

B.Tech. SEM -VI Electrical 2014 Course (CBCS) : SUMMER - 2019
SUBJECT: POWER SYSTEM ANALYSIS

Day: Friday
 Date: 24/05/2019

Time: 02.30 PM TO 05.30 PM
 Max Marks. 60

S-2019-2734

N.B. :

- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) Draw neat diagrams **WHEREVER** necessary.
- 4) Assume suitable data, if necessary.

Q.1 Write short note on: **(10)**

- a) Load voltage, frequency specifications and permissible variations related with power system.
- b) Real power-frequency and reactive power-voltage dependency.

OR

Q.1 a) What is the need of power system analysis? List out different methods of voltage control of power system. **(05)**

- b) Two loads $Z_1 = (100 + j0) \Omega$ and $Z_2 = (10 + j20) \Omega$ are connected across a 200V rms 60Hz source as shown in fig. (1). Find the total real and reactive power, the power factor at the source and the total current. **(05)**

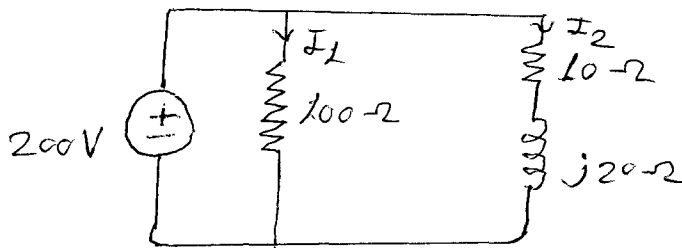


Fig. (1)

Q.2 Derive synchronous generator simple model such as emf behind reactance. **(10)**

OR

Q.2 a) List the advantages and applications of **(05)**
 i) Single line diagram ii) per unit system

- b) Draw per phase impedance diagram and per-phase reactance diagram for following single line diagram of an electrical power system. **(05)**

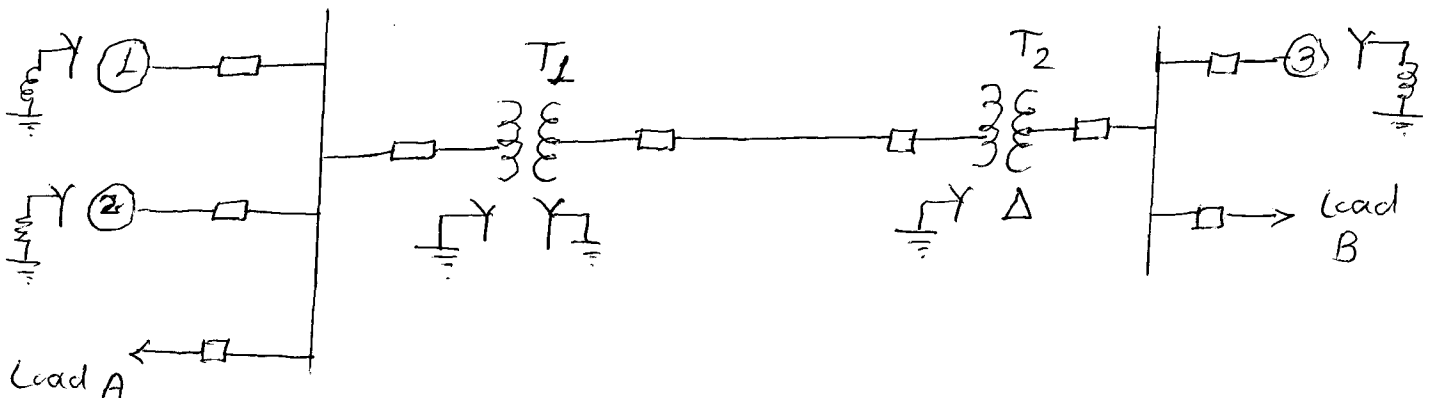


Fig (2.1) single line diagram of electrical power system.

P.T.O.

- Q.3 a)** Explain concept of Z-bus and Y-bus matrices and its use in load flow analysis. (05)
- b)** Classify different types of buses in power system for load flow studies. How slack-bus is distinguished from other types of buses in load flow analysis? (05)

OR

Q.3 Explain Newton-Raphson method used to solve the load flow equations with flow chart. (10)

- Q.4 a)** Explain symmetrical and unsymmetrical fault in power system. What is the significance of 3 ϕ symmetrical fault analysis? (05)
- b)** Describe the role of current limiting reactor in power system. List out different points for selection criteria of current limiting reactor. (05)

OR

Q.4 A 3-phase, 5 MVA, 6.6 kV alternator with a reactance of 8% is connected to a feeder of series impedance $(0.12 + j0.48)$ ohm/phase/km. The transformer is rated at 3 MVA, 6.6 kV/ 33kV and has a reactance of 5%. (10)

Determine the fault current supplied by the generator operating under no load with a voltage of 6.9 kV, when a 3-phase symmetrical fault occurs at a point 15km along the feeder.

Q.5 Prove that for Single Line to Ground (S-L-G) fault, the positive, negative and zero sequence networks are connected in series. (10)

OR

- Q.5 a)** List out different types of symmetrical and unsymmetrical faults. (04)
- b)** A generator of negligible resistance having 1.0 per unit voltage behind transient reactance is subjected to different types of faults. (06)

Type of fault	Resulting fault current in p.u.
3 phase	3.33
L - L	2.23
L- G	3.01

Calculate the per-unit values of 3 sequence reactance's.

- Q.6 a)** Define and classify power system stability. (05)
- b)** Derive swing equation of machine-infinite bus system. (05)

OR

Q.6 Explain and derive equal area criteria for stability study of one machine – infinite bus problem. (10)

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