

Układy elektroniczne i technika pomiarowa

Zadanie zaliczeniowe 2023L

Zadanie 1

Jednofazowe prostowniki niesterowane

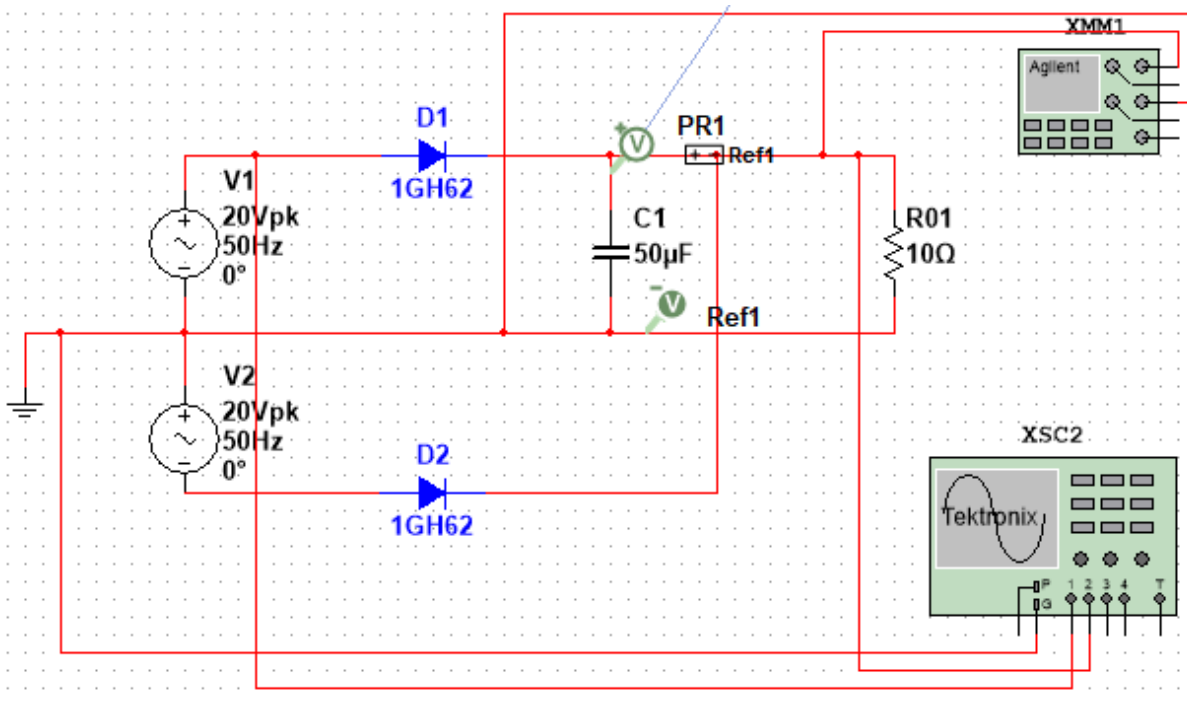
Mateusz Puławski
Nr albumu:226735

1. Treść zadania

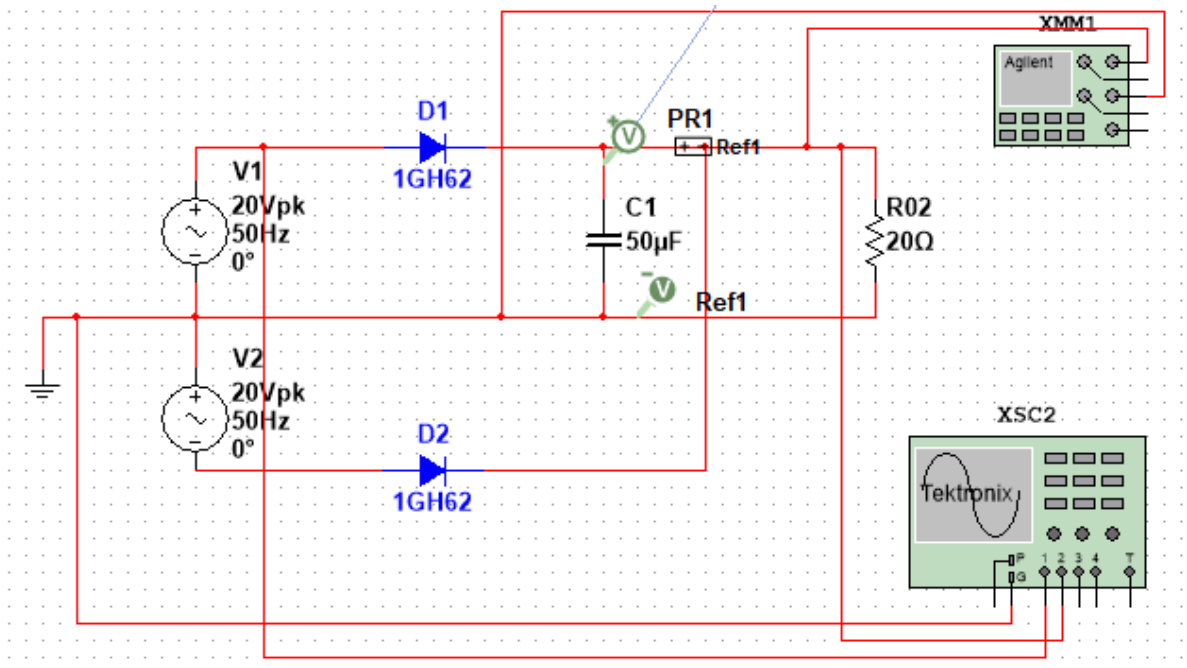
Wyznaczyć, na drodze symulacji komputerowej, funkcję zmian współczynnika tętnień $k_t = f(C)$ dla układu prostownika dwupulsowego, z dzielonym uzwojeniem wtórnym transformatora (bez modelu transformatora – zasilanie w postaci dwóch źródeł napięcia przemiennego) z filtrem pojemnościowym C dla dwóch wartości