

TUTORIAL-7

EE 101: Basic Electronics

DEPARTMENT OF ELECTRONICS & ELECTRICAL ENGINEERING

INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI

(First question is the Pre-Tutorial Assignment problem to be solved in the space provided.)

Name:

Roll No.

Tutorial Group:

1. (a) Write advantages of a three-phase network or circuit. Find the line voltages for a balanced three-phase network if the phase voltages are given as $v_{an} = V_p \sin(\omega t + 20^\circ)$, $v_{bn} = V_p \sin(\omega t - 100^\circ)$ and $v_{cn} = V_p \sin(\omega t - 220^\circ)$. Draw the phasor diagram showing all the line and phase voltages

(b) Derive the balanced delta loads (Z_{AB} , Z_{BC} and Z_{CA}) in terms of a balanced star connected load (Z_A , Z_B and Z_C).

2. In the balanced three-phase system of Fig. Q2 let $Z_P = 12 + j5 \Omega$ and $I_{bB} = 20 \angle 0^\circ$ A rms with (+) phase sequence. If the source is operating with a power factor of 0.935, find (a) R_W , (b) V_{bn} , (c) V_{AB} and (d) the complex power supplied by the source.

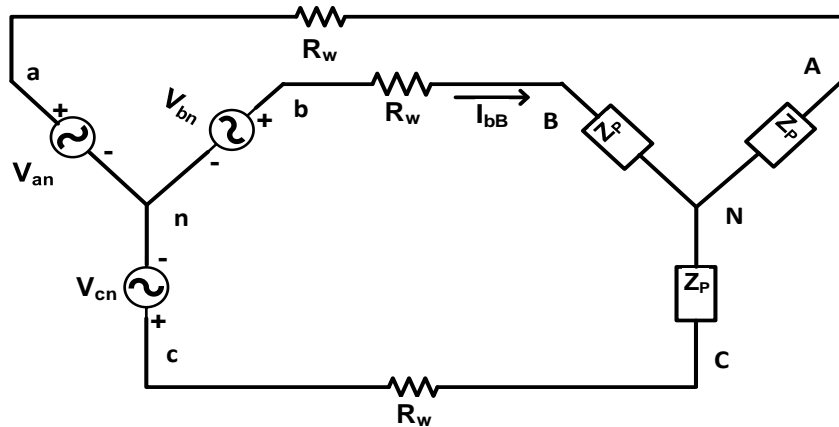
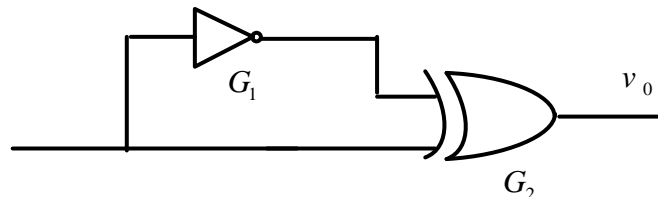
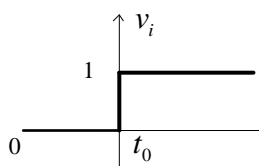


Fig. Q2

3. A balanced three-phase three-wire system has a Y-connected load with $V_{ab} = 400$ V rms. Each load contains three loads in parallel: $-j100 \Omega$, 100Ω and $50 + j50 \Omega$. Find (a) V_{cn} , (b) I_{aA} and (c) the total power (kW) drawn by the load.
4. The gate G1 and G2 in figure below have propagation delays of 10 nsec and 20 nsec respectively. Draw the output waveform v_o , if the input v_i makes an abrupt change from logic 0 to logic 1 at time $t=t_0$.



5. Given the gate T below whose output Boolean expression is given by $T = A\bar{B}\bar{C} + \bar{A}\bar{B}C + \bar{A}B\bar{C}$, prove that if, the logical value 1 is given, T gate acts as a universal gate.

