# Sahrdaya College of Engineering & Technology

## Department of Electronics & Communication

### List of Experiments
### ESL 130: ELECTRONICS WORKSHOP

1. Familiarization/Identification of electronic components with specification (Functionality, type, size, colour coding, package, symbol, cost etc. [Active, Passive, Electrical, Electronic, Electro-mechanical, Wires, Cables, Connectors, Fuses, Switches, Relays, Crystals, Displays, Fasteners, Heat sink etc.)

2. Drawing of electronic circuit diagrams using BIS/IEEE symbols and introduction to EDA tools (such as Dia or XCircuit), Interpret data sheets of discrete components and IC's, Estimation and costing.

3. Familiarization/Application of testing instruments and commonly used tools. [Multimeter, Function generator, Power supply, DSO etc.] [Soldering iron, De-soldering pump, Pliers, Cutters, Wire strippers, Screw drivers, Tweezers, Crimping tool, Hot air soldering and de- soldering station etc.]

4. Testing of electronic components [Resistor, Capacitor, Diode, Transistor and JFET using multimeter.]

5. Inter-connection methods and soldering practice. [Bread board, Wrapping, Crimping, Soldering - types - selection of materials and safety precautions, soldering practice in connectors and general purpose PCB, Crimping.]

6. Printed circuit boards (PCB) [Types, Single sided, Double sided, PTH, Processing methods, Design and fabrication of a single sided PCB for a simple circuit with manual etching (Ferric chloride) and drilling.]

7. Assembling of electronic circuit/system on general purpose PCB, test and show the functioning (**Any Two circuits).**

   1. Square wave generation using IC 555 timer in IC base.
   2. RC coupled amplifier with transistor BC107.

## ECL202: Analog Circuits and Simulation Lab
### PART A

1. RC integrating and differentiating circuits (Transient analysis with different inputs and frequency response)
2. Clipping and clamping circuits (Transients and transfer characteristics)
3. RC coupled CE amplifier - frequency response characteristics
4. Cascade amplifier – gain and frequency response
5. Low frequency oscillators –RC phase shift or Wien bridge
6.Voltage regulators

### PART B:

The experiments shall be conducted using open tools such as QUCS, KiCad or variants of spice

1. RC integrating and differentiating circuits (Transient analysis with different inputs and frequency response)
2. Clipping and clamping circuits (Transients and transfer characteristics)
3. RC coupled CE amplifier - frequency response characteristics
4. Cascade amplifier – gain and frequency response
5. Feedback amplifiers (current series, voltage series) - gain and frequency response
6. Low frequency oscillators – RC phase shift or Wien bridge
7. Transistor series voltage regulator (load and line regulation)

# ECL332 COMMUNICATION LAB

## Part A

1. FM generation and demodulation using PLL
2. Generation and Detection of BPSK

## Part B

1. Performance of Waveform Coding Using PCM

   - Generate a sinusoidal waveform with a DC offset so that it takes only positive amplitude value.

   - Sample and quantize the signal using an uniform quantizer with number of representation levels L. Vary L. Represent each value using decimal to binary encoder.

   - Compute the signal-to-noise ratio in dB.

   - Plot the SNR versus number of bits per symbol. Observe that the SNR increases linearly.

2. Pulse Shaping and Matched Filtering

   - Generate a string of message bits.

   - Use root rasied cosine pulse p(t) as the shapig pulse, and generate the corresponding baseband signal with a fixed bit duration Tb. You may use roll-off factor as $\alpha = 0.4$

   - Simulate transmission of baseband signal via an AWGN channel

   - Apply matched filter with frequency response $Pr(f) = P * (f)$ to the received signal.

   - Sample the signal at mTb and compare it against the message sequence.

3. Eye Diagram

   - Generate a string of message bits.

   - Use rasied cosine pulse p(t) as the shapig pulse, and generate the corresponding baseband signal with a fixed bit duration Tb. You may use roll-off factor as $\alpha = 0.4$.

   - Use various roll off factors and plot the eye diagram in each case for the received signal. Make a comparison study among them.

4. Error Performance of BPSK

   - Generate a string of message bits.

   - Encode using BPSK with energy per bit Eb and represent it using points in a signal-space.

   - Simulate transmission of the BPSK modulated signal via an AWGN

     channel with variance N0/2.

   - Detect using an ML decoder and plot the probability of error as a function of SNR per bit Eb/N0.

5. Error Performance of QPSK

- Generate a string of message bits.

- Encode using QPSK with energy per symbol Es and represent it using points in a signal-space.

- Simulate transmission of the QPSK modulated signal via an AWGN channel with variance N0/2 in both I-channel and Q-channel

- Detect using an ML decoder and plot the probability of error as a function of SNR per bit Eb/N0 where Es = 2Eb.

## Part C

1. Familiarization with Software Defined Radio (Hardware and Control Software)

- Familiarize with an SDR hardware for reception and transmission of RF signal.

- Familiarize how it can be interfaced with computer.

- Familiarize with GNU Radio (or similar software's like Simulink/ Lab- View) that can be used to process the signals received through the SDR hardware.

- Familiarize available blocks in GNU Radio. Study how signals can be generated and spectrum (or power spectral density) of signals can be analyzed. Study how filtering can be performed.

2. FM Reception

- Receive digitized FM signal (for the clearest channel in the lab) using the SDR board.

- Set up an LPF and FM receiver using GNU Radio.

-  Use appropriate sink in GNU Radio to display the spectrum of signal.

- Resample the voice to make it suitable for playing on computer speaker.

# ECL 204 MICROCONTROLLER LAB

## PART – A

These experiments shall be performed using 8051 trainer kit. The programs shall be written either in embedded C or in assembly language.

1. Data transfer/exchange between specified memory locations.
2. Largest/smallest from a series.
3. Sorting (Ascending/Descending) of data.
4. Addition / subtraction / multiplication / division of 8/16 bit data.
5. Sum of a series of 8 bit data.
6. Multiplication by shift and add method.
7. Square / cube / square root of 8 bit data.
8. Matrix addition.
9. LCM and HCF of two 8 bit numbers.
10. Code conversion – Hex to Decimal/ASCII to Decimal and vice versa.

## PART – B

Interfacing experiments shall be done using modern microcontrollers such as 8051 or ARM. The interfacing modules may be developed using Embedded C.

1. Time delay generation and relay interface.
2. Display (LED/Seven segments/LCD) and keyboard interface.
3. ADC interface.
4. DAC interface with wave form generation.
5. Stepper motor and DC motor interface.
6. Realization of Boolean expression through port.