



SCHOOL OF ELECTRICAL ENGINEERING
FALL SEMESTER 2026-2027
CONTINUOUS ASSESSMENT TEST - II

Programme Name & Branch : B.Tech & Electrical and Computer Science Engineering.
Course Code and Course Name : BECS304L and Computer Aided Power System Analysis
Faculty Name(s) : Dr. B.Saravanan & Dr. M V Chilukuri
Class Number(s) : VL2026270104532 & VL2026270104531
Date of Examination : 29/09/26 FN
Exam Duration : 90 minutes Maximum Marks: 50

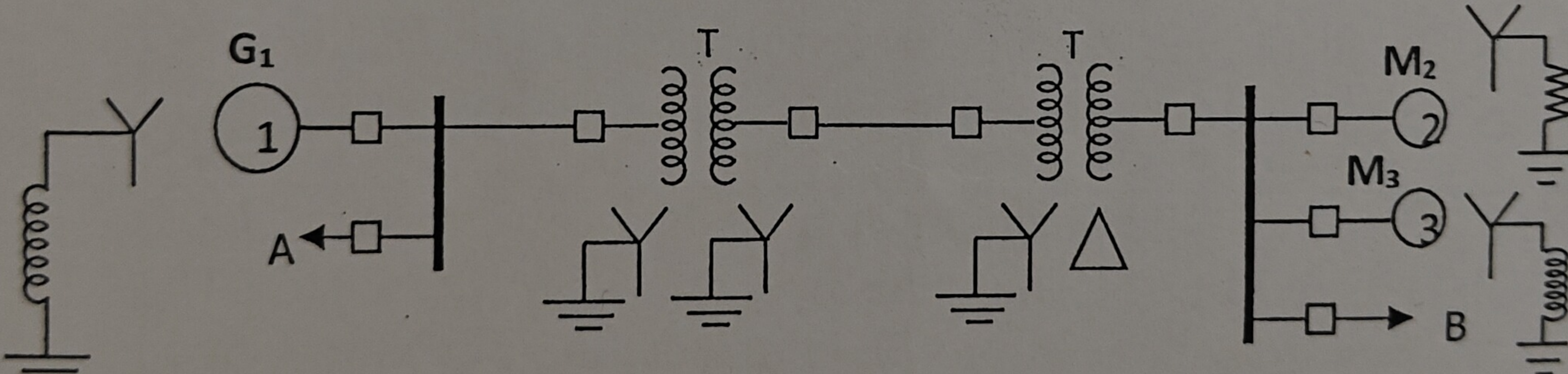
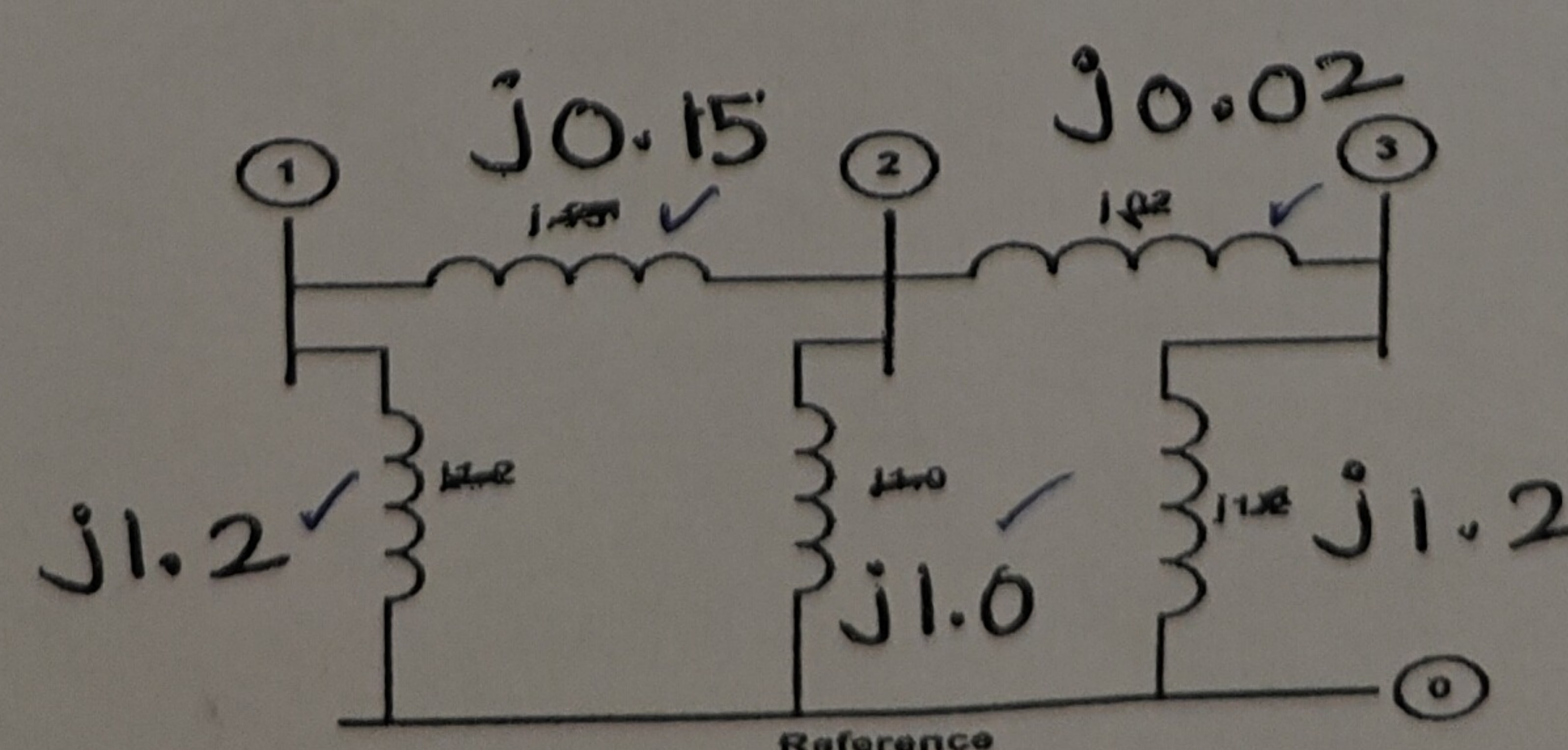
General instructions:**Answer All Questions:**

