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Total number of printed pages–4

53 (IE 810) VRIN

2021

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 Virtual Instrumentation? 6

   (b) State and explain the Sampling theorem. 4

   (c) Draw and explain the Virtual Instrumentation model and Virtual Instrumentation architecture. 10

2. *(a)* Write a VI-program to convert degree to radian and radian to degree. 10

Contd.

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

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

(i) SAR type ADC

(ii) R-2R type DAC.

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

(b) Write the VI-program to perform the transpose 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 to be set during VI-program. 10

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6. *(a)* Write a VI-program for BMI (Basic Metabolic Index) representation along with both digital and analog (by slide pointer) indicator. Indicate the result in front-panel for Mr. X having weight $(W) = 180lb$ and height $(h) = 5ft\ 3in$, 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 ? 12

(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 that will solve for the value of $y(t)$ for a specific time. Show the value of $y(t)$ for $t = 2 \cdot 5$ minutes and $t = 25 \cdot 5$ minutes. 8

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 PID controller. 10

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8. Write short notes on : 5×4=20

(i) Local and global variables

(ii) Weighted resistor type 4-bit DAC

(iii) cRIO and MyRIO devices

(iv) RS232 and RS422.

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