53 (IE 810) VRIN

2019

VIRTUAL INSTRUMENTATION

Paper : IE 810

Full Marks : 100

Time : Three hours

The figures in the margin indicate full marks for the questions.

Answer ***any five*** *questions.*

1. *(a)* What is Virtual Instrumentation? Mention the advantages of virtual instrumentation. 5

   (b) Explain the sampling theorem and aliasing effect. 5

   (c) Draw and explain the virtual instrumentation model and architecture. 10

Contd.

2. *(a)* Write a VI Program to convert radians to degrees and degrees to radians. 10

(b) What is Sub VI? Explain how the Sub VI can be reused to solve the quadratic equations. 10

3. Draw and explain the operation of the following converters : 20

(i) Dual slope type ADC

(ii) R-2R ladder type DAC.

4. *(a)* Explain, with a suitable example, the operation of FOR loop and WHILE loop. 10

(b) Write the VI programs to perform the determinant and transpose of a given matrix. 10

5. *(a)* What is Data Acquisition System (DAS) ? Explain, with a block diagram, the computer based DAS. 10

(b) Explain how DAS can be designed and developed using LabView. Mention the important parameters that to be set during VI Program. 10

6. A first order response is described by the equation $y(t) = (y_{ult} - y_{orig})\left[1 - e^{-t/\tau}\right]$ where y_{orig} is the initial (original) value of $y(t)$ at $t = 0$, y_{ult} is the ultimate value of $y(t)$ at $t = \infty$ and τ is the time constant. Create a VI program that will solve for the value of $y(t)$ for a specified time, given $y_{orig} = 0$, $y_{ult} = 100$ and $\tau = 10$ minutes. Also show the value of $y(t)$ for $t = 2$ minutes and $t = 5$ minutes. 20

7. *(a)* Why are shift registers and feedback nodes used in loops ? Describe the need for initializing shift registers and feedback nodes. 10

(b) Write a VI Program to simulate a PI controller. 10

8. Write a short notes on ***any four*** of the following : 4×5=20

(a) Local and global variables

(b) Successive approximation register type ADC

(c) CRIO and MYRIO devices

(d) Role of range and resolution in DAS

(e) RS 232 and RS 422

(f) Array and Clusters.