rezystancji obciążenia: $R_{01} = 10\Omega$ i $R_{02} = 20\Omega$. Amplituda napięcia źródeł zasilających prostownik $U_M = 20V$. Pojemność kondensatora filtru C zmienia się w zakresie $50\mu F - 5mF$. W raporcie umieścić wykresy $k_t = f(C)$ dla dwóch wartości R_0 .

2. Zaprojektowany schemat

Dla $R_{01} = 10\Omega$



Dla $R_{02} = 20\Omega$



3. Wyznaczanie współczynnika k_t

Współczynnik tętnień k_t wyznaczyć można ze wzoru:

$$k_t = \frac{U_t}{U_{AVG}} [-]$$

Gdzie:

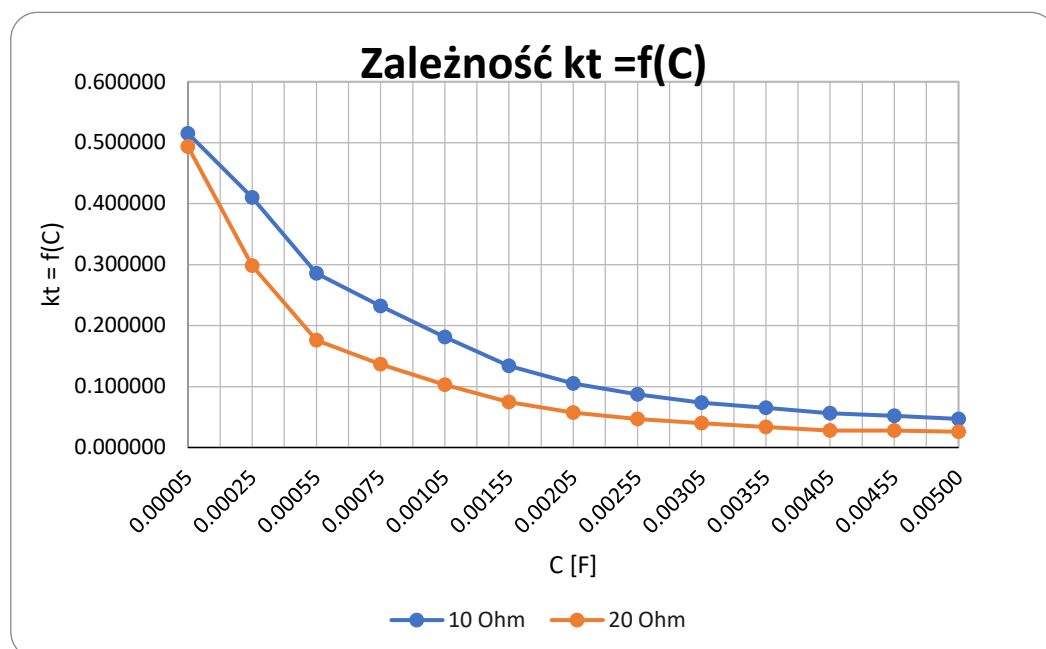
U_t - wartość skuteczna napięcia tętnień

