KAT 340/2 – Analytical Chemistry Practical II

Course Objective : To acquire practical skill in electronic interfacing in relation to analytical instrumentation and data acquisitions and processing.

Topic	Content	Number of laboratory hours	Expected outcome – upon completion of these experiments, the student should be able to:

1. Analog Electronics	• Operation amplifiers in chemical instrumentation
	• Circuits employing operational amplifiers
	  o Voltage follower
	  o Voltage amplification
	• Applications to mathematical operations
	  o Multiplication/division
	  o Addition/subtraction
	  o Integration
	  o Differentiation
		12	• Use a breadboard.
			• Identify electronic components, its symbols and how to use them.
			• Connect batteries and components to a breadboard.
			• use the operational amplifier such as LM 741 and its use in signal amplification.
			• Understand their role in precise measurement of voltage, current and resistance – signals obtained from transducers in chemical measurements.
			• Understand that operational amplifiers are employed to perform mathematical operations such as:
			  o Summing
			  o Multiplying
			  o Differentiating
			  o Integrating
			• Understand that these operations are an important part of modern instrumentation.
			• Construct circuits for voltage divider, voltage follower, signal amplifier, signal adder, signal comparator, signal integrator and signal differentiator.

Topic	Content	Number of laboratory hours	Expected outcome – upon completion of these experiments, the student should be able to:
2. Digital Electronics	• Logic gates NOT, AND, NAND, OR, NOR, EX-OR and EX-NOR	3	• Understand that simple logic functions in electronic circuits may be performed by logic gates. • Understand that logic gates process signals which represent true or false. • Wire up circuits for various logic gates. • Test out truth tables for various logic gates.
3. Problem-Based Learning	• Group projects on data acquisition, electrochemistry, separation techniques and spectroscopy.	21	• Work as part of a team on a group based project (definition of problem, designing and running of experiments to solve the problem, data analysis). • Write a report and present project work in a seminar. • Be more creative and develop critical thinking.