جامعة الفرات الاوسط التقنية
المعهد التقني سماوة
قسم التقنيات الكهربائية

المحاضرة الثالثة عشر

POWER ELECTRONICS

المرحلة الثانية

2023 – 2022

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الاختبار القبلي

Q1-Enumerate the trigger methods for the thyristor .

Q2- Draw the pulls trigger methods by using UJT .

Gate Trigger methods
طرق قدح البوابة

➢ **The Thyristor trigger methods or(firing methods)**

1. D.C trigger methods :

1) By Using Variable Resistance:

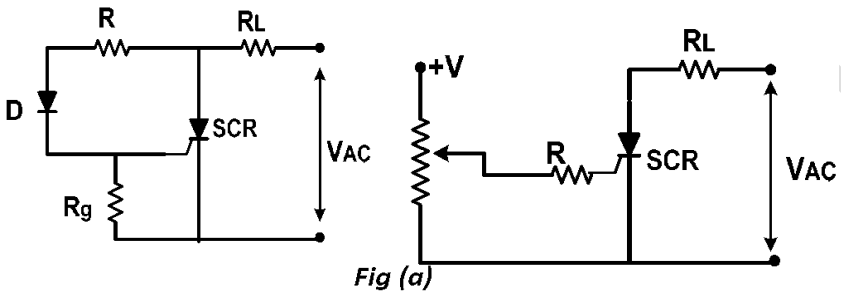
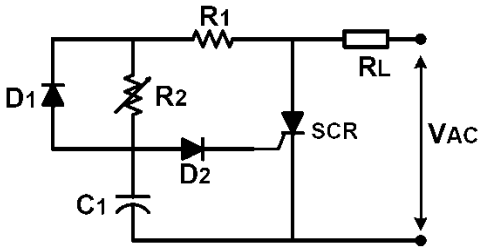


Fig (a)

2) By Using Resistor And Capacitor :

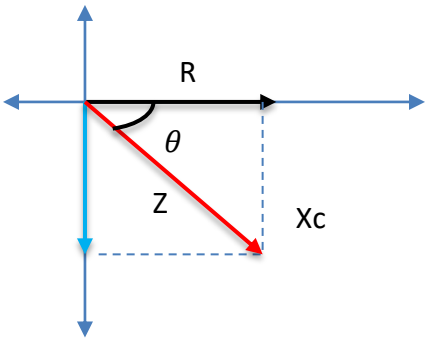


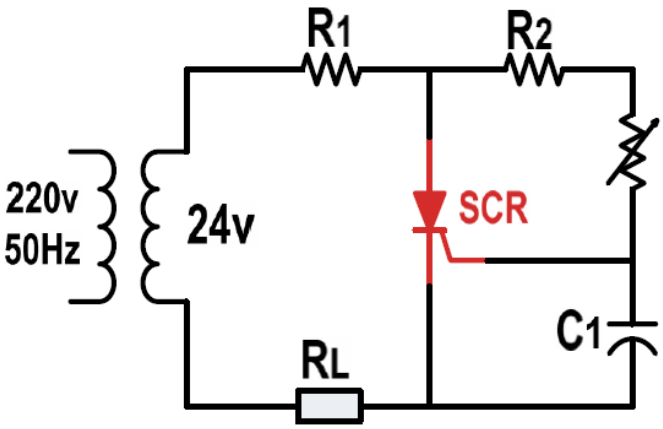
(Fig b)

2. A.C trigger methods:

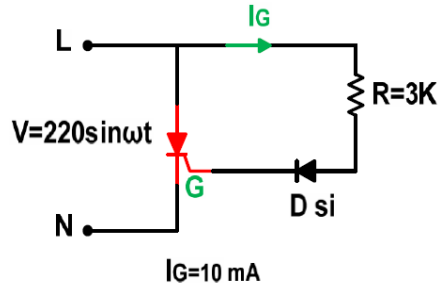
$$\tan\theta = \frac{Xc}{R}$$

$$\theta = \tan^{-1}\frac{Xc}{R}$$





EX: ***for the circuit shown below Determine the value of α if you know that V_D=0.7V , V_G=1 v***



