

**Department of Electronic and Telecommunication
Engineering
University of Moratuwa**



EN-2160 Electronic Design Realization

Report on Conceptual Design Part

Name
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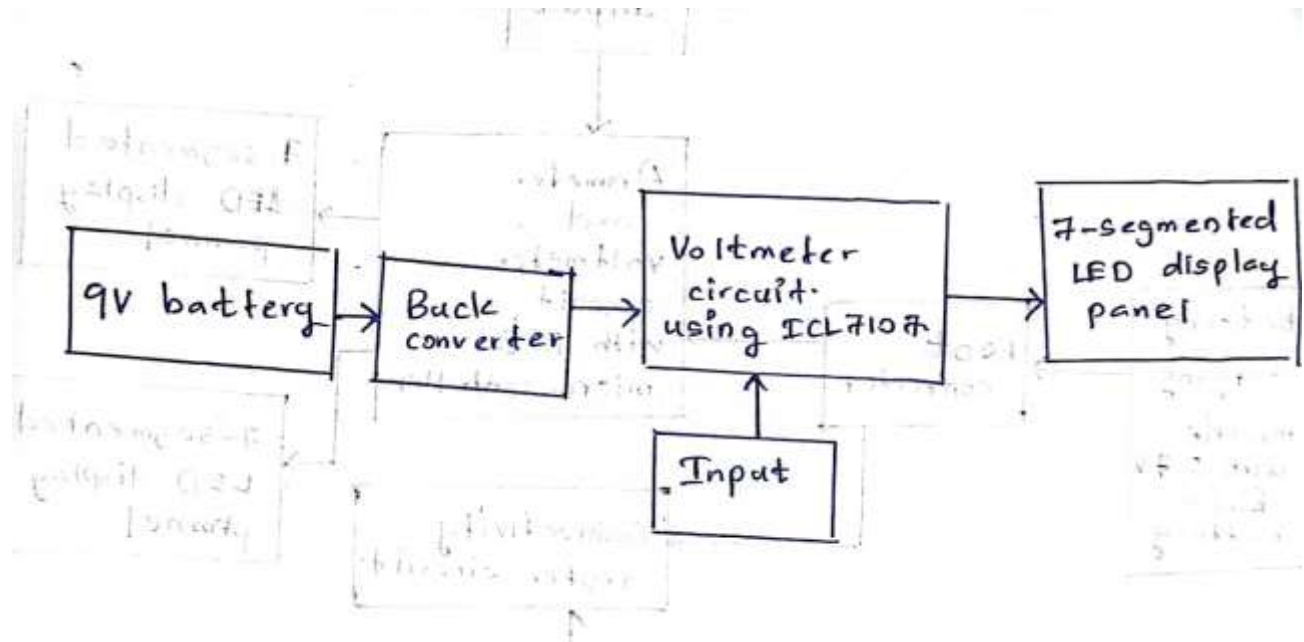
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Introduction

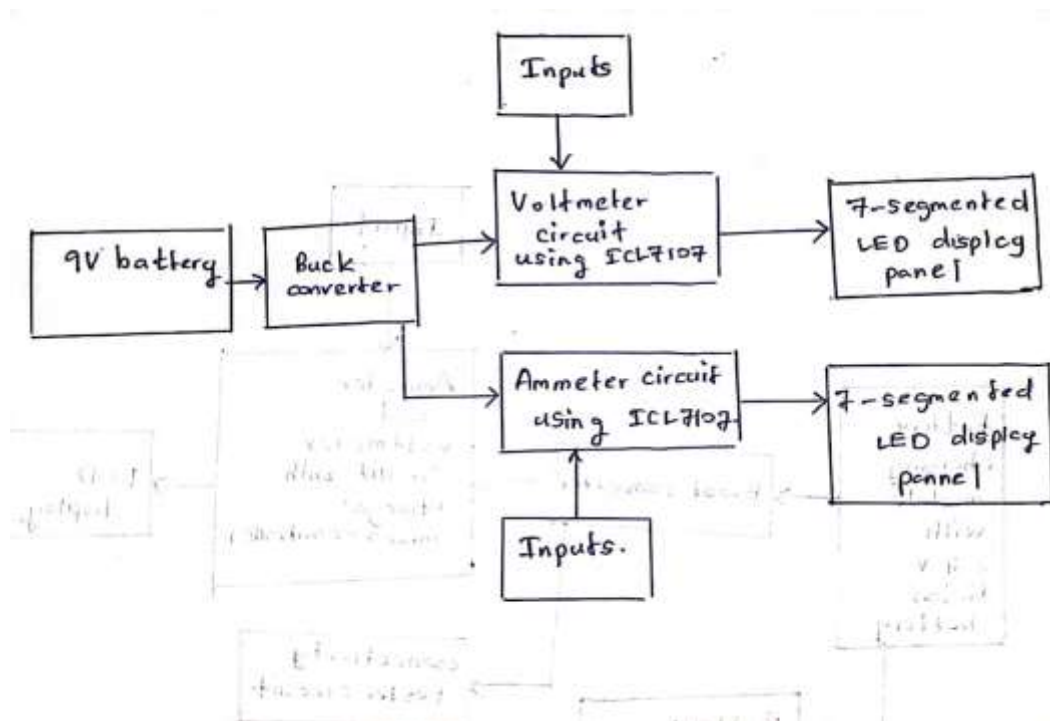
This conceptual design report is on a **digital volt-amp meter**. This is a device that is capable of measuring voltage and current in a circuit. This device has the ability to measure (0-200) V voltage range and (0-10) A current range with high accuracy. And as an additional feature this device is capable of testing connectivity (continuity test). And this device consists of a rechargeable power supply.

