

REPORT

ON

“Hands-on Basic Electronics and Circuit Designing on Bread Boards”

for two schools adopted as part of **UNNAT BHARAT ABHIYAN (UBA)**

Organized by Electronics Dept

St Edmund’s College.

(under DBT Star College Scheme)

The Department of Electronics conducted a Three Days Outreach Program from the 29th to 31th of March 2022, for 2 schools adopted as part of **UNNAT BHARAT ABHIYAN (UBA)** on “**HANDS-ON BASIC ELECTRONICS AND CIRCUIT DESIGNING ON BREAD BOARDS**” under DBT Star College Scheme.

The Program was suggested and designed by **Br Raj Noronha**. **Prof Kishore Chakraborty** coordinated the whole program under him.

The program was **fully Hands-on** with the active participation of the **4th and 6th semester Electronics Major students**.

The Plan was to conduct the program in a “**DO AND LEARN**” manner for three consecutive days with the 4th and 6th semester students as instructors. Each day would have two sessions and each session would be of two hours duration. There would be a break of one hour between two sessions.

A total of 20 projects were decided to be completed in these three days. The Electronics Major Students of 4th and 6th semester were trained to be the main work force to impart training to the students of the school. It was also decided to keep the instructor student ratio 1:2.as far as possible.

It may be mentioned that all circuits underwent test run in the Lab. so as to see that they work well in the actual workshop. A total of 30 workstations were made ready. The workstations comprised of a box containing components and tools necessary to complete all the experiments.

Two Schools from Myllem agreed to be a part of the program with their Class IX and X students. The Schools are **RKM SECONDARY SCHOOL MYLLEM having 26 students** and

MYLLIEM PRESBYTERIAN HIGHER SECONDARY SCHOOL having 28 students. The Students from Electronics Dept were accordingly divided into two groups.

Dr D.Roy Choudhury , Prof S. Chakraborty and Dr H.Medhi took charge of **RKM SECONDARY SCHOOL MYLLIEM**, while **Prof. K. Chakraborty and Prof. B. P. Thangkhiew** for **MYLLIEM PRESBYTERIAN HIGHER SECONDARY SCHOOL**.

The whole team was lead by Br Raj Noronha reached the two Schools around 9.30am and both the Principal appreciated our plan and welcomed us . However the Principal of **MYLLIEM PRESBYTERIAN HIGHER SECONDARY SCHOOL** expressed her unwillingness to have three days session with the class X. She however later agreed to allow the class IX students numbering 62 to join the program for the next two days. There were no such issues with **RKM SECONDARY SCHOOL MYLLIEM**.

RKM SECONDARY SCHOOL MYLLIEM.

DAY 1

The Workshop started at 10AM after dividing them into groups having the instructor student ratio as 1:2 .

SESSION I

In the first session the students were taught the following projects :

| | |
|----|--|
| 1. | Use a MM to measure the DV voltage, AC Voltage, AC Main Voltage. |
| 2. | Resistance Measurement with Multimeter, Resistance colour code |
| 3. | Understanding Bread board connection. |
| 4. | Potentiometer connection and checking |

The session ended at 12 Noon.

SESSION II

The second session started at 1PM and continued till 3PM. The following projects were taught to them.

| | |
|----|--|
| 1. | To Identify Capacitors caps which included electrolytic Capacitor . |
| 2. | To Identify the primary and secondary of a 9v transformer with multimeter and also to measure the AC output. |
| 3. | To use of Multimeter to check a diode IN4001. |
| 4. | Forward and Reverse Biasing of a diode and to observe output with LED. |

DAY2

SESSION I

The Workshop started again 10AM. In the first session the students were taught the following projects :

| | |
|----|---|
| 1. | To study a battery eliminator by connecting transformer with a premade bridge rectifier (IN4001) and the DC output voltage was checked. . A LED with resistor connection was made on the bread board and supplied with the voltage from the made battery eliminator. |
| 2. | To Observe three different colour LEDs by placing each one on the Breadboard, connecting a 330 resistor. The polarity of the LED was also checked with a Multimeter |
| 3. | To study a 7 Segment display on the bread board. Power was supplied from the battery eliminator to light up different numbers. |

SESSION II

The second session started again at 1PM and continued till 3PM. The following projects were taught to them:

| | |
|----|--|
| 1. | To Identify a NPN and a PNP transistor. |
| 2. | To use the NPN transistor to construct a switching circuit on the breadboard to light up a LED. |
| 3. | To use a LDR to make a simple day night switch with a single transistor and an LED. |
| 4. | To use two transistors, two electrolytic caps, two LEDs and resistors to construct an astable circuit on the Breadboard. |

The session ended at around 3pm

Day 3

SESSION I

The Workshop started once again 10AM. In the first session the students were taught the following projects :

| | |
|----|---|
| 1. | To use IC555 to make an astable oscillator which uses LED as output. |
| 2. | To Study a 12 volt relay by Identifying the coil pins and the 3 contact pins. |
| 3. | To Use of IC 555 and a Relay to make a touch switch. |

SESSION II

The second session started again at 1PM and continued till 3PM. The following project were taught to them:

| | |
|----|--|
| 1. | To Use IC 555 to make a siren. |
| 2. | To construct a running LED display using IC4017. The input signal was supplied from the multimeter as it had that provision. |

MYLLIEM PRES HIGHER SECONDARY SCHOOL.

