

B TECH
(SEM VI) THEORY EXAMINATION 2018-19
POWER SYSTEM ANALYSIS

Time: 3 Hours

Total Marks: 100

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt all questions in brief.

2 x 10 = 20

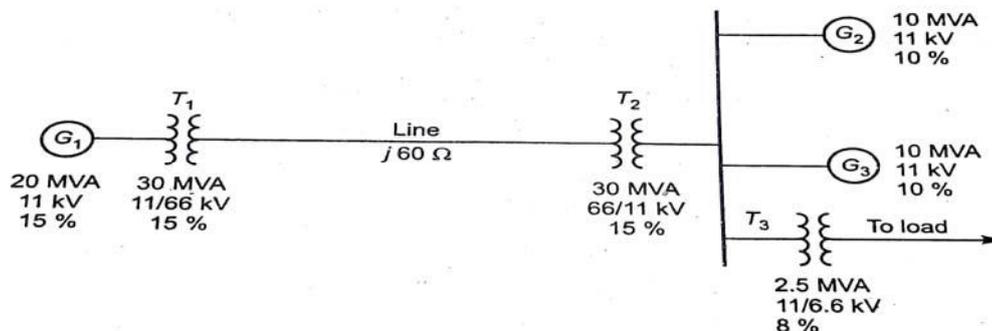
- a) What do you mean by phase sequence?
- b) Draw the single line diagram of a power system showing its voltage level.
- c) What do you mean by symmetrical faults?
- d) What do you mean by short circuit capacity of a bus in a network?
- e) Explain Load bus and generator bus in a power system network for load flow studies.
- f) What do you mean by acceleration factors? Why it is used?
- g) What are factors affecting transient and steady state stability?
- h) What do you mean by transient limit?
- i) What do you mean by the velocity of travelling waves?
- j) What is the effect of cable on surge?

SECTION B

2. Attempt any three of the following:

10 x 3 = 30

- a) Draw a per unit reactance diagram for the three phase system shown in figure. Choose 20MVA and 66 KV as base values.



- b) Develop an equivalent network showing the interconnection of sequence networks to simulate a double line to ground fault.
- c) Explain the computational procedure for the load flow solution using Gauss Seidel method, when the system contains all three buses.
- d) Explain the equal area criterion and how it may be used to study the stability of a two machine system.
- e) Derive the wave equation for a two wire transmission line.

SECTION C

3. Attempt any one part of the following:

10 x 1 = 10

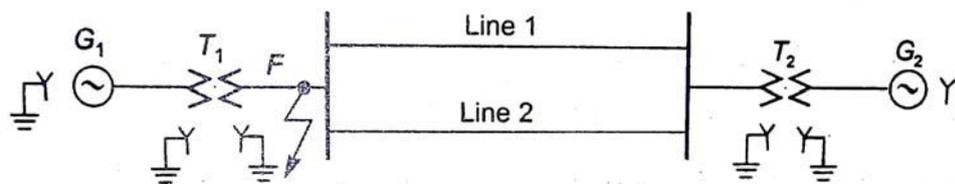
- (a) A set of unbalanced line currents in a three phase four wire system is as follows
 $I_a = -j6$ A, $I_b = (-8+j5)$ A and $I_c = 7$ A.
 Determine the positive, negative and zero sequence components of the current.
- (b) Determine the sequence impedance of a transmission line and then draw the sequence networks of transmission line.

4. Attempt any one part of the following: 10 x 1 = 10

- (a) Three 60 MVA ac generator, each having 15% reactance are connected via three 36 MVA reactors each of 10% reactance to a common bus bar. The feeders are each connected o the junction of each alternator and its reactor. What must be the minimum rating of each feeder circuit breaker?
- (b) Draw the sequence network for the system shown in figure. determine the fault current when (a) LLG and (b) LL fault occurs at point F. The per unit reactances all referred to the same base are as follows.

	X_0 (p.u.)	X_1 (p.u.)	X_2 (p.u.)
Generator G1	0.05	0.3	0.2
Generator G2	0.03	0.25	0.15
Line 1	0.70	0.3	0.3
Line 2	0.70	0.3	0.3
Transformer T1	0.12	0.12	0.12
Transformer T2	0.1	0.1	0.1

Both the generator are generating 1p.u voltage.

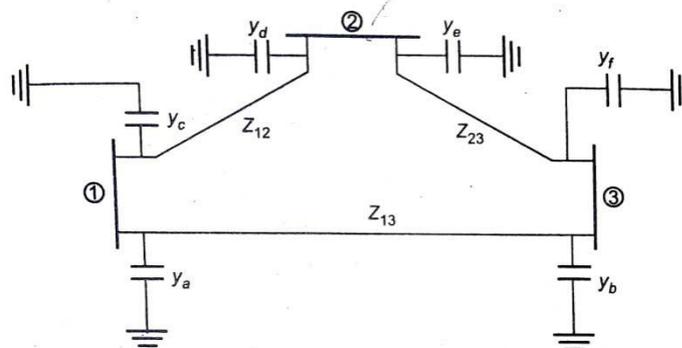


5. Attempt any one part of the following: 10 x 1 = 10

- (a) Compare the performance of Gauss Seidel and Newton Raphson methods for load flow solution. Explain the method of formation of Y bus.
- (b) Determine Y bus for the 3 bus system shown in figure. The line series impedance is as follows.

Line (Bus to bus)	Impedance (p.u.)
1-2	$0.06 + j0.18$
1-3	$0.03 + j0.09$
2-3	$0.08 + j0.24$

Each line has a shunt admittance of $-j5.0$.



6. Attempt any one part of the following: 10 x 1 = 10

- (a) A generator supplies a large power system via a dual circuit line. With one circuit in service and maximum power transfer is 150 MW. Find approximate magnitude of the minimum angle between terminal voltage phasors occurring after switching in one circuit while 50 MW is being delivered by the other.
- (b) Derive the swing equation for the synchronous machine and draw the swing curve.

7. Attempt any one part of the following: 10 x 1 = 10

- (a) Derive the relation between the reflection factor for voltage and current at a junction of two dissimilar lines.
- (b) Explain what is meant by the surge impedance of a transmission line and derive its value in terms of the line constants.