Block Diagrams of the product

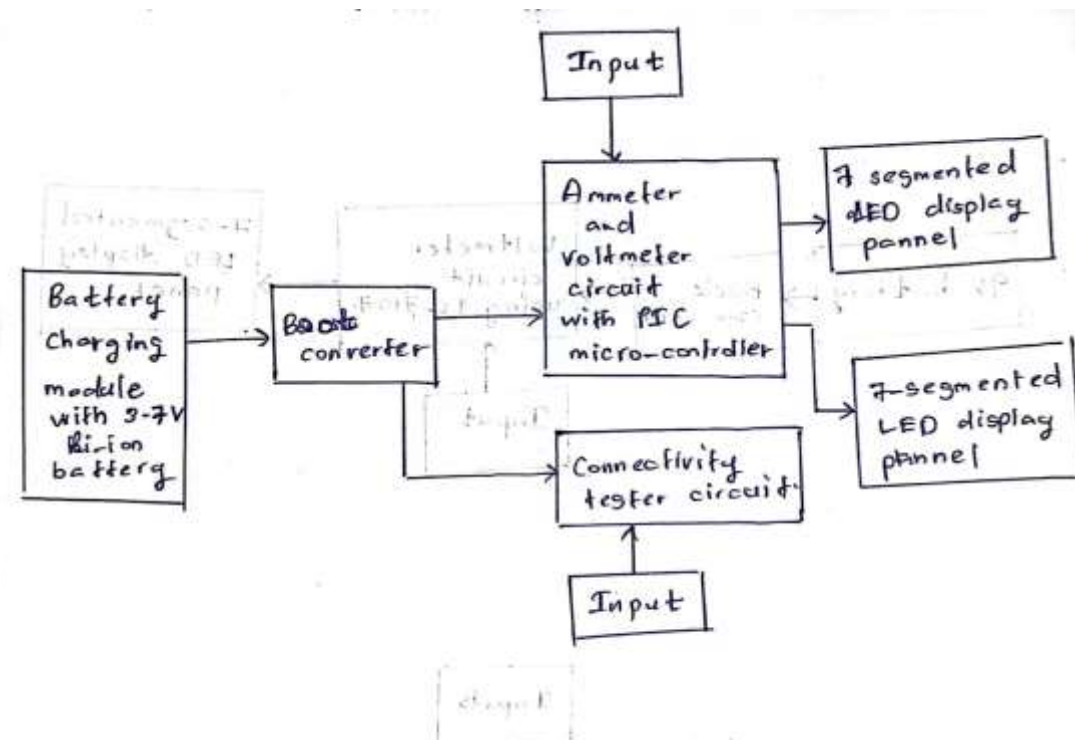
Option 1



Option 2



Option 3



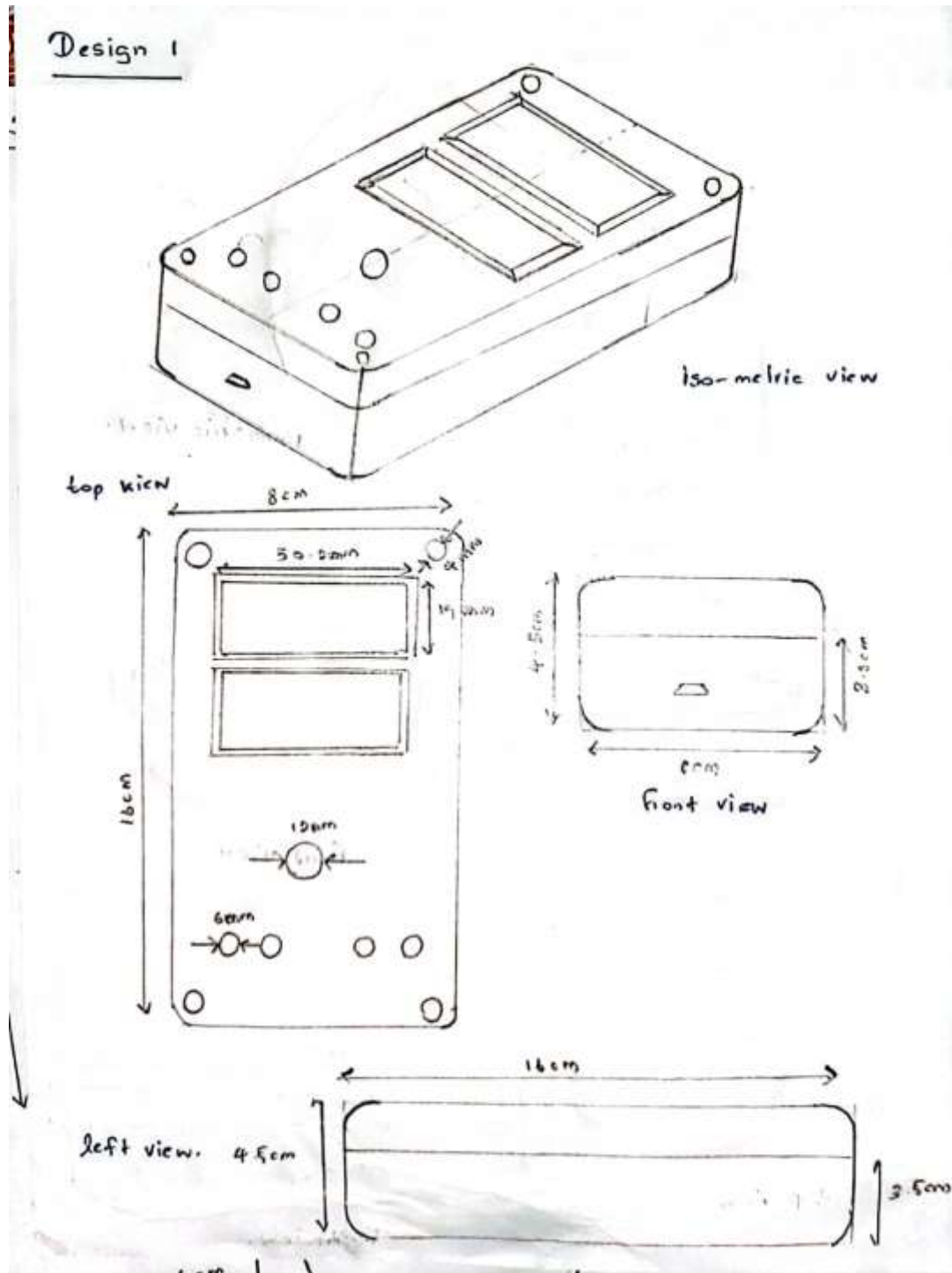
Selection Matrix for the block diagrams

Criteria	Option1	Option 2	Option 3
Accuracy	8	8	7
Power source and battery life	6	6	9
Cost	8	7	7
Performance and features	5	6	8
Complexity	8	7	7
Measurement range	6	6	8
Power consumption	7	7	8
Total	48	47	54

