Printed Pages:03 **Sub Code: NEE601**

Paper Id: | 1 | 2 | 0 | 6 | 0 | 3 | **Roll No.** | | | | | | | | | | |

BTECH

(SEM-VI) THEORY EXAMINATION 2017-18

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 is single line diagram of power system from generating station to utilization level?
b) What is impedance and reactance diagram?
c) Define sub-transient reactance.
d) Write a short note on feeder reactors.
e) Explain the matrix partitioning in load flow study.
f) Define: Load bus, Generator bus and Slack bus.
g) Explain the methods of improving steady state stability.
h) Explain the swing curve.
i) Define: characteristic impedance loading and surge impedance loading.
j) Find the CIL of 200 kV transmission line.

SECTION B

2. Attempt any *three* of the following: **10 x 3 = 30**

a) Obtain per unit reactance diagram of the power system shown in figure. The reactance data of the elements are given as –

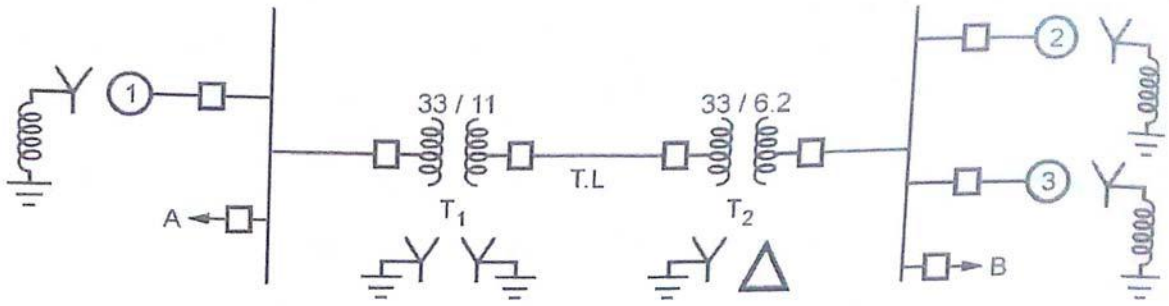
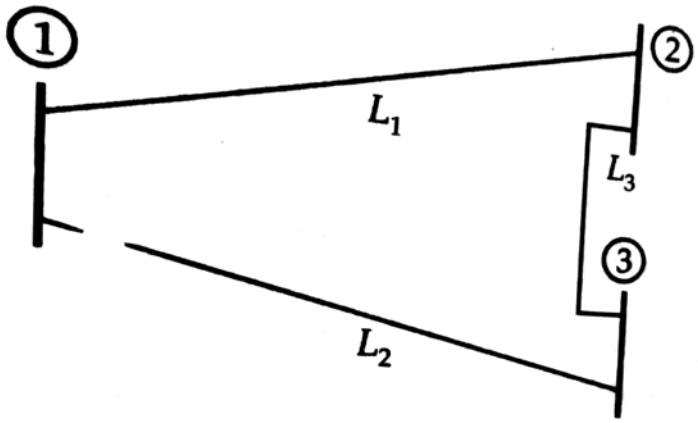


Fig. 1.4.2 One line representation of a simple power system

G1: 30 MVA	*10.5 kV*	*X'' = 1.6 Ω*
G2: 15 MVA	*6.6 kV*	*X'' = 1.2 Ω*
G3: 25 MVA	*6.6 kV*	*X'' = 0.56 Ω*
T1: 15 MVA	*33/11 kV*	*X = 15.2 Ω per phase on ht side*
T2: 15 MVA	*33/6.2 kV*	*X = 16 Ω per phase on ht side*
Transmission Line	*20.5 Ω per phase*	
Load A 40 MW	*11 kV (L-L)*	*0.9 lagging p.f.*
Load B 40 MW	*6.6 kV (L-L)*	*0.8 lagging p.f.*

b) Explain the switching operation in a series R-L circuit.

c) In the 3 bus system shown in figure the series and shunt impedances of line (L1) is (14.3+j97) ohm and (-j3274) ohm, line (L2) is (7.13+j48.60) ohm and (-j6547) ohm, and line (L3) is (9.38+j64) ohm and (-j4976) ohm respectively, find [Y_{Bus}].



d) Derive the swing equation for a machine connected to an infinite bus in a power system.

e) Deduce the general wave equations for a loss less transmission line for propagation of voltage and current wave.

SECTION C

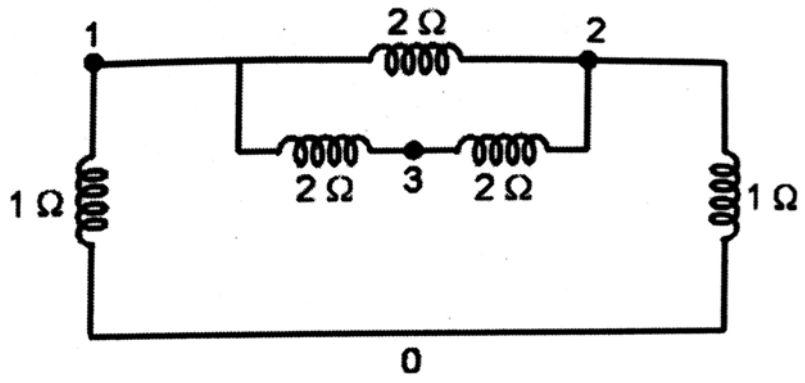
3. Attempt any *one* part of the following: 10 x 1 = 10

a) One conductor of a 3-phase line is open. The current flowing to the delta connected load through line 'a' is 10 A. With the current in the line 'a' as reference and assuming that line 'c' is open. Find the symmetrical components of the line current.

b) Explain the sequence impedances. Define balanced star connected load and transmission lines of sequence impedances.

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

a) Develop Z_{Bus} matrix for the network shown in figure.



b) Derive the relationship to determine the fault current for a single line to ground fault. Draw an equivalent network showing the interconnection of sequence networks to stimulate LG fault.

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

a) Explain clearly the computational procedure for load flow solution using Newton-Raphson method when the system contains only PQ buses.

b) Discuss the fast decoupled load flow method in load flow study.

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

a) Show that the steady state power which could be transmitted over a transmission line will be maximum when $X = \sqrt{3}\,R$, where X and R have their usual meaning.

b) Explain equal-area criterion for the stability of an alternator supplying infinite busbar via an inductive interconnector.

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

a) Determine reflection co-efficient and transmission coefficient for receiving end of transmission line terminated by resistance.

b) Explain the Bewley's Lattice diagram. Write a note on surge phenomenon. Define the protection against overvoltages.