

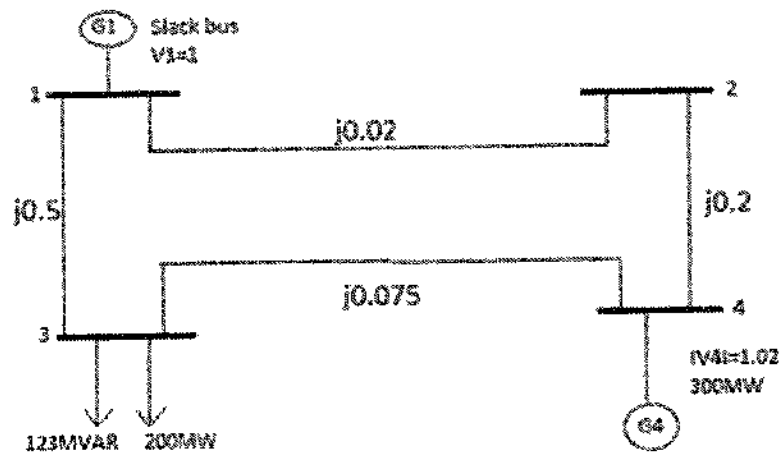


Course	EPM3211 Power System Analysis (1)	Time	3 HOURS
Students	3 rd Year Electrical Power	Mark	90

Course Related Program Competencies: A1, A2, A3, A9, B1, B4, C1, and C4.

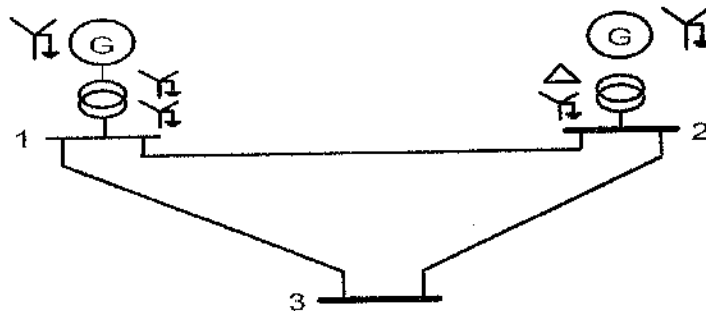
Answer the following THREE questions in detail:

(Q1) A single-line diagram is shown below with all impedances and voltages are in per unit. The base power is 100 MVA. Do the power flow analysis if the load increased by 8%, find the necessary voltage magnitudes and angles and stop after the third completed iteration using Newton- Raphson method. Find the power flow and power losses of each line. Put all the results in a single-line diagram. (30 Marks)



(Q2) 1) Explain the different types of buses in load flow analysis, 2) With the aid of time response diagram, compare the modeling of synchronous generator in power flow analysis and in fault analysis, 3) What is the role of symmetrical components in fault analysis?, 4) What is the role of per unit system in power system analysis? (30 Marks)

(Q3) For a line-to-ground fault at bus 3 of the power system below, calculate the fault current and phase voltages at each bus (Use Z_{bus} method). Given the following Positive, negative and zero sequence impedances in per unit: For the generators $Z^+ = Z^- = j0.2$; $Z^0 = j0.05$. For the transformers $Z^+ = Z^- = Z^0 = j0.06$. For the lines $Z^+ = Z^- = j0.1$; $Z^0 = j0.2$. Assume unloaded pre-fault with voltages = $1.02 \angle 0$ p.u. Repeat the solution for the L-L fault and L-L-G fault. Compare between the results of the three types of faults. Put all the results in a single-line diagram.



(30 Marks)