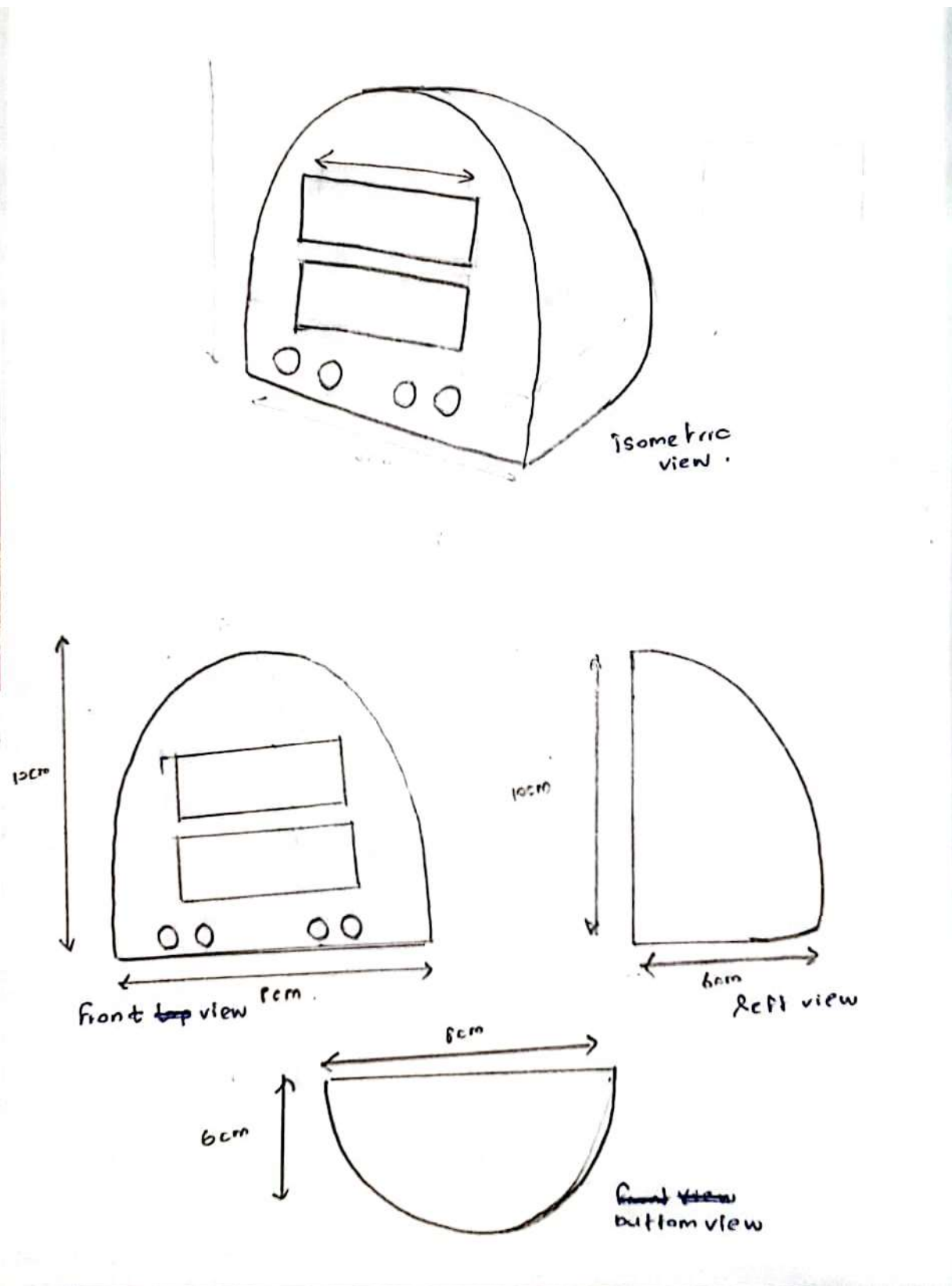
According to the above selection matrix the best option is option 3. So the following sketches are built to the option 3 block diagram.