U_t można wyznaczyć za pomocą wzoru na wartość skuteczną napięcia:

$$U^2 = U_{AVG}^2 + U_t^2 \Rightarrow U_t = \sqrt{U^2 - U_{AVG}^2}$$

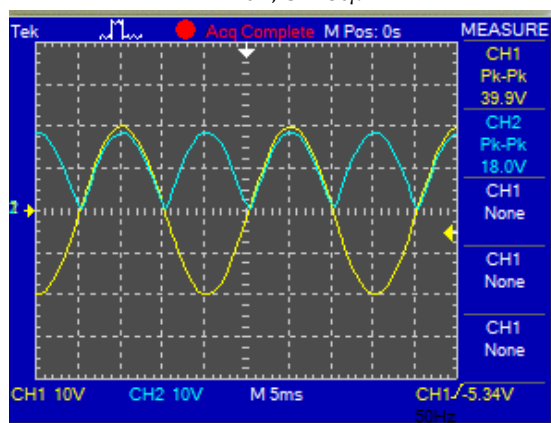
$$k_t = \frac{U_t}{U_{AVG}} = \sqrt{\frac{U^2 - U_{AVG}^2}{U_{AVG}^2}} = \sqrt{\frac{U^2}{U_{AVG}^2} - 1}$$

$R[Ohm]$	$C[F]$	$U(avg) [V]$	$U [V]$	kt
10	0.00005	11.517	12.956	0.515270
10	0.00025	12.200	13.186	0.410087
10	0.00055	13.387	13.922	0.285527
10	0.00075	14.032	14.405	0.232101
10	0.00105	14.756	14.996	0.181090
10	0.00155	15.554	15.693	0.133989
10	0.00205	16.076	16.164	0.104776
10	0.00255	16.438	16.500	0.086935
10	0.00305	16.705	16.750	0.073450
10	0.00355	16.907	16.943	0.065293
10	0.00405	17.070	17.097	0.056267
10	0.00455	17.197	17.220	0.051737
10	0.00500	17.298	17.317	0.046883
20	0.00005	11.710	13.058	0.493439
20	0.00025	13.304	13.884	0.298484
20	0.00055	14.915	15.144	0.175906
20	0.00075	15.578	15.723	0.136758
20	0.00105	16.210	16.296	0.103145
20	0.00155	16.826	16.873	0.074796
20	0.00205	17.192	17.220	0.057096
20	0.00255	17.427	17.446	0.046709
20	0.00305	17.588	17.602	0.039908
20	0.00355	17.705	17.715	0.033615
20	0.00405	17.799	17.806	0.028048
20	0.00455	17.867	17.874	0.027995
20	0.00500	17.918	17.924	0.025881

