

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 3075

Roll No.

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B. Tech.

(SEM. III) ODD SEMESTER THEORY EXAMINATION

2010-11

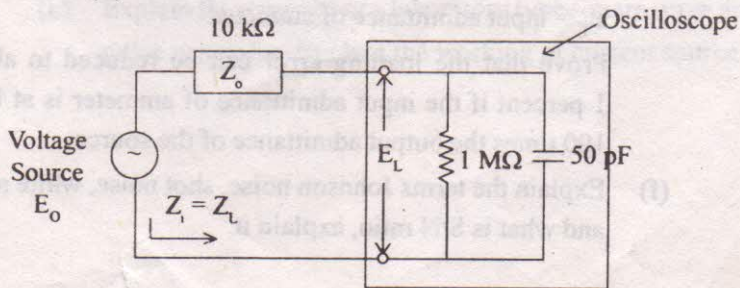
**ELECTRONIC MEASUREMENTS &
INSTRUMENTATION**

Time : 3 Hours

Total Marks : 100

Note : Attempt all questions.

1. Attempt any **four** questions : (5×4=20)
- (a) Define the term “true value”. Explain why it is not practically possible to know the true value of quantity.
- (b) An oscilloscope having an input resistance of $1\text{ M}\Omega$ shunted by 50 pF capacitance is connected across a circuit having an effective output resistance of $10\text{ k}\Omega$ shown in Fig. 1. If the open circuit voltage has 1.0 V peak for a 100 kHz sine wave, what will be the voltage indicated on the oscilloscope when the frequency is (i) 100 kHz and (ii) 1 MHz ?

**Fig. 1**

(c) A multimeter having a sensitivity of $20 \text{ k}\Omega/\text{V}$ is used for the measurement of voltage across a circuit having an output resistance of $10 \text{ k}\Omega$. The open circuit voltage of the circuit is 6 V . Find the reading of multimeter when it is set to its 10 V scale. Find the percentage error.

(d) What is the true value of voltage across the $500 \text{ k}\Omega$ resistance connected between terminals A and B as shown in Fig. 2. What would a voltmeter with a sensitivity of $20 \text{ k}\Omega/\text{V}$ read on the following ranges : $50, 15, 5 \text{ V}$ when connected across terminals C and D ?

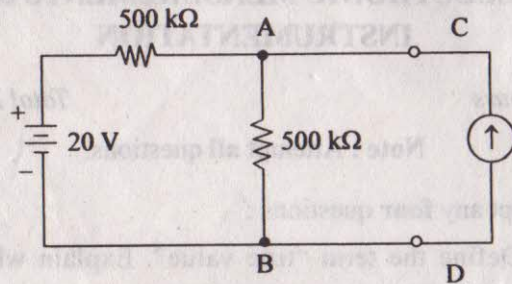


Fig. 2

(e) Prove that when an ammeter is introduced into a circuit for measurement of current the measured value of current is given by $I_L = \frac{I_o}{1 + Y_o/Y_L}$ where

I_o = actual value of current

Y_o = output admittance of ckt

Y_L = input admittance of ammeter.

Prove that the loading error can be reduced to about 1 percent if the input admittance of ammeter is at least 100 times the output admittance of the source.

(f) Explain the terms Johnson noise, shot noise, white noise and what is S/N ratio, explain it.

(c) Describe with the help of suitable diagram, how the following types of measurements are carried out using a digital frequency meter :

- Single and multiple period measurements
- Time interval measurements.

5. Attempt any two parts : (2×10=20)

(a) Determine the frequency of oscillations and the minimum value of R_f to sustain oscillations in Hartley oscillator in Fig. 4.

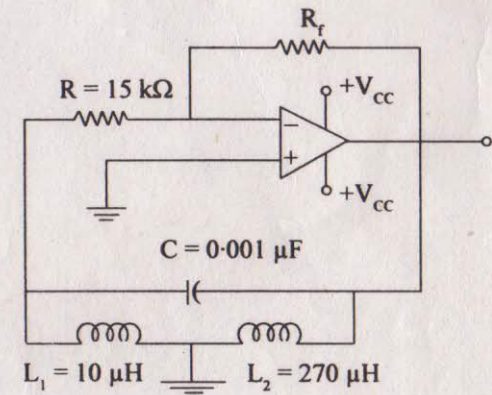


Fig. 4

- Describe the working of a sweep frequency generator. What are the sweeper errors ?
- Explain the working of a laboratory type square wave and pulse generator. Explain the working of current source.