Sketches of the product

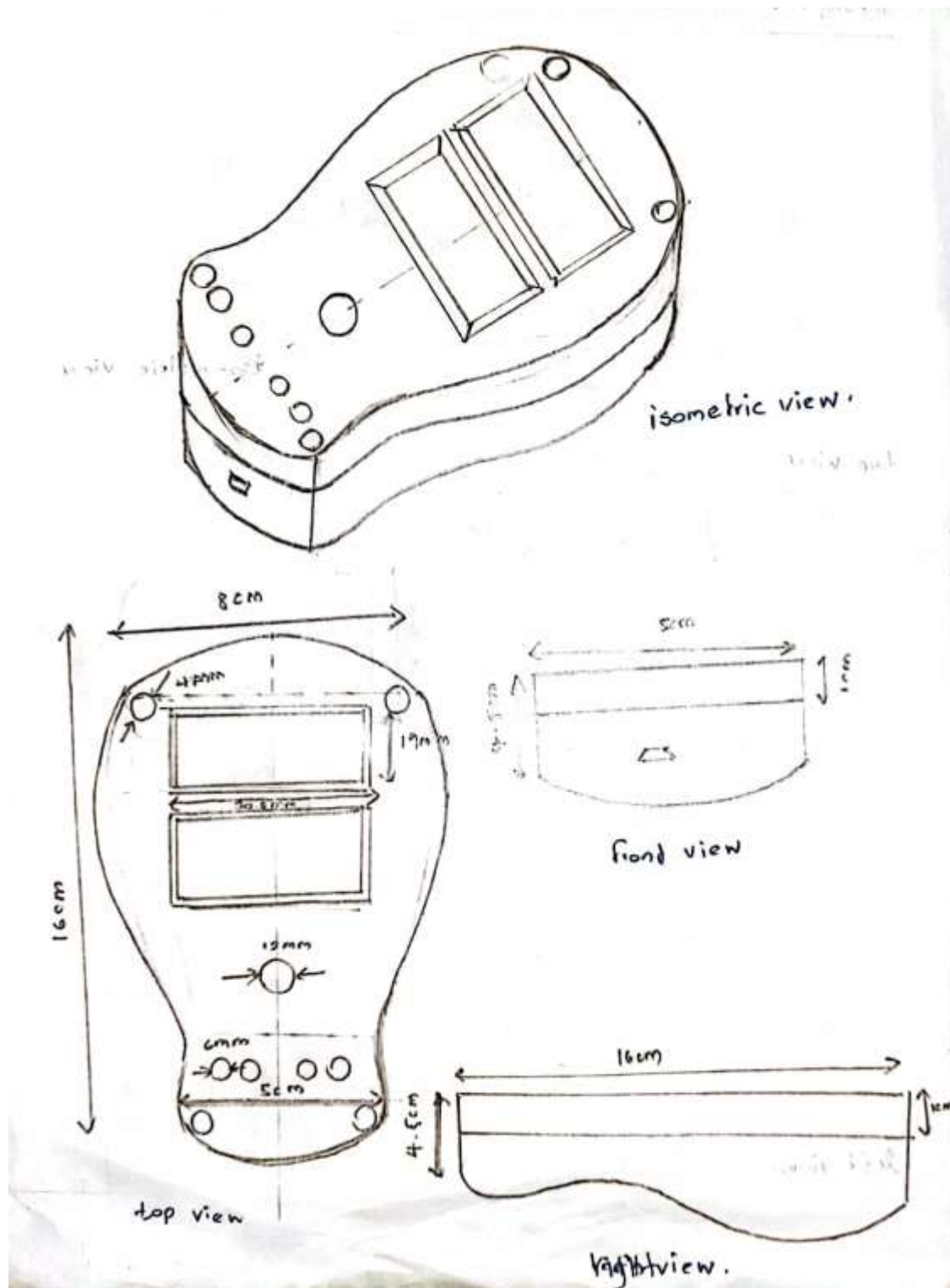
Design 1



Design 2



Design 3



Selection Matrix for the sketches

Criteria	Design 1	Design 2	Design 3
Appearance	6	7	8
Portability	7	6	8
Cost	7	8	7
User experience	7	6	9
Easy to handle	7	6	8
strength	6	8	8
Durability	7	8	9
Total	47	48	57

According to the above selection matrix the best design is Design 3. So, design 3 is selected to further improvements.

User feedbacks for the block diagram and sketches

- 1.) Improve the physical design of the device to ensure comfortable handling and operation. Consider factors such as the shape, size, weight distribution, and grip texture to minimize user fatigue during prolonged use.
- 2.) Design a user interface that is intuitive and easy to navigate. Use clear labeling, symbols, and color-coded controls to make it easy to understand and operate the device's functions.
- 3.) Optimize the display size to provide a clear and easily readable representation of measurements.
- 4.) Integrate graphical representations, such as bar graphs or waveforms, to provide users with a visual depiction of the measured values.
- 5.) Include a battery status indicator on the display or as a separate LED to provide users with clear information about the remaining battery life. This helps users plan for battery replacements or recharging.
- 6.) Improve the accuracy of the measurements taken by the device.