Sol: $$VAc = I * R + V_D + V_{GT}$$

$$220\sin\theta = I * R + V_D + V_{GT}$$

$$220\sin\alpha = 10 * 10^{-3} * 3 * 10^{3} + 0.7 + 1$$

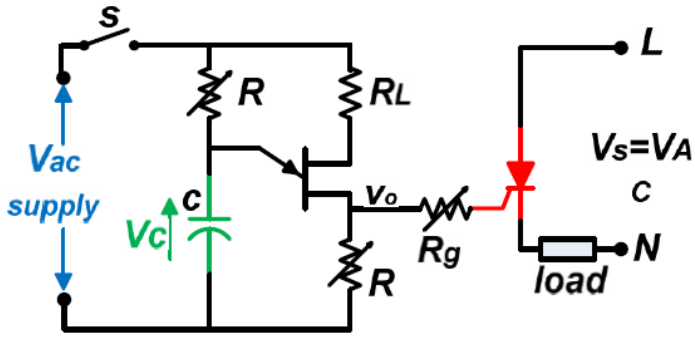
$$220\sin\alpha = 31.7$$

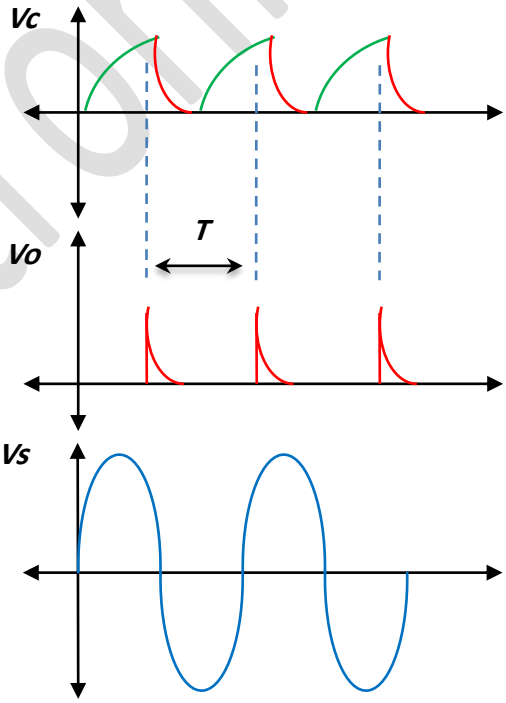
$$\alpha = \sin^{-1}\frac{31.7}{220} = 10.5°$$

3. pulse trigger methods:

We can firing Thyristor gate by using pulse current, there are many different circuits prepare to this purposes such as:

1) Relaxation oscillator by using UJT .





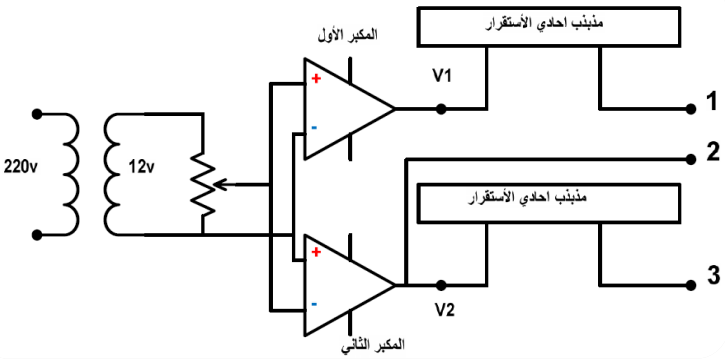
$$T = R * C * \ln\frac{1}{1-\eta}$$

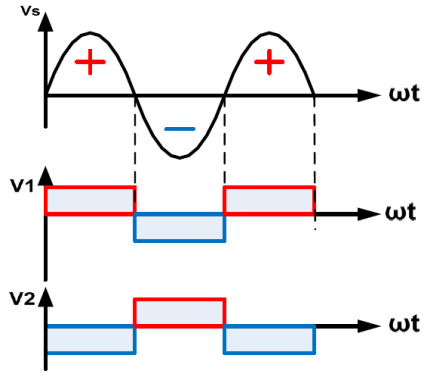
$$Vc \geq \eta V_{BB} + V_D$$

2) Relaxation oscillator by using Operational Amplifier :

a) Zero-Crossing Detector :

