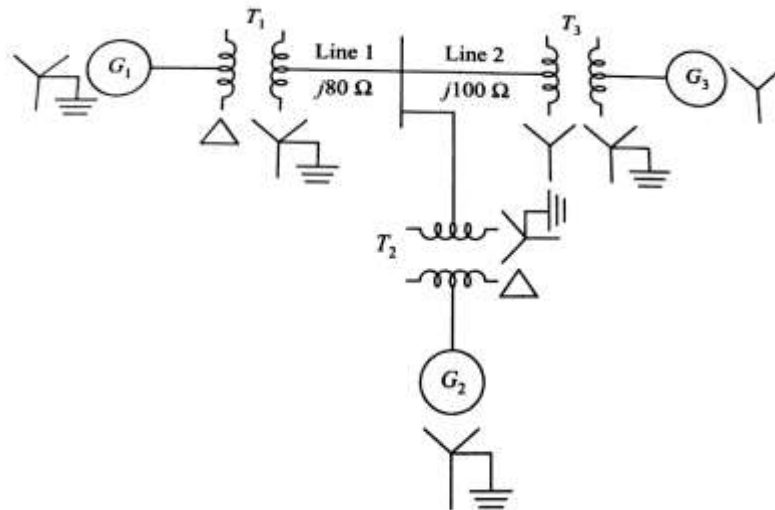
G_3 : 30 MVA, 20.0 kV, $X'' = 20\%$

T_1 : 25 MVA, 220/13.8 kV, $X = 10\%$

T_2 : 3 single phase units each rated 10 MVA, 127/18 kV, $X = 10\%$

T_3 : 35 MVA, 220/22 kV, $X = 10\%$

Determine the new values of per unit reactance of G_1 , T_1 , transmission line 1, transmission line 2, T_2 , G_2 , T_3 and G_3 .



Or

- (b) Two generators rated at 10MVA, 13.2KV and 20MVA, 13.2KV are connected in parallel to a bus bar. Two motors of input 8MVA, 12.5KV and 12MVA, 12.5KV are drawn supply from bus bar. Take $x_g'' = 15\%$ and $x_m'' = 20\%$. Draw the single line diagram and calculate the new P.U. impedance for the power system components. Assume generator1 rating as base quantities. (16)
12. (a) Write the algorithm and flow chart of the FDLF method. (16)

Or

- (b) Construct an algorithm using Gauss-Seidal method to determine load flow solution for a power system network with PQ buses alone. (16)

13. (a) Construct the positive sequence, negative sequence and zero sequence impedance networks of a synchronous machine on no-load using the concept of symmetrical components. (16)

Or

- (b) Write the steps for the fault calculation of an n bus system using bus impedance matrix. (16)

14. (a) The symmetrical components of a set of unbalanced three phase currents are:

$I_{a0} = 100 \text{ A}$, $I_{a1} = 200 - j100 \text{ A}$ and $I_{a2} = -100 \text{ A}$. Calculate the original unbalanced currents I_{a0} , I_{a1} , I_{a2} . (16)

Or

- (b) Derive the equation of fault current for an L-L fault in power system. (16)

15. (a) Explain the step by step procedure to obtain the solution of swing equation by Modified Eulers method. (16)

Or

- (b) Illustrate the concept of equal area criterion and its applications. (16)