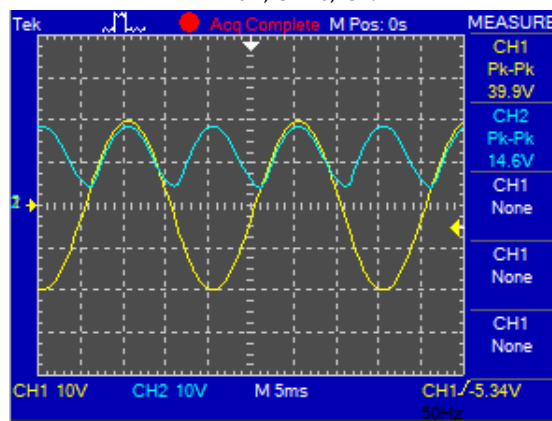


4. Wykresy otrzymane w trakcie symulacji

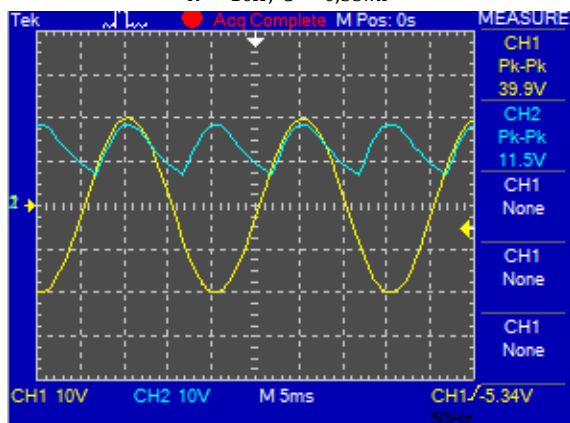
$R = 10\Omega; C = 50\mu F$



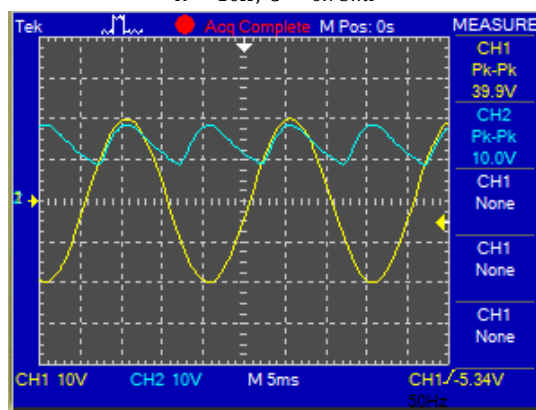
$R = 10\Omega; C = 0,25mF$



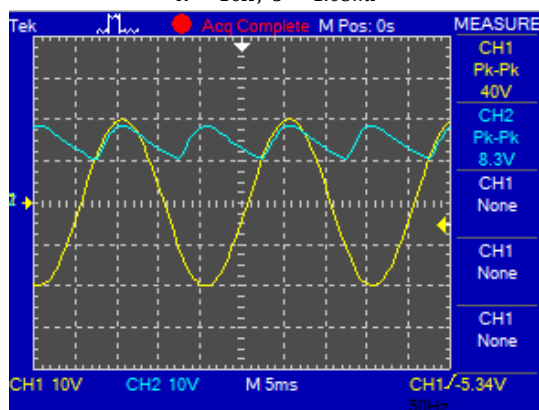
$R = 10\Omega; C = 0,55mF$



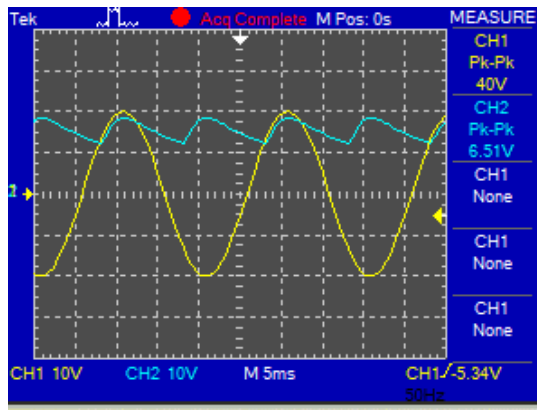
$R = 10\Omega; C = 0.75mF$



