Reg. No. : | | | | | | | | | | | | |

Question Paper Code: U5B03

B.E./B.Tech. DEGREE EXAMINATION, NOV 2023

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.	List three key advantages of using Virtual Instruments over traditional hardware-based instruments.	CO1-U
2.	Sketch the LabVIEW program for addition of two numbers.	CO1-U
3.	Explain the significance of icons and connector panels in LabVIEW virtual instruments.	CO1-U
4.	Define debugging in LabVIEW.	CO1-U
5.	Differentiate flat and stacked Sequence Structures in LabVIEW	CO1-U
6	In LabVIEW, when is the Formula Node typically used, and what does it allow to do?	CO3-Ana
7	Differentiate between analog and digital signals in the context of data acquisition.	CO1-U
8	Explain the primary purpose of a data acquisition system in connecting a computer to the real world.	CO1-U
9	Describe the primary function of LabVIEW in a VI-based cardiac monitor for ECG signal processing and monitoring.	CO1-U
10	Explain how LabVIEW can be used to control assistive devices for individuals with disabilities and improve their quality of life.	CO1-U

PART – B (5 x 16= 80 Marks)

11.	(a)	Provide a detailed block diagram of a typical virtual instrument setup. Explain the functions of each component within the architecture. Discuss the role of software, hardware, and signal processing in VIs.	CO1-U	(16)
		Or		
	(b)	Examine the challenges and limitations of conventional instruments in comparison to virtual instruments. Describe the specific scenarios where VIs are essential and how they address the shortcomings of traditional instruments.	CO1-U	(16)
12.	(a)	Explain the purpose and functionality of the Front Panel and Block Diagram in LabVIEW. Describe its components and palettes used in them. Describe how a VI is generated and RUN in LabVIEW.	CO1-U	(16)
		Or		
	(b)	Discuss the role of the icon and connector panels in LabVIEW programming, and explain how they facilitate data transfer between VIs.Explain the concept of data types in LabVIEW programming, and provide examples of different data types and their uses.	CO1-U	(16)
13.	(a)	Analyze the use of a Shift Register in a LabVIEW program. Describe a real-world scenario where a Shift Register would be beneficial, and explain how it is created and initialized.	CO3-Ana	(16)
		Or		
	(b)	Estimate the impact of loops on the scalability and maintainability of a LabVIEW program, and discuss best practices for loop design and implementation.	CO3-Ana	(16)
14.	(a)	Explain the concept of a Task in NI-DAQmx and its significance in LabVIEW. Discuss the steps involved in creating and configuring a Task in LabVIEW for data acquisition. Provide an example illustrating the use of Task in a LabVIEW program.	CO1-U	(16)
		Or		
	(b)	Describe the concepts involved in DAQ hardware and DAQ software. Describe how they are involved in acquiring real time data from the sensors. Give examples related to Biomedical Engineering.	CO1-U	(16)

15. (a) Develop a LabVIEW-based application that demonstrates the 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. CO3-Ana (16)

Or

(b) Design a LabVIEW-based system for remote patient monitoring, incorporating features for data transmission, security, and real-time visualization of vital signs. Discuss the challenges and considerations in developing secure and reliable telemedicine solutions using LabVIEW. Explain how your system addresses these challenges. CO3-Ana (16)