Course Outcomes Statements:

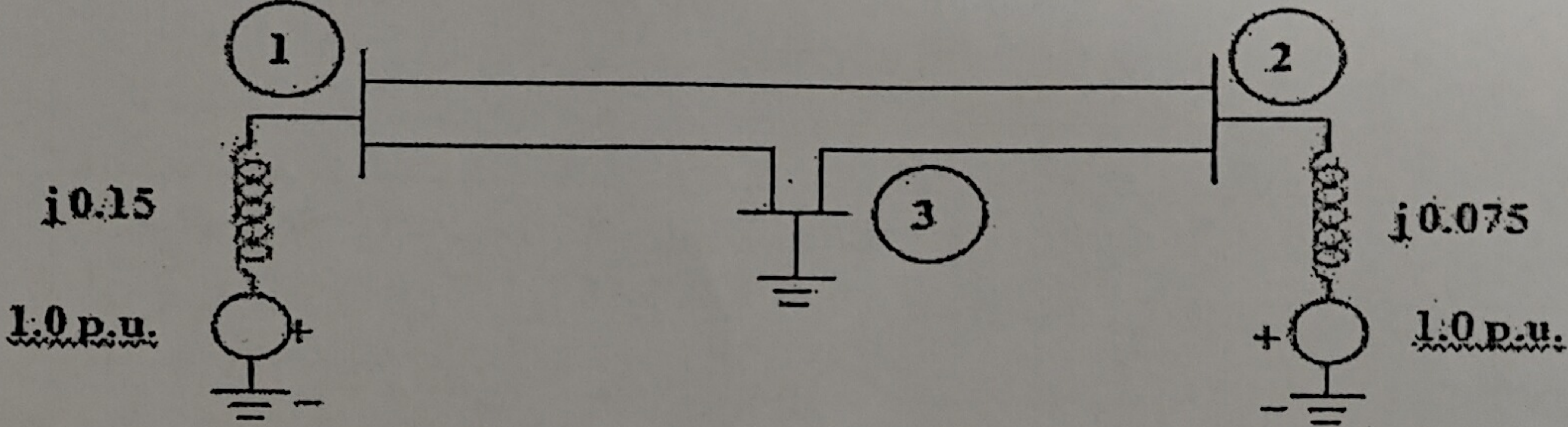
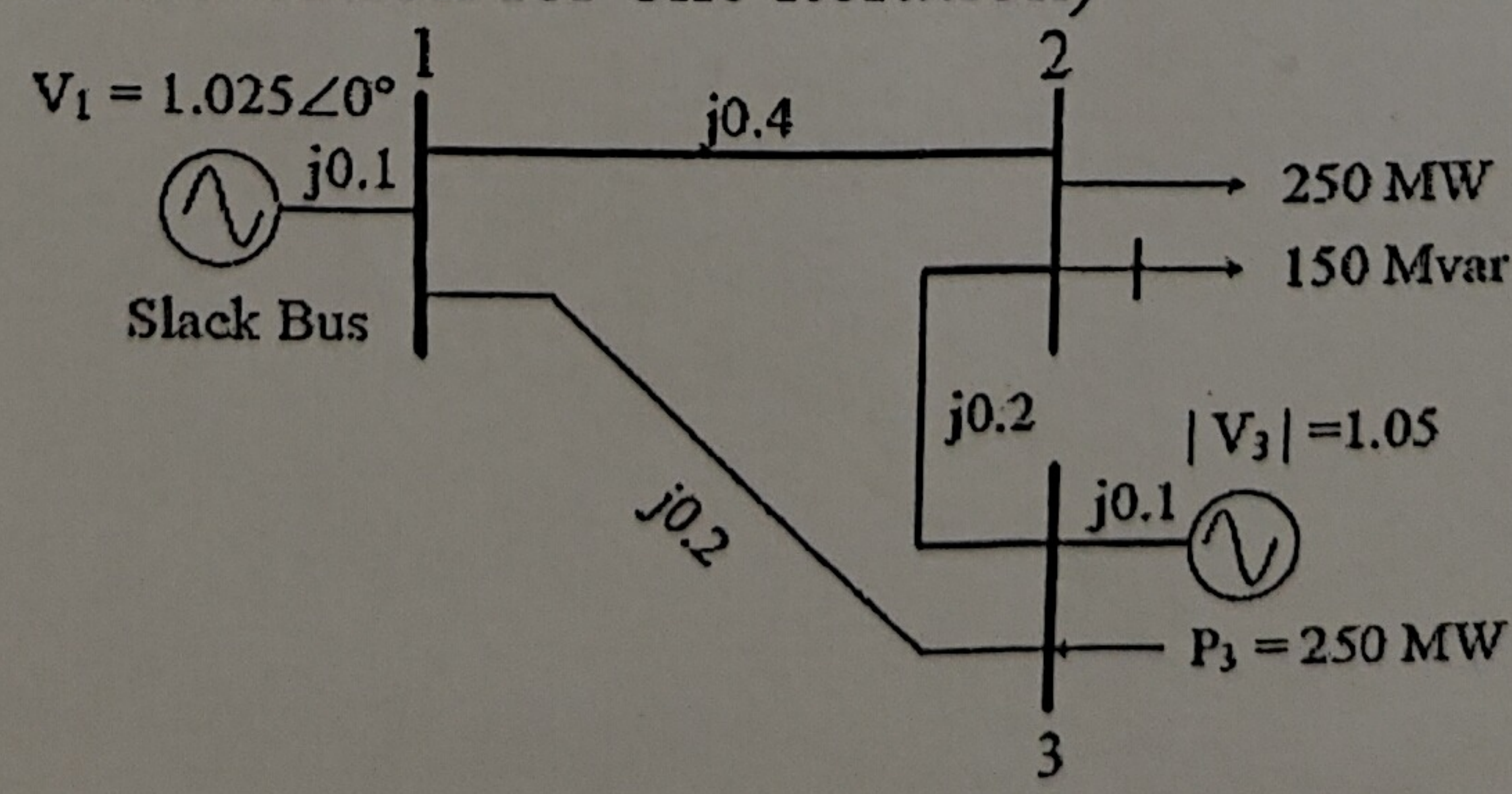
CO.2: Apply different algorithms for the formulation of network matrices.

