KUMARAGURU
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Register Number: ……

B.E DEGREE EXAMINATIONS: NOV/DEC 2014

(Regulation 2009)

Seventh Semester

ELECTRICAL AND ELECTRONICS ENGINEERING

EEE118: Power System Analysis & Stability

Time: Three Hours **Maximum Marks: 100**

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. Which of the following assumptions made is not true with regard to the reactance diagram?
   a) Resistances are neglected
   b) Neutral reactances are neglected
   c) Capacitance of transmission line are neglected
   d) Static loads and induction motors are included
2. A Y connected generator rated at 300MVA, 33 kV has a reactance of 1.24 pu. Find the actual value of reactance
   a) 4.5 Ω
   b) 5.4 Ω
   c) 2.9 Ω
   d) 9.2 Ω
3. Quantities specified in load bus are
   a) P and |V|
   b) P and Q
   c) |V| and δ
   d) Q and |V|
4. Which is not true with regard to NR method?
   a) faster
   b) accurate
   c) Memory requirement is more
   d) More iterations for convergence
5. Which of the following fault occurs more frequently?
   a) Three phase fault
   b) Single line to ground fault
   c) Double line to ground fault
   d) Line to line fault
6. Which of the following is not a shunt type fault?
   a) Three phase fault
   b) One open conductor fault
   c) Single line to ground fault
   d) Line to line fault
7. Which is the formula for surge impedance?

a) $\sqrt{(C/L)}$ b) (C/L)

c) $\sqrt{(L/C)}$ d) (L/C)

8. A transmission line of surge impedance 500 Ω is connected to a cable of surge impedance 60 Ω at the other end. If the surge voltage of 500kV travels along the line to the junction point, find the voltage build up at the junction.

a) 0.786 V b) 893 kV

c) 893V d) 0.786kV

9. If the maximum power is 50 MW, find the electrical power output for a torque angle of 60^{o}.

a) 43.3 MW b) 25 MW

c) 34.4 MW d) 52 MW

10. Steady state stability is concerned with

a) The study of natural oscillations and its decay for small disturbances

b) The determination of upper limit of loading without loss of synchronism

c) The study of dynamics of a system when a major fault occurs

d) The study of dynamics of a system when a major generating station is tripped

PART B (10 x 2 = 20 Marks)

11. What are the components of power system?
12. Define per unit value.
13. What is the need for slack bus?
14. What is meant by flat voltage start?
15. Why faults occur in a power system?
16. Express the unbalanced voltages V_a, V_b and V_c in terms of symmetrical components V_{a1}, V_{a2} and V_{a0}.
17. What is the application of Bewley's Lattice diagram?
18. What are the specifications of a travelling wave?
19. Define critical clearing time.
20. List the methods of improving the transient stability limit of a power system.

PART C (5 x 14 = 70 Marks)

21. a) (i) Explain about modern power system. (8)

(ii) What are the advantages of the per unit system? (6)

(OR)

b) The one line diagram of a three phase power system is shown in figure. Select a common base of 100 MVA and 22 kV on the generator side. Draw the

impedance diagram with all impedances marked in pu. The data for each device is given below.

G: 90 MVA 22 kV X = 18%

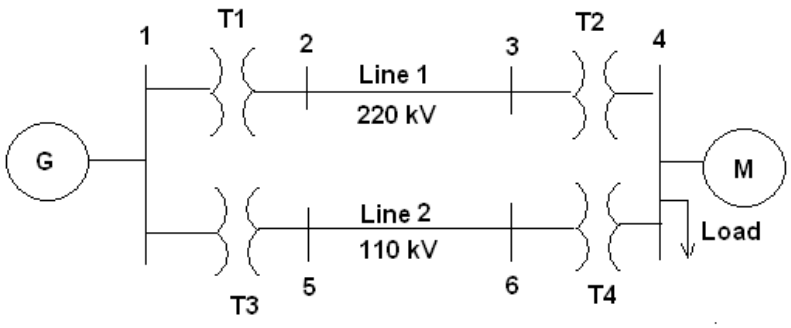
T_1: 50 MVA 22 / 220 kV X = 10%

T_2: 40 MVA 220 / 11 kV X = 6%

T_3: 40 MVA 22 / 110 kV X = 6.4%

T_4: 40 MVA 110 / 11 kV X = 8%

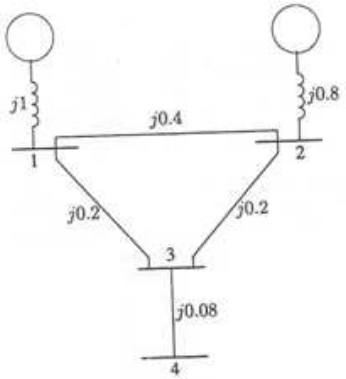
M: 66.5 MVA 10.45 kV X = 18.5%



The three phase load at bus 4 absorbs 57 MVA, 0.6 power factor lagging at 10.45 kV. Line 1 and line 2 have reactances of 48.4 and 65.43 Ω respectively.

22. a) (i) List the quantities specified and quantities to be determined for various types of buses. (4)

(ii) Find the bus admittance matrix of the following network.



(10)

(OR)

b) Explain the algorithmic steps for getting power flow solutions using Guass Seidal method.

23. a) Derive the symmetrical fault analysis of the system using bus admittance matrix.

(OR)

b) Derive the fault current of a system when a double line to ground fault occurs.

24. a) Explain the Bewley's Lattice diagram with neat sketches.

(OR)

b) Derive an expression for standing wave equation.

25. a) Define transient stability. With proper derivation explain how the transient stability is analysed using equal area criterion.

(OR)

b) Give an expression for swing equation. Solve the swing equation by Euler's method.

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