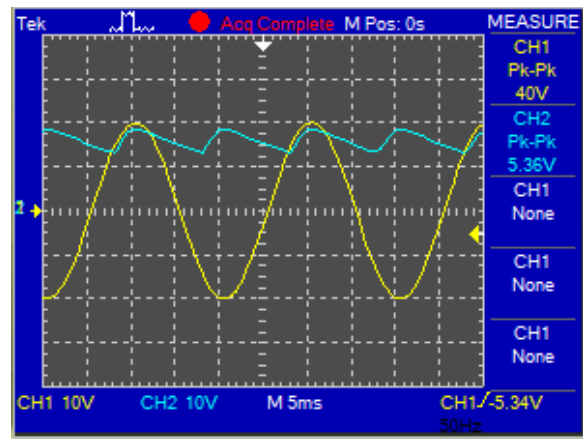
$R = 10\Omega; C = 1.05mF$



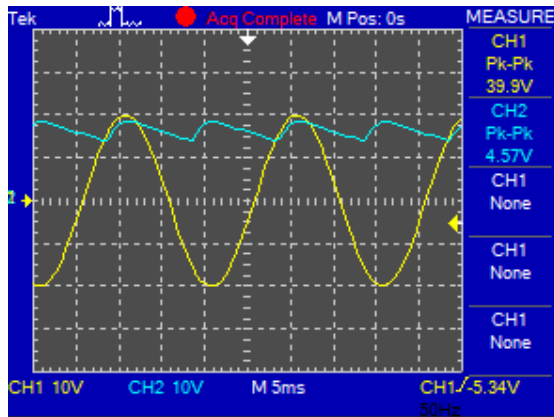
$R = 10\Omega; C = 1.55mF$



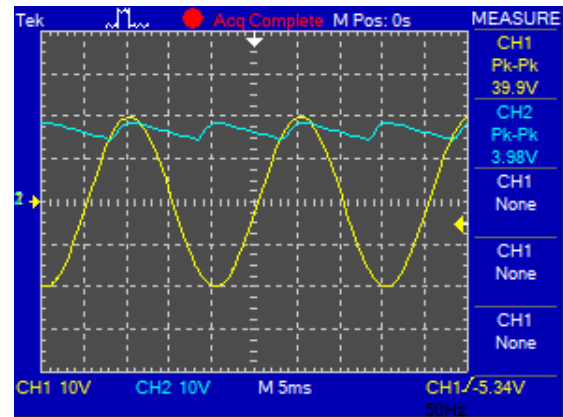
$R = 10\Omega; C = 2.05mF$



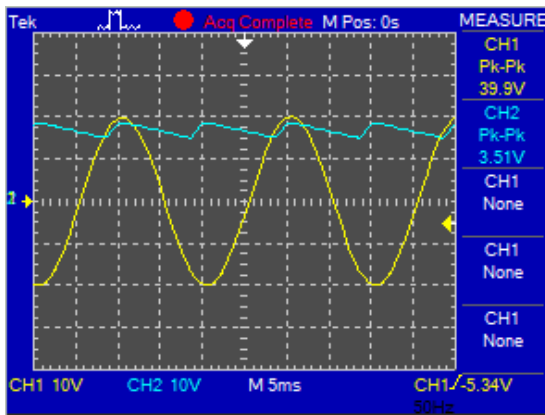
$R = 10\Omega; C = 2.55mF$



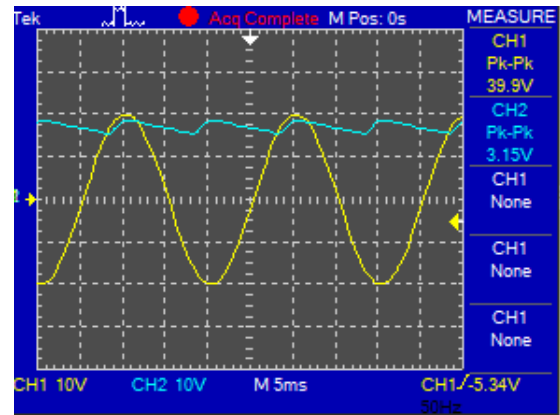
$R = 10\Omega; C = 3.05mF$



