

SUBJECT CODE NO:- P-132
FACULTY OF ENGINEERING AND TECHNOLOGY
T.E.(EEP/EE/EEE) Examination May/June 2017
Power Systems Analysis
(Revised)

[Time: Three Hours]

[Max.Marks:80]

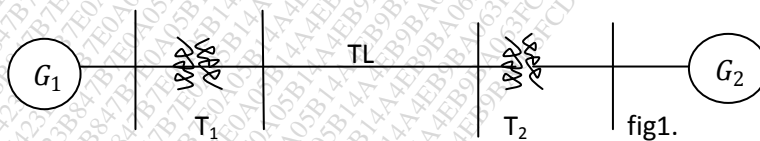
- N.B
- i. Question No.1 & question No.6 are compulsory.
 - ii. Attempt from each section any two questions from the remaining questions
 - iii. Assume suitable data wherever necessary

Section A

Q.1 Solve any five questions. 10

- i) What are the components of power system? Write the equation for converting the p.u impedance expressed in one base to another.
- ii) What are advantages of per unit computations?
- iii) If the reactance in ohms is 15Ω , find the p.u value for a base of 15KVA and 10 kv.
- iv) What is bus admittance matrix?
- v) What are four ways of adding an impedance too an existing system so as to modify bus impedance matrix?
- vi) How a load flow study is performed?
- vii) What is need of slack bus?
- viii) Why. Do we go for iterative methods to solve load few problems?

Q.2 a) Choosing a common base of 20 MVA, compute the p.u reactance of the power system. Shown in fig1. And draw the reactance diagram. 8



- $G_1 : 20\text{MVA}, 10.5\text{KV}, X''=1.4\Omega$
 $G_2 : 10\text{MVA}, 6.6\text{KV}, X'' = 1.2 \Omega$
 $Tr_1 : 10\text{MVA}, 33/11\text{KV}, X = 15.2 \text{ ohms per phase on HT side}$
 $Tr_2 : 10\text{MVA}, 33/6.2 \text{ KV}, X = 16.0 \text{ ohms per phase on HT side}$
 $TL : 22.5 \text{ ohms per phase.}$

b) Derive the expression for per unit impedance referred to base value 7

- Q.3 a) Derive the expression for primitive network. 8
 b) For the power system as shown in fig2. Obtain the B, B^Λ & K. Take ground as reference. 7

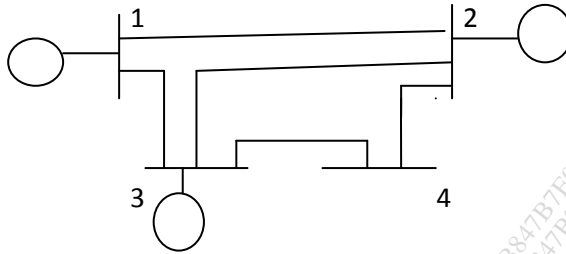


Fig2.

- Q.4 a) Explain the step by step procedure for NR method of load flow studies. 8
 b) Find the bus impedance matrix for the system whose reactance diagram is as from in fig 3. All the impedances are in p.u 7

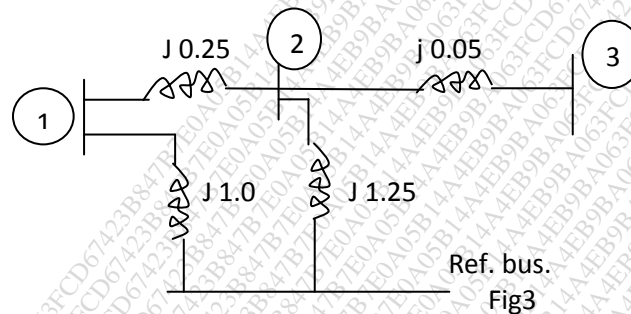


Fig3

- Q.5 a) Derive an expression for symmetrical components of current. 8
 b) Write the advantages of fast decoupled methods over other methods. 7

Section B

- Q.6 Solve any five questions of the following 10

- i) How the reactive power of a generator is controlled?
- ii) What is meant by fault?
- iii) Name the difference in representation of power system for load flow & short circuit studies
- iv) What is the reason for transient during short circuits?
- v) What is the significance of sub transient reactance in short circuit studies?
- vi) How symmetrical faults are analyzed?
- vii) Why the circuit breaker interrupting current is asymmetrical? Write equation.
- viii) What are the complex number operator properties?

- Q.7 a) Explain the phenomenon of transient on transmission line with waveform 8
 b) A delta connected impedance load takes $10\angle 30^\circ$ A and $15\angle -60^\circ$ A currents in its terminals a & b. 7
 find the current in terminal c and determine the sequence components for each line.

- Q.8 a) Explain Z_{Bus} Building. For Type 3 & Type 4 modification. 8
 b) Build Z_{Bus} , by using Z Bus algorithm for the network shown in fig4 7

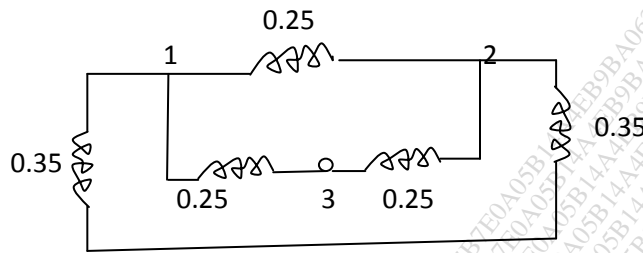


Fig 4.

- Q.9 a) Derive an expression to determine fault current for line to line fault and draw the sequence network. 8
 b) Determine the fault current and MVA at faulted bus for a line to ground fault at bus 4 as shown in figure 5. 7

$G_2, G_2 : 100 \text{ MVA}, 11\text{KV}, x' = x'' = 15\%$,
 $x_0 = 5\%, x_n = 6\%$
 $T_1, T_2 : 100\text{MVA}, 11\text{KV}/220\text{KV}$
 $x \text{ network} = 9\%$
 $L_1, L_2 : X' = X'' = 10\%, X_0 = 10\%$
 All values are on 100MVA base, 11kv

- Q.10 a) Explain the static security analysis at control centers. 8
 b) Explain the sequence impedance of synchronous machine. 7