Question Paper Code: 35303

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2018

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. What is the use of single line diagram?

2. Write the expression for determining base impedance.

3. Mention the advantages of Gauss-Seidel method of load flow analysis.

4. Differentiate generator bus and slack bus.

5. What are the causes for faults in power system?

6. What is meant by prefault and postfault voltage/current?

7. Define zero sequence components of 3-phase unbalanced system.

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) (i) 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.   (10)

    (ii) Briefly discuss about power system components.   (6)

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) (i) What are the classifications of buses? Mention the specified and unspecified quantities of each bus. (4)

   (ii) What is power flow problem? Write down the basic power flow equations. (6)

   (iii) Compare Gauss Seidel, Newton Raphson and Fast Decoupled methods of load flow study. (6)

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) Construct the positive sequence, negative sequence and zero sequence impedance networks of a transformer using the concept of symmetrical components. (16)

14. (a) (i) The symmetrical components of a set of unbalanced three phase currents are: $I_{a0} = 100\ A$, $I_{a1} = 200\text{-}j100\ A$ and $I_{a2} = -100\ A$. Calculate the original unbalanced currents I_{ao}, I_{a1}, I_{a2}. (10)

   (ii) What are sequence impedances? What is the use of sequence networks? Draw sequence networks for L-L fault? (6)

Or

(b) Explain the sequence networks and sequence impedance for an unbalanced generator and transmission lines. (16)

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15. (a) (i) Derive the swing equation and what is swing curve? (8)

(ii) Derive the equation for critical cleaning angle determination. (8)

Or

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

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