53 (IE 810) VINS

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 ? What are the advantages of VI ? 6

   (b) State and explain the Sampling theorem. 6

   (c) Draw and explain the Virtual Instrumentation Model and Virtual Instrumentation Architecture. 8

2. *(a)* Write a VI program to convert °*F* to °*C* and °*C* to °*F*. 10

Contd.

(b) What is Sub-VI ? Give *one* suitable example where you can reuse Sub-VI. 10

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

(i) SAR type ADC and

(ii) Weighted resistors type 4-bit DAC.

4. (a) Explain, with an appropriate example, the operations of FOR loop and WHILE loop. 10

(b) Write the VI program to perform the adjoint of a 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 are to be set during VI program. 10

6. (a) Write a VI program for Basic Metabolic Index (BMI) representation along with both digital and analog (by slide pointer) indication. Indicate the results in front panel for Mr. X having weight $(w) = 180lb$ and height $(h) = 5ft\ 3inch$ and also check whether Mr. X remains in NORMAL BMI range or NOT. If he is not in normal BMI range then what amount of weight is to be reduced/ gained for normal BMI. 13

(b) A first order response of a system is described by the equation $y(t) = 2{\cdot}65\ \left(1 - e^{-0{\cdot}65t}\right)$. Create a VI program that will solve for the value of $y(t)$ for a specified time. Show the value of $y(t)$ for $t = 5{\cdot}2$ minutes and $t = 12{\cdot}8$ minutes. 7

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

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

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

(a) Local and global variables

(b) R-2R type DAC

(c) CRIO and MyRIO devices

(d) RS 232 and RS 422

(e) Array and Clusters.