B.E/B.TECH DEGREE EXAMINATIONS: NOV/DEC 2024

(Regulation 2018)

Seventh Semester

ELECTRONICS AND COMMUNICATION ENGINEERING

U18ECE0053: Virtual Instrumentation

COURSE OUTCOMES

CO1: Construct basic instruments using LABVIEW.

CO2: Select data acquisition cards for analog and digital data.

CO3: Analyze the given images using different image processing tools.

CO4: Build a machine vision system.

CO5: Design real-time control systems using LABVIEW.

CO6: Describe the PC hardware and operating system for virtual instrumentation.

Time: Three Hours   **Maximum Marks: 100**

Answer all the Questions: -

PART A (10 x 2 = 20 Marks)

(Answer not more than 40 words)

1.	What is Virtual Instrumentation, and how does it differ from Traditional Instrumentation?	CO1	[K$_2$]
2.	List two advantages of using LABVIEW for building virtual instruments.	CO1	[K$_2$]
3.	Describe the purpose of A/D and D/A converters in data acquisition.	CO2	[K$_2$]
4.	Explain the role of transducers in a data acquisition system.	CO2	[K$_2$]
5.	What is particle analysis in image processing, and where is it used?	CO3	[K$_2$]
6.	How is machine vision applied in automation? Provide a basic example.	CO3	[K$_2$]
7.	What is the role of SCADA in real-time control?	CO4	[K$_2$]
8.	Identify two features of a Proportional Controller in real-time systems.	CO4	[K$_2$]
9.	What is the function of the NI-ELVIS system in virtual instrumentation?	CO5	[K$_2$]
10.	List the main components of PC architecture relevant to virtual instrumentation.	CO6	[K$_2$]

Answer any FIVE Questions: -

PART B (5 x 16 = 80 Marks)

(Answer not more than 400 words)

11. Discuss the architecture of virtual instrumentation and explain how LABVIEW enables   16   CO1   [K4]
    modular programming with examples of loops, charts, arrays, and clusters.

12. Describe the factors to consider when selecting a data acquisition card. Explain how   16   CO2   [K4]
    data acquisition cards handle multiple analog input and output operations.

13. Explain the process of building a machine vision system using LABVIEW. Include the   16   CO3   [K4]
    steps involved in image acquisition, processing, and analysis with examples.

14. Describe the functioning of ON/OFF and Proportional controllers in LABVIEW.   16   CO4   [K5]
    Discuss how these controllers are used to model and control level and reactor processes
    in a real-time setup. Provide a suitable case study or example of each.

15. Design a basic real-time control system using LABVIEW for monitoring an industrial   16   CO5   [K6]
    process. Outline the steps for integrating SCADA and HMI into this control system,
    highlighting key components and functionalities.

16. Discuss the requirements of PC hardware and operating systems for virtual   16   CO6   [K2]
    instrumentation applications. Describe the role of PXI, SCXI mainframes, and Compact
    RIO modules in enhancing PC-based instrumentation.

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