

FACULTY OF ENGINEERING
TE(EEP/EE/EEE)Examination - DEC – 2014
POWER SYSTEM ANALYSIS(Revised)

[Time: THREE Hours]

[Max. Marks: 80]

“Please check whether you have got the right question paper.”

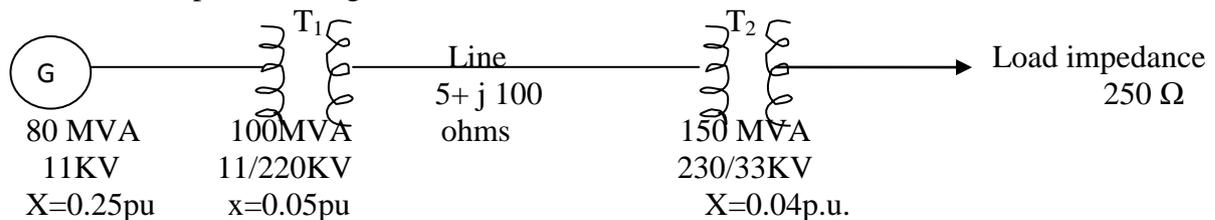
- i) Question no.1 and Q. no. 6 are compulsory.
- ii) Attempt from each section, any two questions from the remaining questions.
- iii) Assume suitable data wherever necessary.

SECTION A

Q 1 Solve any five questions of the following (10)

- i) Define per unit system? Write the per unit, impedance equation
- ii) Define the terms. a) note b) link c) tree d) cotree
- iii) What is bus impedance matrix?
- iv) If the reactance in ohms is 20 ohms find the p. u. value for a base of 20 KVA & 10KV.
- v) What do you mean by PQ bus?
- vi) What are the approximations made in reactance diagram?
- vii) How the NR method is a powerful method.
- viii) What are advantages of decoupled load flow method?

Q2 a) Figure 1 shows the single line diagram of a system. The transformer ratings, generator rating, line impedance & load impedance are as shown. Choosing 100 MVA base and 220 KV as base voltage for line draw impedance diagram. (08)



- b) Explain the impedance diagram. (07)
- Q3 a) Prove that $Y_{BUS} = A^T Y_A$ (08)
- b) Discuss the NR method for solving non-linear algebraic equation. (07)
- Q4 a) Write the algorithm for load flow solution using GS method. (08)
- b) Explain fast decoupled method algorithm for load flow studies. (07)
- Q5 a) Explain the primitive network. (07)
- b) The parameter of a 4-bus system are as under (08)

Bus Code	line impedance (pu)	charging admittance(pu)
1-2	$0.2+j0.8$	$j0.02$
2-3	$0.3+j0.9$	$j0.03$
2-4	$0.25+j1.0$	$j0.04$
3-4	$0.2+j0.8$	$j0.02$
1-3	$0.1+j0.4$	$j0.01$

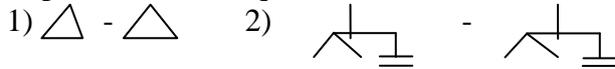
Draw the network and find bus admittance matrix.

SECTION-B

- Q6 Solve any five questions of the following. (10)
- What is need of stack bus?
 - What is the need for short circuit studies?
 - What is meant by doubling effect?
 - What are the main factors to be considered to select a circuit breaker?
 - Define short circuit interrupting MVA of a circuit breaker.
 - What is difference between the L-L and L-L-G fault?
 - What is momentary current rating of circuit breaker? How it is estimated.
 - How symmetrical faults are analyzed?

- Q7 a) Explain the phenomenon of transients on a transmission line with waveform. (07)
 b) A generating station A has a short circuit capacity of 1000 MVA. Another station B has a short circuit capacity of 650 MVA, they are operating at 11KV. Find the short circuit MVA by taking 100 MVA as base and 11KV as base values. If station A&B are interconnected by a cable of 0.50 ohms reactance per phase. Assume 3ϕ fault at bus A. (08)

- Q8 a) Explain the zero sequence network of transformer (07)



- b) Figures show a power system network. Draw zero sequence networks. The system data as under. (08)

G_1 : 50 MVA, 11KV, $X_0=0.08pu$

T_1 : 50 MVA, 11/220 KV, $X_0=0.1pu$

G_2 : 30 MVA, 11KV, $X_0=0.07pu$.

$T_2=30$ MVA, 11/220 KV, $X_0=0.09pu$

Zero sequence reactance of line is 555.6 ohms. Choose base of 50 MVA, 11KV base in generator

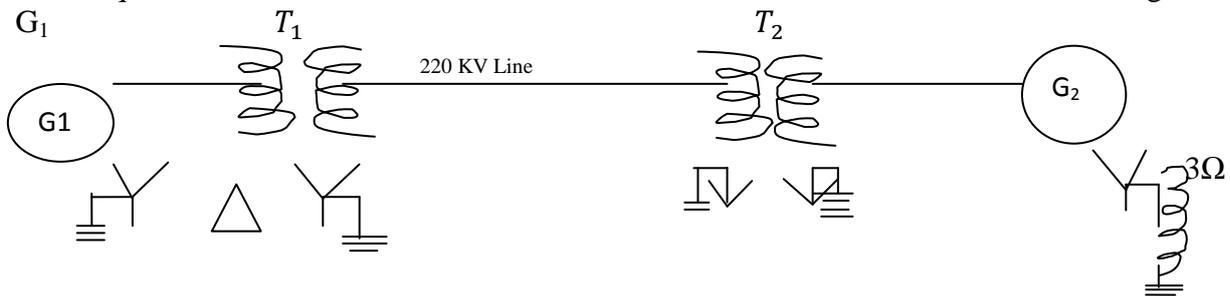


Fig2

- Q9 a) Derive an expression to determine fault current for line to line fault and draw the sequence network. (08)

- b) A 3ϕ 11KV, 20 MVA generators with positive, negative and zero sequence reactances as 0.4 pu, 0.4 pu and 0.1pu respectively, is ground through a reactance of 0.6 Ω calculate the fault current for a single line to ground fault? (07)

- Q10 a) Explain the open conductor faults. (07)

- b) Explain briefly the static security analysis at control centers. (08)