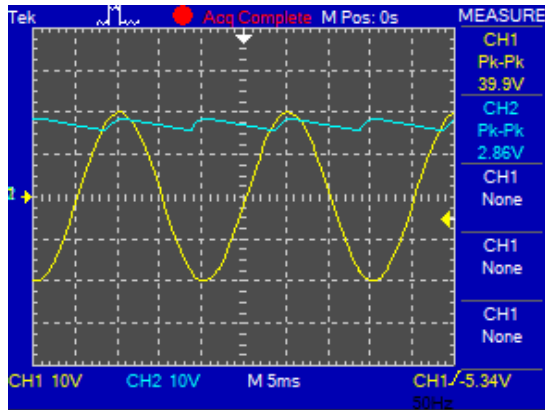
$R = 10\Omega; C = 3.55mF$



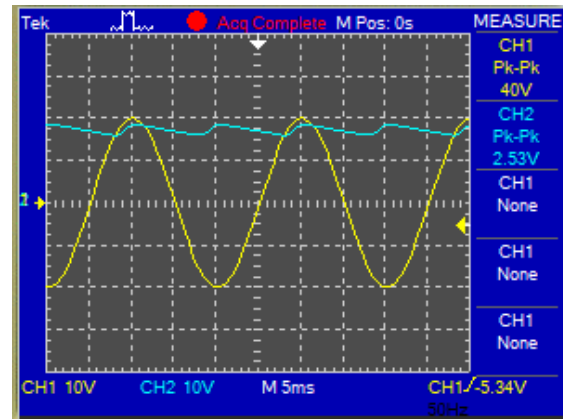
$R = 10\Omega; C = 4.05mF$



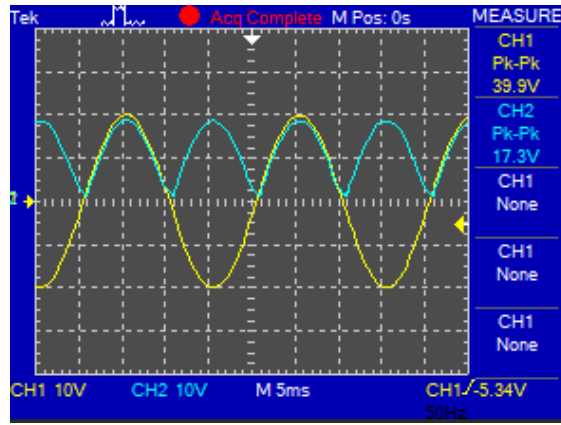
$R = 10\Omega; C = 4.55mF$



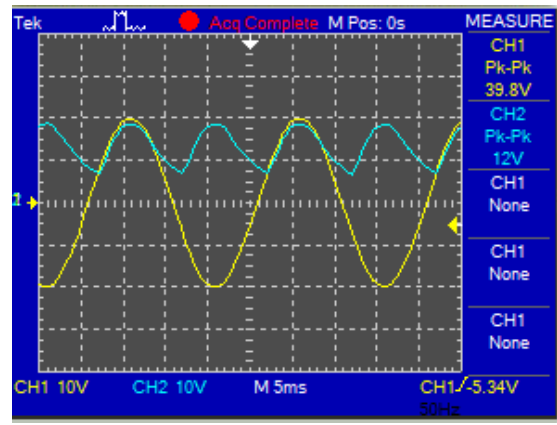
$R = 10\Omega; C = 5mF$



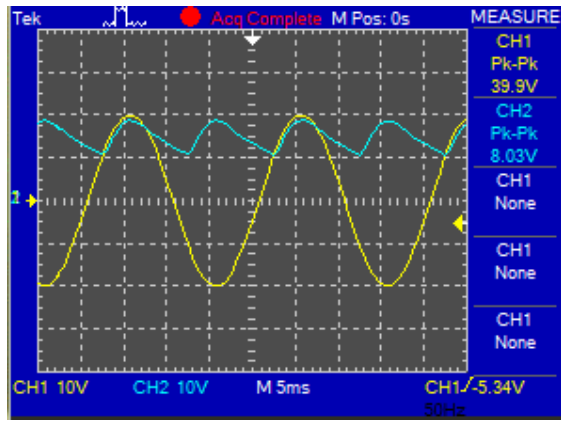
$R = 20\Omega; C = 50\mu F$



