Hall Ticket Number:

Code No. : 31201

VASAVI COLLEGE OF ENGINEERING *(Autonomous)*, HYDERABAD

B.E. (E.E.E.) III Year I-Semester (Main) Examinations, Nov./Dec.-2016

Power Systems-II

Time: **3** hours Max. Marks: **70**

*Note: Answer **ALL** questions in **Part-A** and any **FIVE** from **Part-B***

Part-A (10 × 2 = 20 Marks)

1. Define Ferranti effect. Explain it with a help of phasor diagram.
2. List the $ABCD$ parameters of a long transmission lines.
3. Find the root of the equation $f(x) = x^3 - 6x^2 + 9x - 4 = 0$ using Newton-Raphson method. Assume initial estimate as 5.
4. What are the assumptions that are made in the methods of Decoupled and Fast Decoupled methods of power flow analysis?
5. Define Subtransient reactance and its significance in short circuit studies.
6. List the methods involved in the Z_{bus} building.
7. How to calculate the three phase power in terms of symmetrical components?
8. Define fault. List the various types of series and shunt faults.
9. What are the specifications of a traveling wave?
10. Distinguish between reflection and refraction of traveling waves.

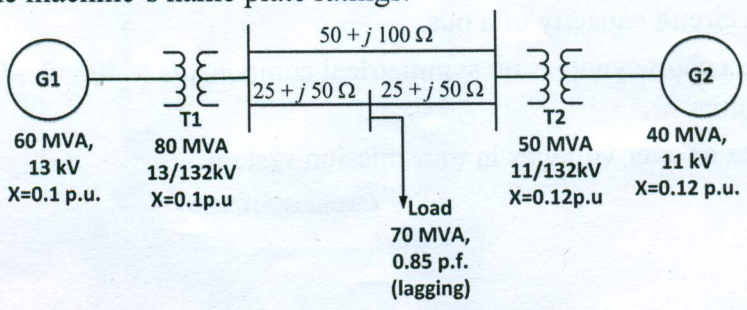
Part-B (5 × 10 = 50 Marks)
(All bits carry equal marks)

11. a) A 220 kV 3-phase transmission line is 50 km long with resistance and inductance values as 0.1234 Ω/km and 1.2345 mH/km. Use short line model to find the voltage and power at sending end, voltage regulation and efficiency when the line is supplying 350 MVA load at 0.85 power factor lagging at rated voltage.

    b) Define corona. Explain its causes.

12. a) Discuss the comparison of Y and Z Matrix Methods for load flow under following parameters:
    - Memory requirements
    - Calculation complexity
    - Convergence
    - Effect of power network modification

    b) For the system shown in the Figure below, develop the Y_{BUS} matrix. The impedances in p.u. values are on the machine's name plate ratings.



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13. a) For the network shown in the Figure below, Calculate the Z_{BUS} matrix. The impedance values are as follows:

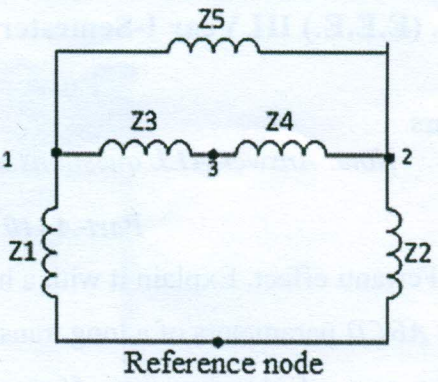
$z_1 = j1.0\ \Omega;$

$z_2 = j1.25\ \Omega;$

$z_3 = j0.1\ \Omega;$

$z_4 = j0.2\ \Omega;$

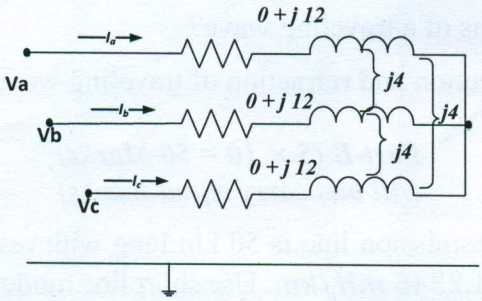
$z_5 = j0.10\ \Omega;$



b) Derive the formula for fault currents, fault bus voltages and current through the lines for a 3 phase symmetrical fault at a bus in a Power System using Z_{bus}. State the assumptions made in the derivations.

14. a) For a set of currents given as $I_a = 1.9\angle 35^0, I_b = 2.0\angle 90^0, I_c = 2.9\angle 152^0$, obtain the symmetrical components and comment.

b) A balanced 3-phase voltages of 230 V phase to neutral is applied to a Y-connected load (ungrounded) shown in Figure below. Calculate the line currents using symmetrical components.



15. a) An overhead transmission line having a surge impedance of 425 Ω runs between two substations S1 and S2; at S2 it branches into two lines B1 and B2, whose surge impedances are 375 Ω and 40 Ω respectively. If a travelling wave of vertical front and magnitude 27.5 kV travels along the line S1-S2, calculate the magnitude of the voltage and current waves which enter the branches at B1 and B2.

b) Derive the reflection and refraction coefficient of a traveling wave which terminates at an inductor.

16. a) Explain per-unit representation and its advantages.

b) Explain power circle diagrams and their applications.

17. Write short notes on any ***two*** of the following:

a) Short circuit capacity of a bus.

b) Write a short synopsis on symmetrical components (<400 words), without using equations or figures.

c) Causes of over voltages in transmission system.