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Paper Code: IC-703

B.TECH
(SEM VII) ODD SEMESTER EXAMINATION 2016-17
DIGITAL MEASUREMENT TECHNIQUE

[Time: 3 hrs.]   **[Max. Marks: 100]**

Note- Attempt All Questions. All questions carry equal marks.

1. Attempt any **FOUR** parts of the following:-   **(5 X 4 = 20)**

   (a) What is the need of digital measurements? Explain the generalized schematic for measuring any physical quantity.
   (b) If the main and Vernier oscillator have time periods of 10.06 and 10.001 µs, respectively, and the time interval to be measured is 1410.05 µs, what would be the main and the Vernier counter reading? Find the total measurement time.
   (c) Describe the Vernier technique for small time interval measurement with the help of Block diagram and waveforms.
   (d) Explain the working principle of a circuit with drawing waveform for measurement of time interval without any priority.
   (e) How the circuit shown in Fig.1, works as a periodic time measuring circuit? Explain with proper waveforms of C, G, V_O and Q.
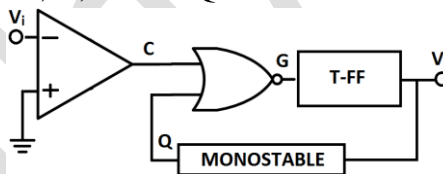

   Fig.1
   (f) Describe the capacitance measurement technique using a Schmitt trigger.

2. Attempt any **TWO** parts of the following:-   **(10 X 2 = 20)**

   (a) Derive the counter reading for power system frequency deviation technique and discuss the problem which may occur in this technique. Explain with the help of circuit diagram and waveforms.
   (b) What is the need of peak frequency measurement? Explain peak frequency measurement technique with proper diagram.
   (c) How the circuit shown in Fig.2 is utilized in average frequency deviation measurement? Explain with proper steps. Also suggest a circuit to detect the higher and lower frequency among f_1 and f_2.
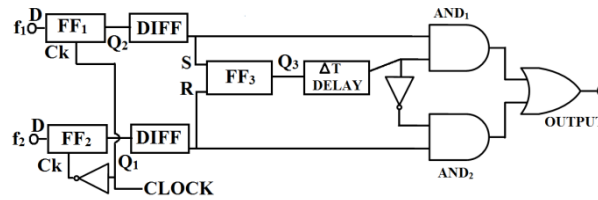
Fig.2

3. Attempt any **TWO** parts of the following:- **(10 X 2 = 20)**

    (a) Multiple gains amplifier can be designed through MUX and IC-741 for digitally programmed input, than what is the basic need of Programmable gain Amplifiers? Explain with example. Design a PGA for gains 1, 2/3, 1/3, 2/3.
    (b) Explain basic principal of programmable Biquad. How the stray capacitance can be eliminated by this scheme?
    (c) What do you understand by single mode and multimode switching in digitally programmable consistor designing? Prove that for single mode switched S-ladder network the value of R_k is given by:

$$R_k = \begin{cases} \dfrac{|A_k| - |A_{k-1}|}{g}, & 2 \le k \le N \\ \dfrac{|A_1|}{g}, & k = 1 \end{cases}$$

4. Attempt any **TWO** parts of the following:- **(10 X 2 = 20)**

    (a) What are the advantages of DACs designed from PGA realizations? Realize 2-Bit inverting and non-inverting DACs with minimum number of components making use of PGAs.
    (b) What type of switches can be utilized in designing DACs? Explain Bipolar transistor used in inverse mode as a switch.
    (c) Realize a 7-bit two stage DAC with a minimum spread in R-values. Compare the spread and total resistance with those of single stage DACs.

5. Write Short notes on any **Two** of the following parts:- **(10 X 2 = 20)**

    (a) VTC (Voltage to Time Converter)
    (b) VFC (Voltage to Frequency Converter)
    (c) Sampling, Time Division Multiplexing, and Quantization.