Benha University
Faculty of Engineering at Shoubra
Electrical Engineering Department
Second Year (Communication)

Final Term Exam
Date: Monday 26/12/2015
Subject: Electrical and Electronics Measurement
Duration: 3 hours

- **Answer all the following questions**
- **Illustrate your answers with sketches when necessary**
- **No. of questions in Part (3) : 1**

Part (3) solution

Question (6) (18 Marks)

[a] State if the following sentences are true or false and correct the false: (10 degrees)

a. Adjusting the direction of sensors only is enough for solving interference in applications with multiple sensors while the sensors spacing is not important.
False, we need to adjust the orientation too

b. Photo-transistor has more current capabilities than photo-diodes.
True

c. Optical proximity sensors can't be sued with glass objects.
True

d. A one-shot oscillator requires an external input signal or trigger to produce an output waveform.
True

e. The Closed-loop gain of an oscillator must be equal to or greater than one.
True

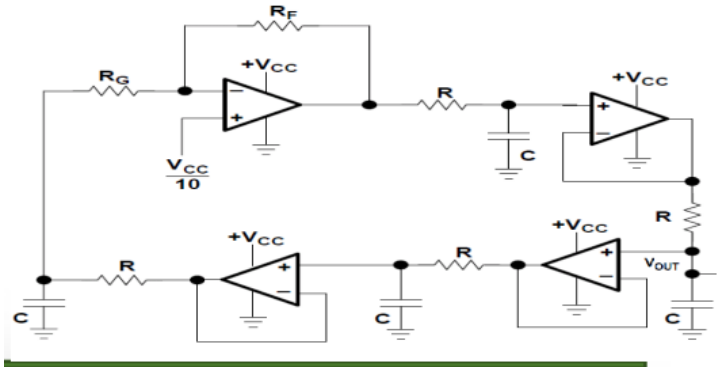
[b] Draw the Bubba oscillator? What type is it? What are the advantages of bubba oscillator design? What is the oscillation frequency? **(4 degrees)**

Answer

- **Bubba oscillator is a phase-shift type oscillator**
- **The advantage is the usage of buffer amplifier between each stage and the next one to prevent loading effect and attenuation**
- **Frequency:**

$$f_r = \frac{1}{2\pi R C \sqrt{2N}}$$

$N = 4$ stages for bubb oscillator

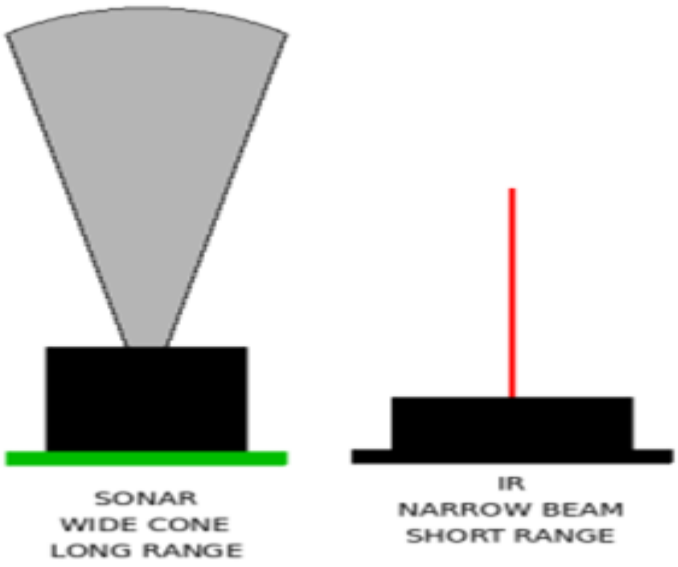


[c]Compare between ultrasonic and infra-red proximity sensors (2 degrees)

Answer

- *The primary difference is that* ultrasonic (sonar) *has a wide detection cone and longer range*

- *Unlike IR sensors, sonars are slightly harder to deal with when it comes to multiple sensors.*
- *Because of the wide cone, and how sound can reflect, they can interfere with each other quite easily.*



With My Best Wishes

Dr. Eng. Basem ElHalawany