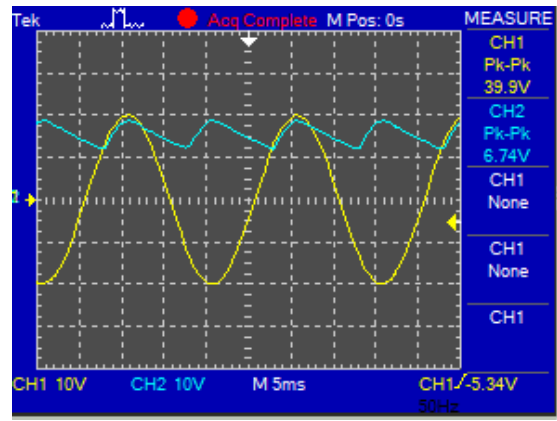
$R = 20\Omega; C = 0,25mF$



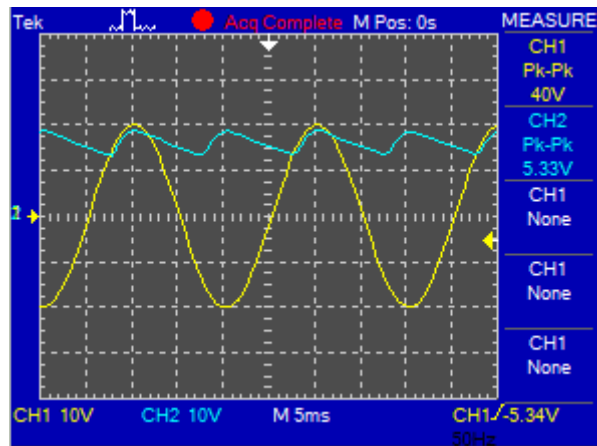
$R = 20\Omega; C = 0,55mF$



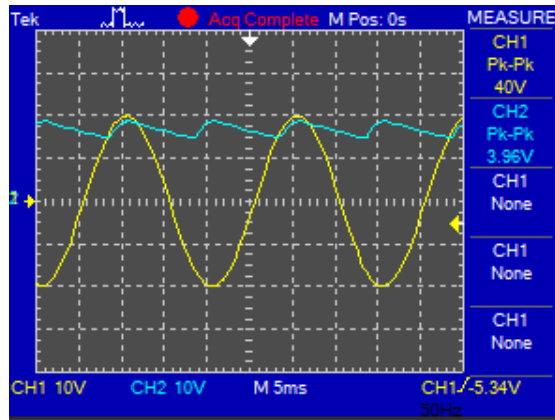
$R = 20\Omega; C = 0.75mF$



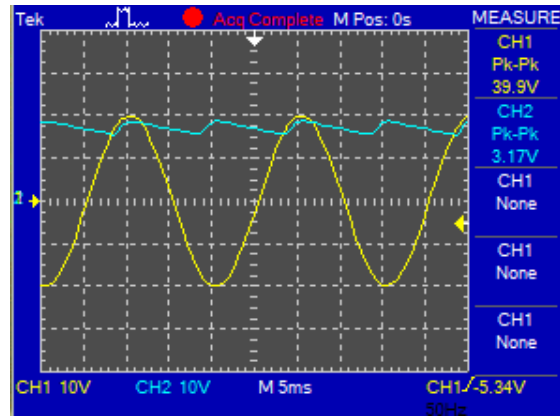
$R = 20\Omega; C = 1.05mF$



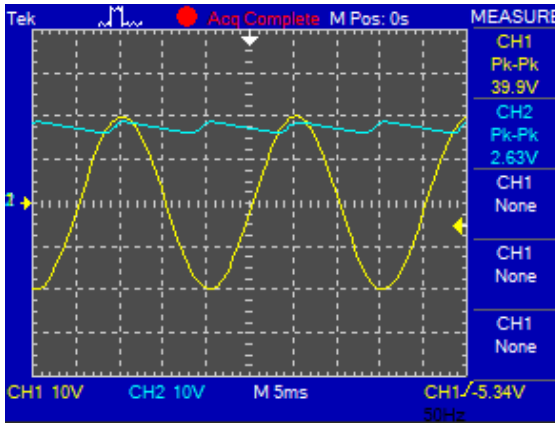
$R = 20\Omega; C = 1.55mF$



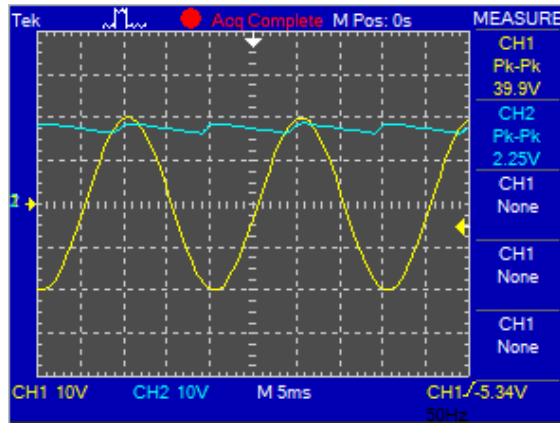
