[Total No. of Printed Pages:2] **CODE NO:- Z-222**

FACULTY OF ENGINEERING

T.E (EEP/EE/EEE) - Year Examination June – 2015

Power Systems Analysis

(Revised)

[Time: Three *Hours*] **[Max. Marks: 80]**

"Please check whether you have got the right question paper."

i) *Question No. 1 and Question No 6 are compulsory*

ii) Attempt from each section any two questions from the remaining questions.

iii) Assume suitable data wherever necessary.

SECTION A

Q.1 Solve any five questions 10

a) What is impedance and reactance diagram?

b) What are the factors that need to be omitted for an impedance diagram to reduce it to a reactance diagram?

c) What is bus admittance matrix?

d) What is a bus?

e) What are sequence impedance and sequence network?

f) A generator rated at 50 MVA, 11KV, has a reactance of 25%. Calculate its per unit reactance **for a box** of 100 MVA, 10KV

g) Define the voltage controlled bus.

h) Write the expression for complex power injected to a bus. Specific the terms

Q.2 a) For power system shown in fig.1. Convert the system to base of 100 MVA, 200 KV in 50Ω line. Neglect the resistance. The rating are 08

Gen: 40 MVA, 25 KV, $x^{11} = 20\%$

Motor: 50 MVA, 11KV, $x^{11} = 30\%$

Y-Y transformer: 40 MVA, 33/220 KV, x=15%

Y-A transformer: 30 MVA, 11/220KV, x=15%

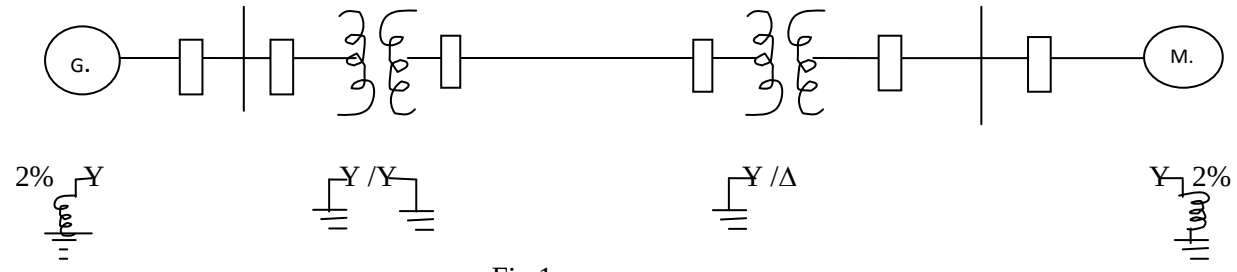


Fig.1

b) Prove the p.u impedance of a 1φ transformer is same weather computed from primary or secondary side 07

Q.3 a) Explain formation of network matrices lay singular transformation of Y-bus 08

b) For the power system as shown in fig.2 obtain $A, \hat{A}$ and K. 07

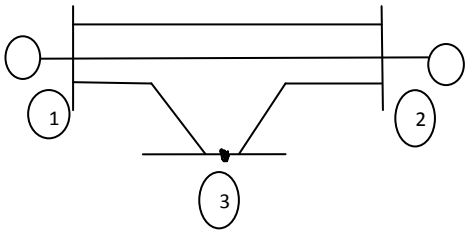


Fig.2

Q.4 a) Discuss the significance of load flow solution in power system analysis 07

b) For the power system show below compute Y_{BUS} and Bus voltage upto one iteration using Gauss seidel method for figure.3 08

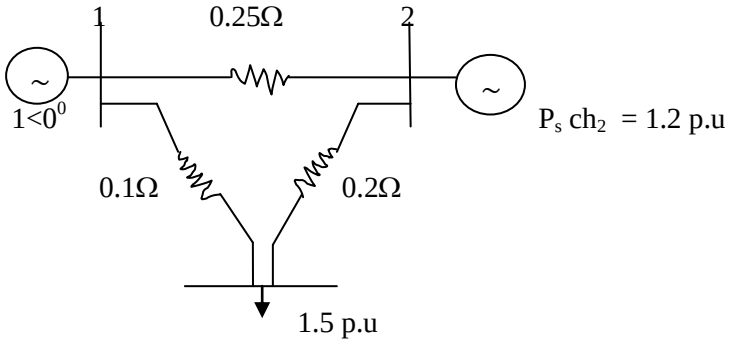


Fig.3

Q.5 a) Explain the procedure of fast decoupled load flow method. 08

b) Explain the selection of circuit breakers 07

SECTION B

Q.6 Solve <u>any five</u> question of the following 10

a) What is the need for voltage control in a power system?
b) Name the main difference in representation of power system for load flow and short circuit studies
c) What is need of short circuit analysis?
d) What is meant by doubling effect?
e) What are main factors to be considered while selection of circuit brealar?
f) Why the circuit breaker interrupting current is asymmetrical?
g) Name the fault in which zero sequence current do not flow and define positive sequence impedance
h) How is the convergence of N.R method speeded up?

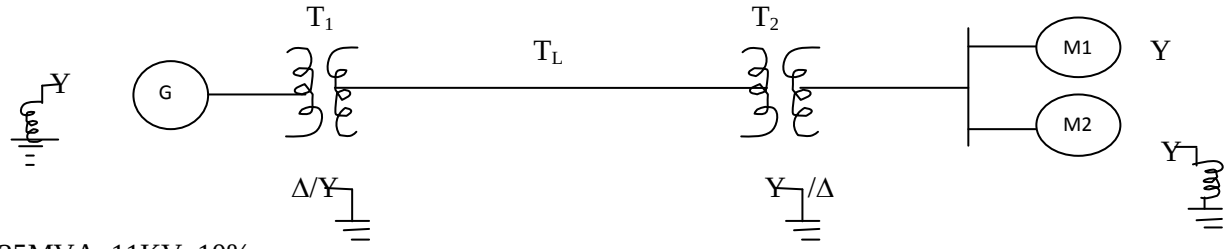
Q.7 a) Explain the sequence impedance and network of transmission line 08

b) Determine the symmetrical components of three voltages 07

$V_a = 225\angle 0^0,\ V_b = 225\angle 240^0$ & $V_c = 225\angle 110^0$

Q.8 a) Explain the Z_{BUS} building for Type 1 & Type 3 modification 08

b) Draw the zero sequence reactance network. The current limiting reactor of 2.5 Ω are connected in the neutral of motor no.2 & generator choose a box 25 MVA, 11KV in generator 07



G: 25MVA, 11KV, 10%
T_1: 30MVA, 10.8/121KV, 10%
T_2: 30MVA, 121/10.8KV, 10%
T_L: j300Ω
M_1: 15MVA, 10KV, 25%
M_2: 7.5 MVA, 10KV, 25% **For figure 4**

Q.9 a) Derive the expression for fault current for L-L-G fault & draw the sequence network 08

b) A 3phase, 37.5 MVA, 33KV, alternator having $x_1 = 0.18\ p.u, x_2 = 0.12\ p.u$ and $x_0 = 0.10\ p.u$ based on its rating is connected to a 33Kv overhead line having $x_1 = 0.63\ p.u$ x_2 =0.63p.u and $x_0 = 0.126\ pu$ A single line to ground fault occurs at the remote end of the line. The alternator neutral is soidly grounded. Calculate fault current in KA. 07

Q.10 a) Explain the open conductor fault 07

b) Explain the contingency analysis for security 08