Question Paper Code:U5B03

B.E./B.Tech. DEGREE EXAMINATION, NOV 2024

Fifth Semester

Biomedical Engineering

21UBM503 – VIRTUAL BIO INSTRUMENTATION

(Regulations 2021)

Duration: Three hours   Maximum: 100 Marks

Answer All Questions

PART A - (10 x 2 = 20 Marks)

1.	Sketch the LabVIEW program for addition of two numbers.	CO3-Ana
2.	List three key advantages of using Virtual Instruments over traditional hardware-based instruments.	CO1-U
3.	Write the components in control palette in LabVIEW.	CO1-U
4.	Design a simple block diagram for a Virtual Instrument to perform temperature monitoring.	CO2-Ana
5.	Demonstrate how a Shift Register is initialized in LabVIEW.	CO3-Ana
6.	State the primary purpose of a waveform chart in LabVIEW.	CO2-App
7.	Define the term "Data Acquisition" and write its significance in the field of measurement and control.	CO1-U
8.	Differentiate analog and digital input/output (I/O) channels in the context of data acquisition.	CO2-App
9.	Give the role of Bio Bench in a virtual instrument application for data acquisition and analysis of physiological analysis.	CO2-App
10.	Explain how LabVIEW can be used to control assistive devices for individuals with disabilities and improve their quality of life.	CO2-App

PART – B (5 x 16= 80 Marks)

11. (a) Define graphical system design. With a neat block diagram explain its functionalities.   CO1- U   (16)

Or

(b) Explain the general basic components of high level instruments with a neat block diagram.   CO1- U   (16)

12. (a) Design a LabVIEW VI that   CO3 – Ana (16)
        i. Add, multiply, subtract and divide two numeric inputs.
        ii.Compute the expressions $Y=(A*B*C) +(D*E)$ and $Y = mx + c$

                               Or

(b) The length and breadth of a rectangle and the radius of a circle are   CO3 – Ana (16)
inputs. Build a VI to calculate the area and perimeter of the
rectangle, and the area and circumference of the circle.

13. (a) Compare and contrast the use of loops in LabVIEW with other   CO3 – Ana (16)
programming languages, and evaluate the strengths and
weaknesses of each approach.

                               Or

(b) Analyze the use of a Shift Register in a LabVIEW program.   CO3 – Ana (16)
Describe a real-world scenario where a Shift Register would be
beneficial, and explain how it is created and initialized.

14. (a) Illustrate the process of acquiring analog data from sensors using   CO3 – Ana (16)
LabVIEW and NI-DAQmx. Include details on sensor selection,
signal conditioning, and data acquisition.

                               Or

(b) Critically evaluate the factors that influence the selection of DAQ   CO3 – Ana (16)
measurement hardware for a specific application in LabVIEW.
Sketch the block diagram of DAQ and explain each component in
detail.

15. (a) Discuss the principles of human-machine interaction and user   CO3 – Ana (16)
interface design for assistive device control VIs. Explain how
LabVIEW can be used to create user-friendly interfaces for
individuals with disabilities. Provide an example VI with an
accessible user interface.

                               Or

(b) Develop a LabVIEW-based application that demonstrates the   CO3 – Ana (16)
real-time monitoring and analysis of physiological data, such as
ECG or EEG signals. Discuss how LabVIEW facilitates the
creation of reliable and efficient biomedical applications.