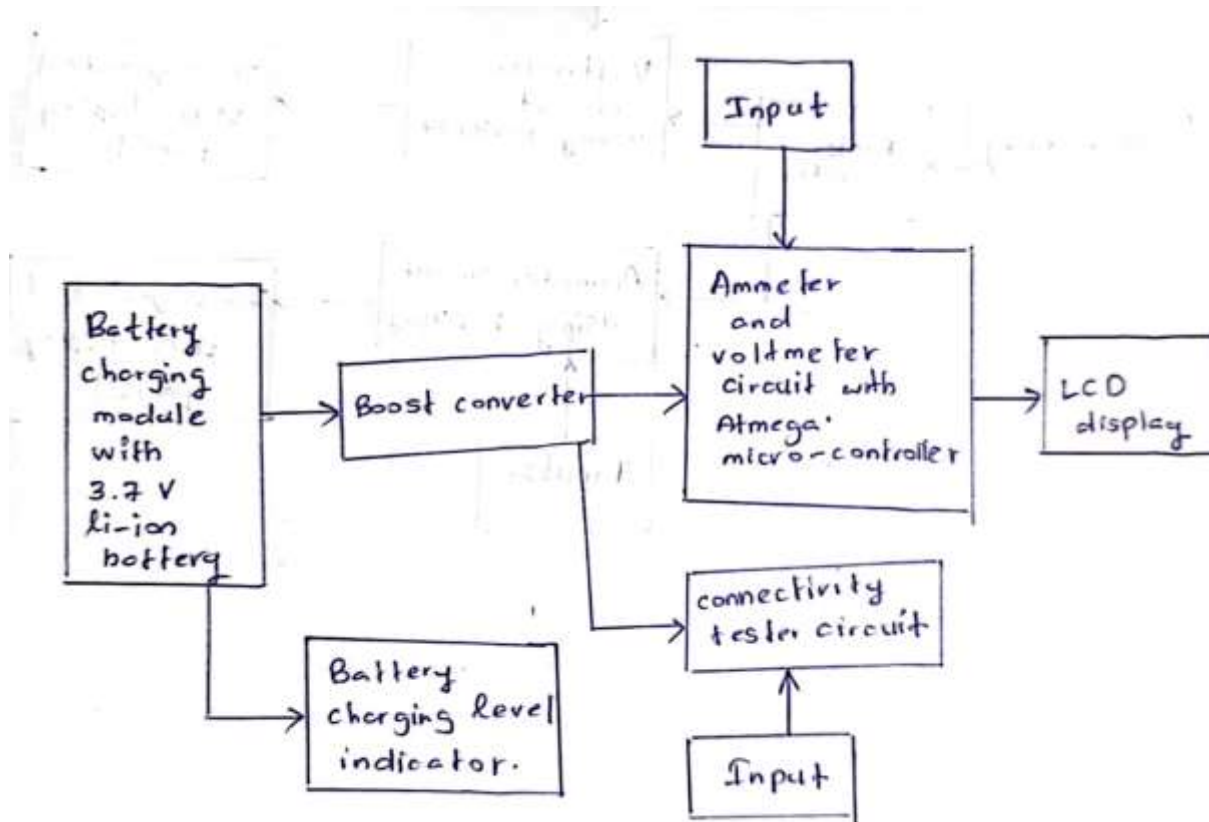
According to feedbacks taken by user, the above selected block-diagram and sketch is modified as follows.

Final Block diagram

Newly added and removed features for the above selected block diagram using selection matrix are as follows,

- 1.) Added a battery level indicator circuit to check the remaining battery level and it is displayed on a display.
- 2.) To improve the accuracy of measurements that taken by the device, added a circuit with an atmega microcontroller for the voltmeter and ammeter circuit instead of a PIC micro controller.