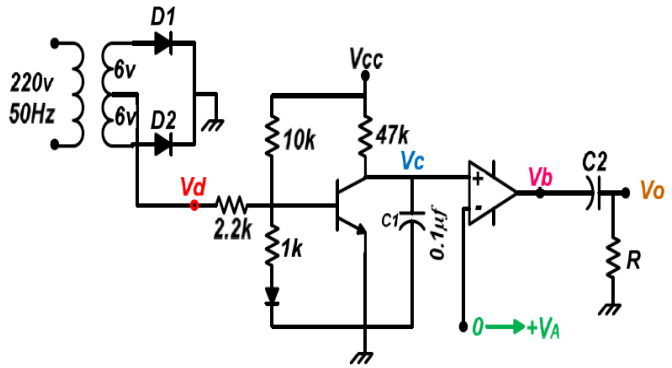
تحتوي هذه الدائرة على مكبرين الاول يعمل كمكبر غير قالب ويعمل الثاني كمكبر قالب ولهما نفس المرجع وبالتالي سوف تتحول الموجة الجيبيه الى موجتان مربعتان بينهما زاوية فرق بالطور مقدارها وبهذه الطريقة يمكن لنا قدح اكثر من ثايرستور

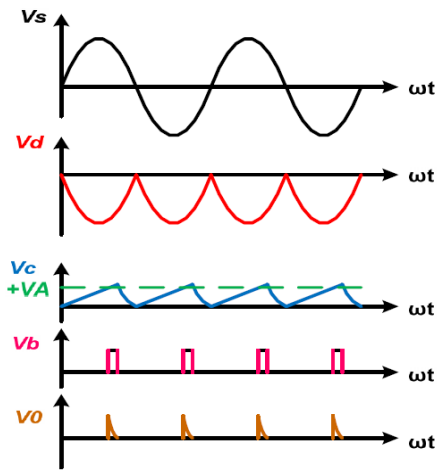




Power Electronics

b) comparator :



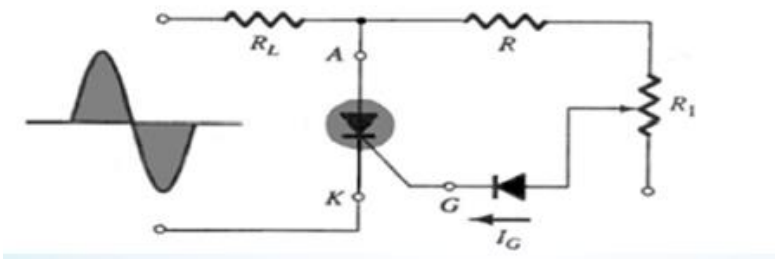
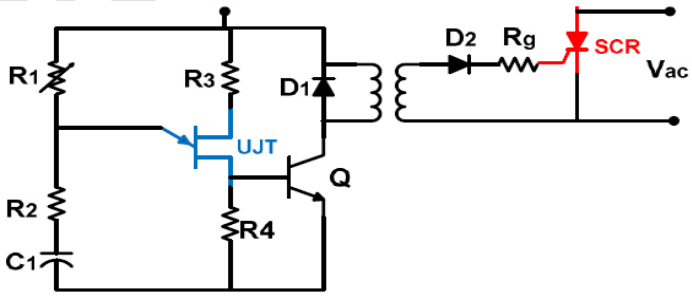


$V_A=0$ $\alpha = 0$

$V_A= Vc$ $\alpha = 180°$

الاختبار البعدي

1. *Draw the waveform of the output voltage across R_L as shown in the Fig. at firing angle of 90°*



2. *what kind of the circuit that shown below*