1(a) waveform graph ⇒ data is equally spaced along the X-axis.
X-Y graph ⇒ X-intervals are not equal.

(b) Text files tends to be larger than the other formats, so more storage space required.
⇒ low speed.

Even - 2016 M.TECH-EE (I&C)-2

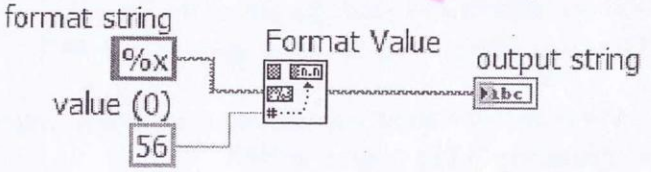
CAD OF INSTRUMENTATION SYSTEM

Time: 3 Hrs. **Full Marks: 70**

Answer SIX questions including Q.No.1 which is compulsory

The figures in the right hand margin indicates marks.

1. Answer the following questions: **[2x10]**
   a. What is the difference between X-Y graph & waveform graph?
   b. Write down two disadvantages of ASCII text format files.
   c. What is the output at "output string" terminal of "Format Value" function as shown below? Hexadecimal value of 56 i.e 32



   d. Find the full scale output of a 8bit digital to analog converter operating with 10V internal reference.
   V_{FS} = Resolution × D_{FS} = $\left[\left(\frac{1}{2^8}\right)\times 10\right] \times \left[2^8 - 1\right] \approx 39.06 \times 10^{-3}$ X255 = 9.960 V.
   e. A 12-bit successive approximation ADC outputs binary code 1111 1111 1111 for an analog input of 10.0 V. Find its resolution.

D_{FS} ⇒ decimal value of full scale n-bit digital o/p word is $(2^n - 1)$

Resolution represents the o/p for 1 LSB.

(e) The o/p binary code 1111 1111 1111 is the full scale o/p of 12-bit ADC, $(2^n - 1)$, i.e 4095. The corresponding analog o/p is 10.0 V.

Resolution = Full scale analog o/p / Full scale digital o/p
= $\frac{10}{4095}$ = 2.442 mV.

For 12-bit ADC, with 10V, 1 LSB = Resolution = 2.442 mV.
Quantization error = $\pm \frac{1}{2}$ LSB = ± 1.221 mV.

f. Find quantization error for a 12-bit ADC operating with 10V full-scale.

08H, 09H g. What are the interrupt type code & function of interrupt request lines IRQ0, IRQ1 of 8259A in the PC/PC-XT systems? P-225.
Timer, keyboard

h. Write down about Framing error & overrun error in the serial communication. P-437

i. Draw the structure of HART telegram. P-359

j. Define mathematically power spectral density(PSD) & what is the characteristics of PSD for white noise ?

2 (a) Draw & explain the basic difference between the traditional instruments & Software based virtual instruments. [5]

(b) With suitable figures, describe about two types of sample timing techniques used in DAQ systems for analog to digital conversion. P-185

2 + 2

[5]

3 (a) With suitable figures, describe about the interrupts in the PC & PC-XT system with priority interrupt controller. P-224 [5]

M → 1001101
E → 1000101

(b) Draw & describe about asynchronous serial transmission of "M" & "E" characters in 7E1 format. P-429 [5]

4. (a) Draw & explain block diagram representation of the code whose front panel is shown in Figure 1."Numeric 1" & "Numeric 2" in front panel are numeric control & "Result" is numeric indicator which displays the result of the mathematical operation performed on two numeric inputs. "Menu" is a pop-up menu in which ,the following options are available to select the mathematical operation you want to perform. [5]

MUL-----for multiplication
ADD-----for addition
SUB------for subtraction
DIV-------for Division

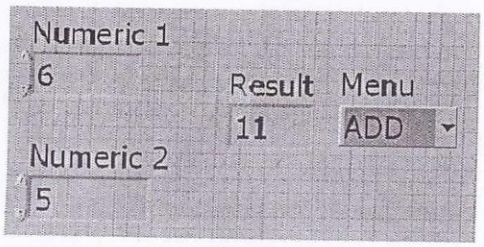


Figure 1

(b)With suitable diagram, describe basic DMA operation with DMA controller. [5]

5 (a) Write down about CheckSum method, Cyclic redundancy check method & error flags for error checking. [5]

(b) Write short notes on RS-485. [5]

6. (a) Name & explain the functions of 24 lines in GPIB. [5]

(b) Describe about different types of packets in USB. [5]

7 (a) Write down about HART data link layer. Compute time required to transmit a HART short frame telegram that contains a message of 25 characters. [5]

(b) Explain in detail about LabVIEW string format. [5]

8. (a)Describe about HART physical layer & HART network connection.

[5]

(b) If a continuous function y(t) in the interval 0 to T_0 is given as:

$$y(t) = b\ \sin(w_1 t + \emptyset)$$

Find the autocorrelation coefficient $R_{yy}(\beta)$ of y(t) & draw the block diagram of autocorrelator.

[5]