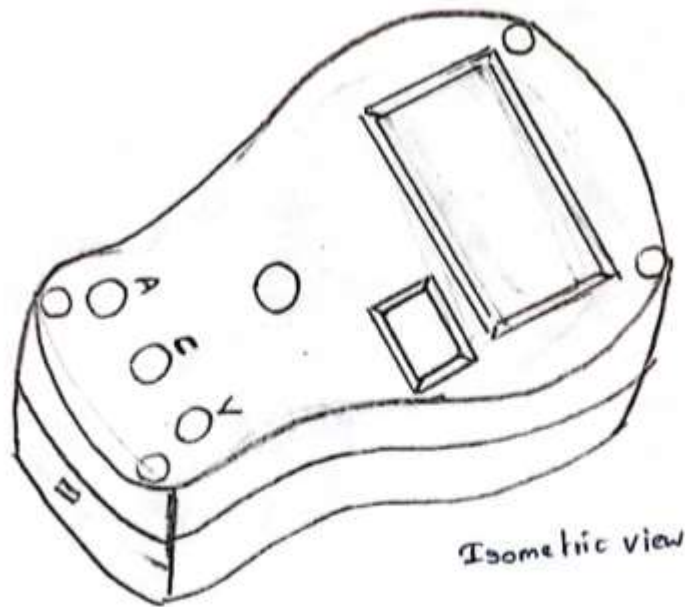
- 3.) To optimize the display, an LCD display is replaced for the two 7 segmented LED display panels.



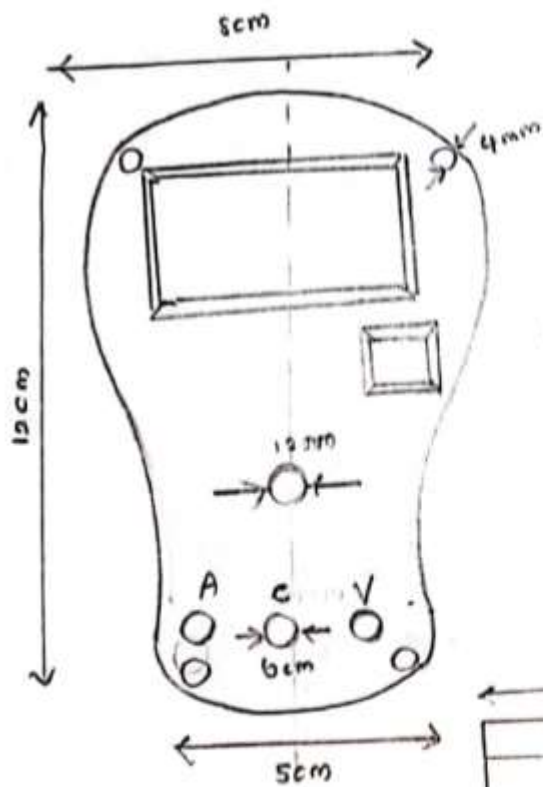
Final Sketch

Newly added and removed features for the above selected sketch using selection matrix are as follows,

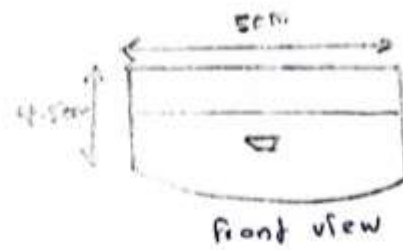
- 1.) Added a display to indicate battery level status of battery.
- 2.) Reduced the length of the device in order to ensure comfortable handling and operation.
- 3.) Used only one LCD display instead of two 7 segmented LED display panels.
- 4.) To design a user-friendly device, added three ports to connect the probes with the middle port as a common port and other two ports separately for the voltmeter and ammeter. And it is clearly mentioned in the enclosure.



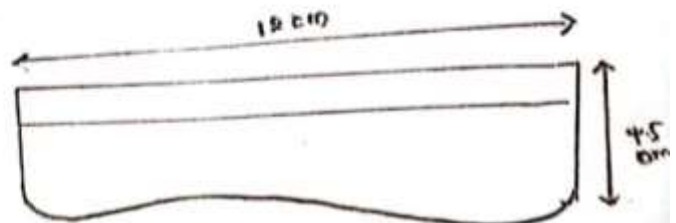
Isometric view



Top view



front view



right view

List of names who contributed to Design Driven Innovation

1.) A.K. Anuradha	200041E
2.) T.I.R. De Zoysa	200115K
3.) G.I. Deshapriya	200118X
4.) A.D. Upeksha Dilhara	200128D
5.) P.M.I.R.B. Kandegedara	200284B
6.) G.L.S.M. Perera	200455C
7.) R.A.R.L. Ranasighe	200511V
8.) R.D.H.C. Weerasingha	200699C
9.) H.D.K.G. Wijesiri	200728R