CO.3: Carry out computer aided load flow analysis for a given power system network.

CO.4: Carry out fault analysis and understand the impact of different types of faults using digital techniques.

Q. No	Question	M	CO	BL
1.	Draw the positive sequence, negative sequence and zero sequence reactance diagram using a base of 20 MVA , 13.8 kV in Generator 1 of the network shown in Figure 1. Assume positive, negative and zero sequence reactances are same for all the components (generator, motors, and transmission line) $X_1 = X_2 = X_0 = 10\%$. Also the value of neutral reactance X_n for the Generator 1 and the Motor 3 is $j0.25\Omega$. For the Motor 2 neutral resistance is 3Ω.  Figure 1	10	4	3
2.	Obtain the Z_{bus} matrix using bus building algorithm for the power system shown in Figure 2.  Figure 2	10	2	3

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3.	The Z_{bus} for the single-line diagram of a three-bus system shown in Figure 3 is $Z_{bus} = j \begin{bmatrix} 0.07286 & 0.03857 & 0.05571 \\ 0.03857 & 0.05571 & 0.04714 \\ 0.05571 & 0.04714 & 0.10143 \end{bmatrix}$ The per unit impedance are on a base of 50 MVA, 12 kV. Symmetrical three-phase fault occur at bus 3 with zero fault impedance. Using the above Z_{bus} matrix determine the fault current, bus voltages and also the current contributed by the generators.  Figure 3	10	4	3
4.	A generator rated 100MVA, 20 kV has $X_1 = X_2 = 20\%$ and $X_0 = 5\%$. Its neutral is grounded through a reactor of $j0.32$ ohm. The generator is operating at rated voltage with load and is disconnected from the system when a single line to ground fault occurs at its terminal. Find the sub-transient fault current in the faulted phase and line to line voltage.	10	4	3
5.	Figure 4 shows the single-line diagram of three-bus power system with generation at bus 1 and bus 3. The voltage at bus 1 is $V_1 = 1.025 \angle 0^\circ$ per unit. The voltage magnitude at bus 3 is fixed at 1.05 per unit with a real power generation of 250 MW. The scheduled load on bus 2 is marked on the diagram shown in Figure 4. Line impedances are marked in per unit on a 100 MVA base. Line resistances and line charging susceptances are neglected. By using Gauss-Seidel method and initial estimates of $V_2^{(0)} = 1.0 \angle 0^\circ$ and $V_3^{(0)} = 1.05 \angle 0^\circ$, determine $V_2^{(1)}$ and $V_3^{(1)}$. (Perform calculation for one iteration)  Figure 4	10	3	3