

Total number of printed pages-4

53 (IE 810) VRIN

2021

VIRTUAL INSTRUMENTATION

Paper : IE 810

Full Marks : 100

Time : Three hours

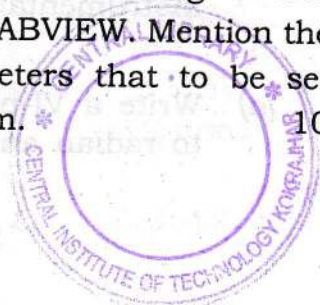
The figures in the margin indicate full marks for the questions.

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



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?

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- (b) A first order response of a system is described by the equation :

$$y(t) = 2.65(1 - e^{-0.65t}).$$

Create a VI that will solve for the value of $y(t)$ for a specific time. Show the value of $y(t)$ for $t = 2.5$ minutes and $t = 25.5$ minutes.

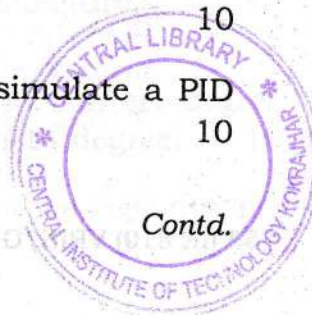
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7. (a) Why are shift registers and feedback nodes used in loops? Describe the need for initializing shift registers and feedback nodes.

10

- (b) Write a VI-program to simulate a PID controller.

10



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.