$R = 20\Omega; C = 2.05mF$



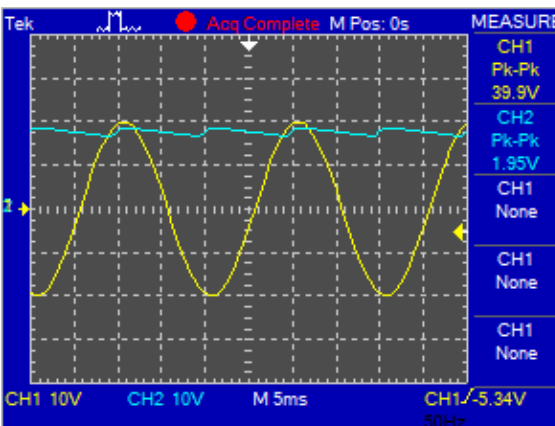
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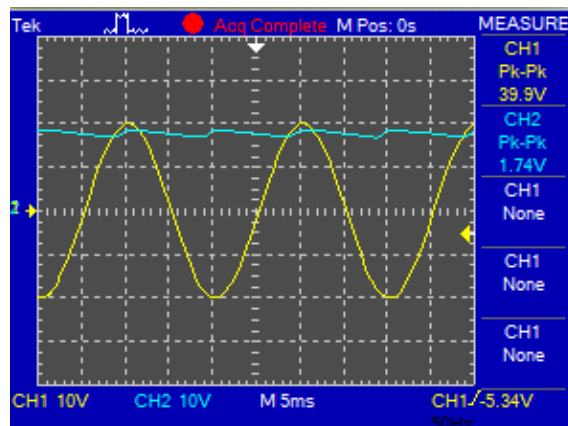
$R = 20\Omega; C = 3.05mF$



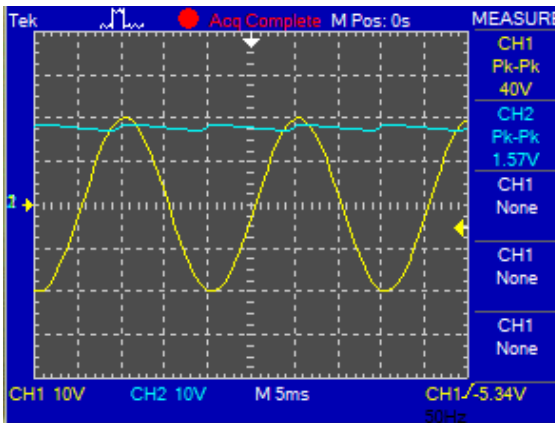
$R = 20\Omega; C = 3.55mF$



$R = 20\Omega; C = 4.05mF$



$R = 20\Omega; C = 4.55mF$



$R = 20\Omega; C = 5mF$

