BACHELOR OF TECHNOLOGY (C.B.C.S.) (2014 COURSE)
B.Tech.Sem - VI ELECTRICAL : WINTER- 2022
SUBJECT : POWER SYSTEM ANALYSIS

Day : Friday | Time : 10:00 AM-01:00 PM

Date : 25-11-2022 | **W-13327-2022** | Max. Marks : 60

N.B.

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

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

a) Methods of voltage control

b) Power system analysis and it's necessity

OR

Q.1 a) Derive and explain the concept of complex power **(05)**

b) Two ideal voltage sources 1 and 2 are connected by line of impedance $\bar{Z}=(0+j10)\Omega$ as shown in fig. 2 (b) **(05)**
Estimate the active and reactive power supplied or absorbed by each source and power loss in the line

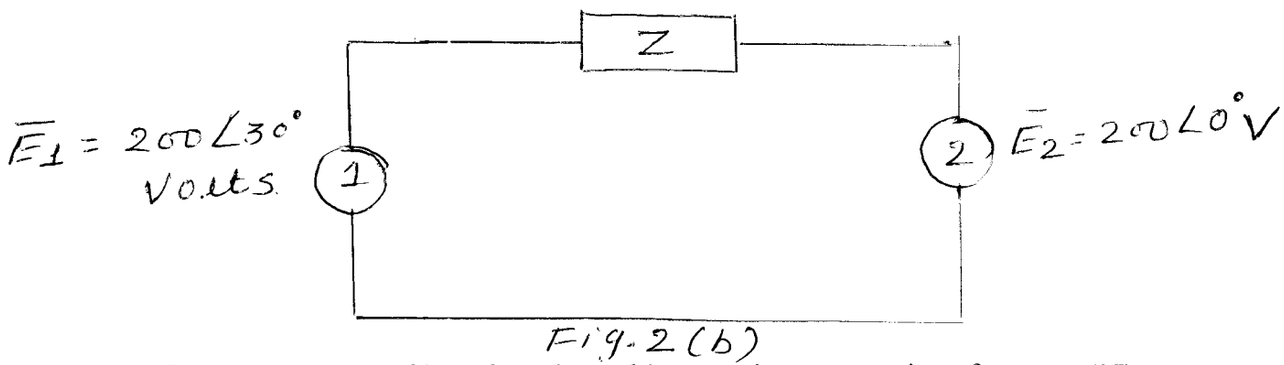

Fig. 2 (b)

Q.2 a) Derive the change of base formula used in per unit representation of power system. **(05)**

b) Explain the concept of single line diagram in short and also draw single line diagram of power system. **(05)**

OR

Q.2 State the applications of three winding transformer in the power system. Derive and sketch the model of three winding transformer. **(10)**

Q.3 a) Write short note on formation of power flow equations for n bus power system. **(05)**

b) Determine the nodal admittance matrix for the power system represented by the single line diagram in fig. 3 (b) **(05)**

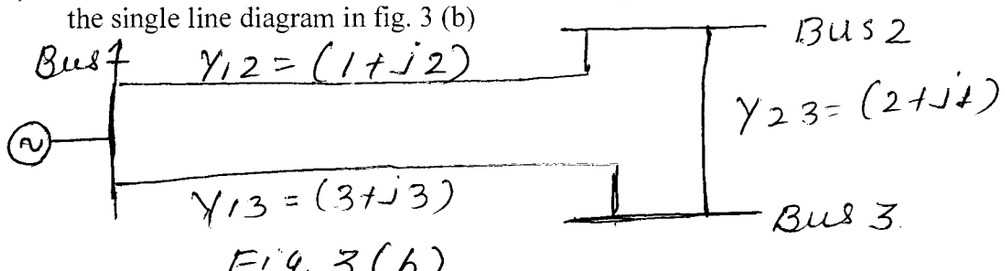

Fig. 3 (b)

OR

P.T.O.

Q.3 Explain in detail Newton–Raphson method (Polar form) for load flow solution. **(10)**

Q.4 **a)** Explain the concept of: **(05)**

i) Subtransient reactance
ii) Transient reactance
iii) Synchronous reactance

b) Derive the symmetrical short circuit current and DC off–set current of unloaded alternator **(05)**

OR

Q.4 Discuss in detail the selection of circuit breaker and current limiting reactor during symmetrical fault analysis. **(10)**

Q.5 Draw the sequence network diagram for : **(10)**

i) Line–to–Ground (L–G) fault
ii) Line–to–Line (L–L) fault

OR

Q.5 A 10 MVA, 13.8 KV alternator has positive, negative and zero sequence reactances of 20% , 30% and 5% respectively. **(10)**

i) What reactance must be put in the generator neutral so that the fault current for a line-to-ground fault of zero fault impedance will not exceed the rated line current?
ii) What value resistance in the neutral will serve the same purpose?

Express both resistance and reactance in per unit and in ohms.

Q.6 **a)** Derive swing equation. **(05)**

b) Discuss importance of rotating machine dynamics in the power system stability evaluation. **(05)**

OR

Q.6 Define and classify power system stability. Derive and explain in short the equal area criterion for stability study of one machine infinite bus system. **(10)**

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