Code No: R2032023 **R20** SET -1

III B. Tech II Semester Supplementary Examinations, December -2023
POWER SYSTEM ANALYSIS
(Electrical and Electronics Engineering)

Time: 3 hours Max. Marks: 70

Answer any **FIVE** Questions **ONE** Question from **Each unit**
All Questions Carry Equal Marks
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UNIT-I

1. a) What are the advantages of p.u system? Explain. [7M]
   b) A 345 KV transmission line has a series impedance of (4+j60) Ω and shunt admittance of j2 x 10^{-3} S. Using 100 MVA and the line voltage base values, calculate the per unit impedance and per unit admittance of the line. [7M]

(OR)

2. a) What is incidence matrix? Explain with suitable example. [6M]
   b) Form the Y_{BUS} by using singular transformation for the network shown in figure (1) including the generator buses. [8M]

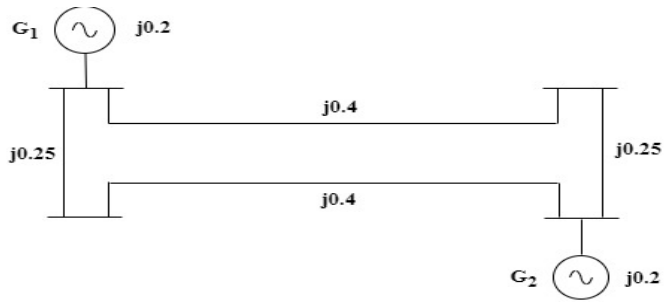

Figure (1)

UNIT-II

3. a) Write the advantages and disadvantages of Gauss –Seidel method. [4M]
   b) Explain clearly with a flow chart the computational procedure for load flow solution using Newton-Raphson method when the system contains all types of buses. [10M]

(OR)

4. a) Compare the N-R method and fast decoupled load flow method. [8M]
   b) What is the need for slack bus or reference bus? Explain. [6M]

UNIT-III

5. a) Derive the necessary expressions for the building up of Z_{BUS} when new element is added between two existing buses. [8M]
   b) What are the advantages of Z_{BUS} building algorithm? [6M]

(OR)

6. a) What do you understand by percentage reactance? Why do we prefer to express the reactances of various elements in percentage values for short-circuit calculations? [7M]
   b) A generating station has four bus-bar sections. Each section is connected to tie-bar though 20% reactors rated at 200 MVA. Generators of total capacity 100 MVA and 20% reactance are connected to each busbar section. Calculate the MVA fed to a fault under short-circuit condition on one of the bus-bars. [7M]

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UNIT-IV

7. a) Discuss the 'symmetrical components method' to analyze an unbalanced 3-φ system. [7M]

   b) The zero and positive sequence components of red phase are as under : $\overrightarrow{ER0}$ = (0·5 – j 0·866) V ; $\overrightarrow{ER1}$ = 2 ∟0º V [7M]
   If the phase voltage $\vec{E}_R$ = 3∟0ºV, find the negative sequence component of red phase and the Phase voltages $\vec{E}_Y$ and $\vec{E}_B$.

(OR)

8. a) Discuss the positive, negative and zero sequence impedances with reference to synchronous generators, transformers and transmission lines. [7M]

   b) The per unit values of positive, negative and zero sequence reactances of a network at fault are 0·08, 0·07and 0·05 respectively. Determine the fault current if fault is line-to-line-to-ground. [7M]

UNIT-V

9. a) Explain the terms: (i) Steady state stability (ii) transient stability and (ii) dynamic stability. [7M]

   b) State and derive the swing equation. [7M]

(OR)

10. a) Explain the equal area criterion for stability. [7M]

    b) Discuss the various methods of improving steady state stability. [7M]