



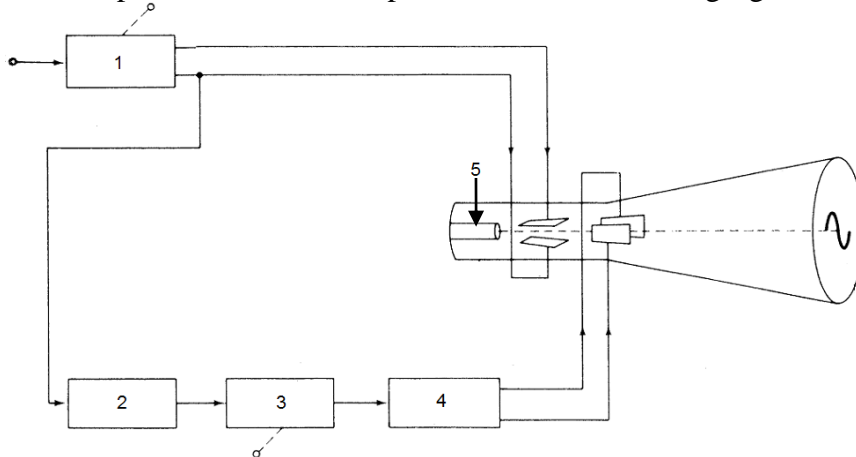
Dept. of Electrical Engineering
Second Exam, Summer Semester: 2014/2015

Course Title: Instrumentation and Measurement	Date: 20/8/2015
Course No: (610332)	Time Allowed: 50 Minutes
Lecturer: Dr. Mohammad Abu-Naser	No. of Pages: 1

Question 1: (10Mark)

Objectives: This question is related to oscilloscope

1) Name all components of oscilloscope shown in the following figure



- 2) An oscilloscope is used to display the output from frequency generator whose frequency dial is set at 1 kHz producing 7.07 Vrms. If the volt/div knob is 5 volt/div and the time/div knob is 200 μ sec/div.
- Determine the number of vertical divisions occupied by the signal peak-to-peak.
 - Determine the number of horizontal divisions per one full cycle.
 - Sketch the output display for the signal.
- 3) Choose the correct answer
- The property of phosphorus to emit light in the visual spectrum after absorbing the kinetic energy of electrons is called:
 - Fluorescence
 - Phosphorescence
 - Luminance
 - none of the above.
 - Relatively _____ are required by cathode ray tube for acceleration of electron beam.
 - few thousand volts
 - few hundred volts
 - very few volts
 - none of the above
 - Best phosphor type to be used in CRT of oscilloscopes is:
 - P7
 - P11
 - P31
 - P33

Question 2: (10Mark)

Objectives: This question is related to bridge measurements

A 50 Hz bridge has the following constants: Arm1: $R_1 = 1000 \Omega$. Arm2: $R_2 = 50 \Omega$ in parallel with $L_2 = 0.1 \text{ H}$. Arm4: $R_4 = 100 \Omega$. Find the constants of Arm3.

- Express the result as a pure resistance in series with a pure inductance or capacitance.
- Express the result as a pure resistance in parallel with a pure inductance or capacitance.

Instrumentation and Measurement

Second Exam

Summer Semester 2014/2015

Q1

- 1) 1. Vertical amplifier
2. Trigger circuit
3. Time base generator
4. Horizontal amplifier
5. Electron gun

2) a. $V_{rms} = 7.07 \text{ V}$

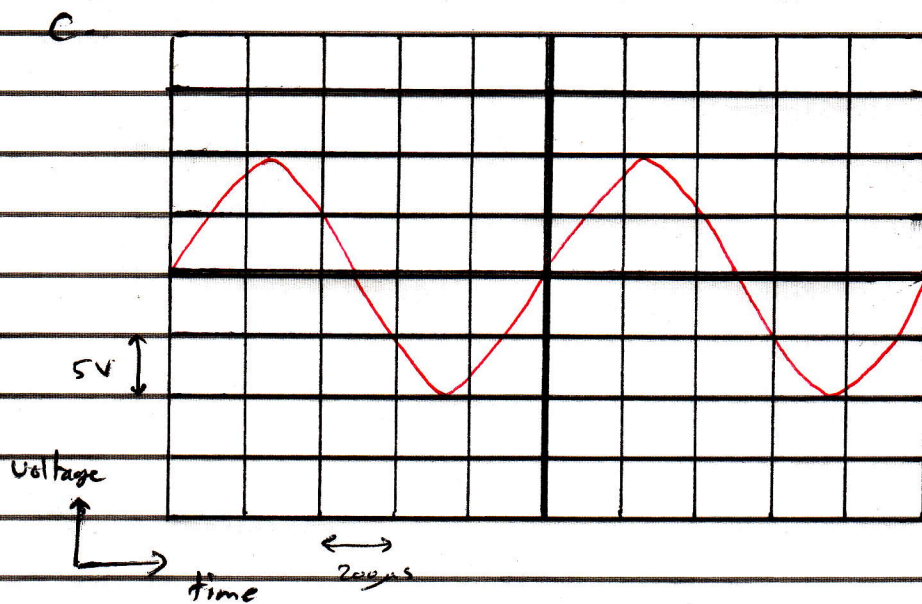
$$V_m = \sqrt{2} \times 7.07 = 10 \text{ V}$$

$$V_{pp} = 20 \text{ V}$$

$$\text{number of vertical divisions} = \frac{V_{pp}}{\text{volts/division}} = \frac{20 \text{ V}}{5 \text{ V}} = 4 \text{ divisions}$$

b. $f = 1000 \text{ Hz}$, $T = \frac{1}{f} = 1 \text{ ms}$

$$\text{number of horizontal divisions} = \frac{T}{\text{time/div}} = \frac{1 \text{ ms}}{200 \mu\text{s}} = 5 \text{ divisions}$$



- 3) A. Fluorescence
- B. few thousand volts
- C. P31

Q2

$$Z_1 = 1000 \Omega$$

$$Z_2 = 50 \parallel j100\pi \times 0.1 = 50 \parallel j10\pi = 14.15 + j22.5 \Omega$$

$$Z_4 = 100 \Omega$$

$$Z_1 Z_4 = Z_2 Z_3 \Rightarrow Z_3 = \frac{Z_1 Z_4}{Z_2} = 2000 - j3183 \Omega$$

$$a) R_{3s} = 2000 \Omega$$

$$3183 = \frac{1}{100\pi \times C_{3s}} \Rightarrow C_{3s} = \frac{1}{100\pi \times 3183} = 1 \mu\text{F}$$

$$b) Y_3 = \frac{1}{Z_3} = 1.4 \times 10^{-4} + j2.25 \times 10^{-4}$$

$$\Rightarrow R_{3p} = \frac{1}{1.4 \times 10^{-4}} = 7066 \Omega$$

$$2.25 \times 10^{-4} = 100\pi C_{3p} \Rightarrow C_{3p} = 0.717 \mu\text{F}$$