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)**

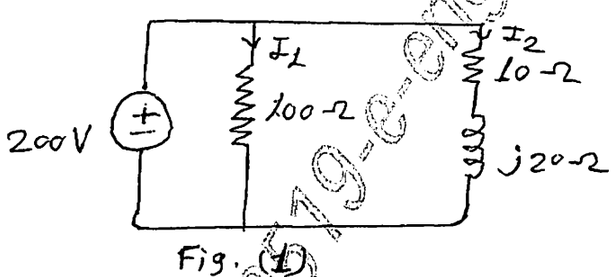

Fig. (1)

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)**

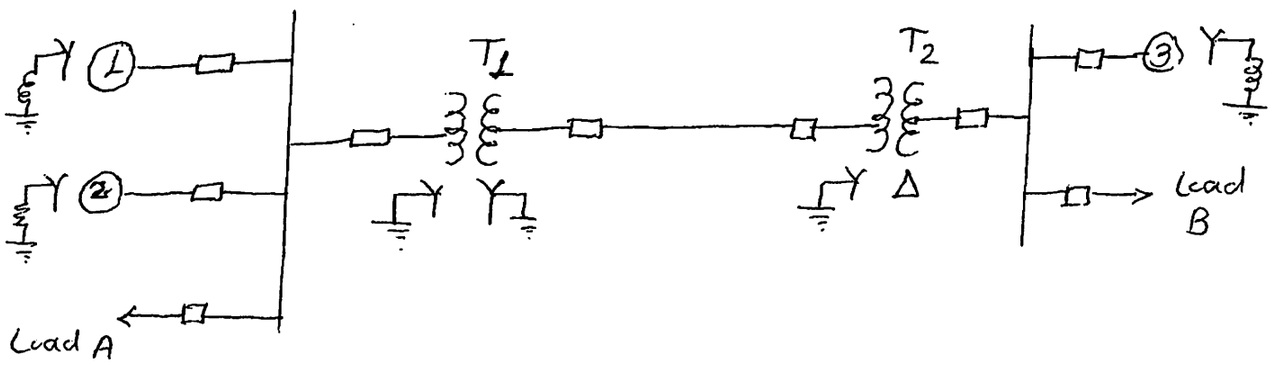

Fig (2.1) single line diagram of electrical power system.

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 3ϕ 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)

* * * *