Day1

SESSION I

The Workshop started at 10AM after giving the students name badges and dividing them in groups in the instructor student ratio 1:2 as far as possible . It must be mentioned here once again that the Students of class X joined the program only for one day. In the first session the students were trained in the following projects :

| | |
|----|--|
| 1. | Use a MM to measure the DV voltage, AC Voltage, AC Main Voltage. |
| 2. | Resistance Measurement with Multimeter, Resistance colour code. |
| 3. | Understanding Bread board connection. |
| 4. | Potentiometer connection and checking. |
| 5. | To Identify Capacitors caps which included electrolytic Capacitor. |
| 6. | To Identify the primary and secondary of a 9v transformer with multimeter and also to measure the AC output. |
| 7. | To use of Multimeter to check a diode IN4001. |
| 8. | To Identify a NPN and a PNP transistor. |

The session ended at 12 Noon.

SESSION II

The second session started at 1PM and continued till 3. 30PM. The following projects were given to them:

| | |
|----|---|
| 1. | To use the NPN transistor to construct a switching circuit on the breadboard to light up a LED. |
| 2. | To use a LDR to make a simple day night switch with a single transistor and an LED. |
| 3. | To Use of IC 555 and a Relay to make a touch switch. |
| 4. | To Use IC 555 to make a siren. |

Day 2

SESSION I

The Workshop started at 10AM with a different set of 63 students from class IX .

It was then decided to divide the students into **two group** to maintain the ratio as far as possible 1:2. Space constrain was another factor taken into account.

Session I

The **FIRST GROUP** was then again further divided into **two more groups**.

The two groups were then separately given a **hands on** understanding by making them sit in two different class rooms .

In each class room a group of three students were made sit in each bench.

The followings items were given to them to be handled.

| | |
|----|--|
| 1. | Use a MM to measure the DV voltage, AC Voltage, AC Main Voltage. |
|----|--|

| | |
|----|--|
| 2. | Resistance Measurement with Multimeter, Resistance colour code. |
| 3. | Understanding Bread board connection. |
| 4. | Potentiometer connection and checking. |
| 5. | To Identify Capacitors caps which included electrolytic Capacitor. |

The **SECOND GROUP** of students were made to proceed to the room allotted for Project and were engaged in the hand on.

The following projects were taught to them :

| | |
|----|--|
| 1. | To Identify the primary and secondary of a 9v transformer with multimeter and also to measure the AC output. |
| 2. | To use of Multimeter to check a diode IN4001. |
| 3. | To Identify a NPN and a PNP transistor. |

SESSION II

The second session started again at 1PM and continued till 3.30PM. In this session the groups **were interchanged** .

The **Second group** was taken to the classroom after dividing them into two groups and the mechanism adopted in the first session was repeated.

The **First group** students were taken for practical and were engaged in hand on.

DAY 3

SESSION I

The Workshop started at 10AM

Session I

The same procedure as followed in Day 2 was repeated. They were then given idea of the second set of practical along with the components.

| | |
|----|---------------------------------------|
| 1. | Transistor Checking NPN and PNP. |
| 2. | Seven Segment Display connection. |
| 3. | IC555 and IC 4017 leg identification. |
| 4. | LDR. |
| 5. | Relay Connection. |

The **Second group** of students were made to proceed to the room allotted for Project and were engaged in the hand on. The following projects were taught to them:

| | |
|----|--|
| 1. | To use a LDR to make a simple day night switch with a single transistor and an LED. |
| 2. | To use two transistors, two electrolytic caps, two LEDs and resistors to construct astable circuit on the Breadboard. |
| 3. | To Use of IC 555 and a Relay to make a touch switch. |
| 4. | To Use IC 555 to make a siren. |
| 5. | To construct a running LED display using IC4017. The input signal was supplied from the multimeter as it had that provision. |

SESSION II

The second session started again at 1Pm and continued till 3.30PM. In this session the the groups were interchanged.

The Second group was taken to the classroom after dividing them into two groups. And the same procedure was repeated as in session I.

The first group students were taken practical and were engaged in hand on. The set of experiments of session one was repeated.

CONCLUSION

The three days program was successfully organized and conducted with active participation of the students and teachers, along with the tremendous support of the college management.

The Principal and Students of the two Schools thanked us and showed their gratitude. It was also conveyed to us that the course was innovative and informative. It's a real eye-opener for the students as they have never experienced a session of this kind. They were all very excited and expressed their willingness to take part in many more program like this. They had few queries and shared their feeling of being enriched.

The Students of the Electronics Department who played the pivotal role expressed their gratefulness for conducting such a program. It was a new experience for them. The workshop has given them a platform to share their knowledge and skill with the school students. They made the best of the opportunity.

The Department also thanks the management for making it possible for us to conduct such a Workshop.

LIST OF TWENTY PROJECT

| | Date 29th, 30th,31th March | | |
|---|--|---|---|
| | Project | Experiment | Notes |
| 1 | Brief Ideas Voltage | Use a MM to measure the Dc voltage | 1.5 v & 9v battery |
| | | Use a MM to measure the Ac voltage of a step down transformer | This 9v transformer will be used later to make a battery eliminator |
| | | Use a MM to measure the voltage of the house supply | Care is to be taken and supervision is to be taken while measuring the house voltage |
| 2 | Ohm's law | Connect a 100ohm 5 w resistor and a battery. Measure the current with a MM and calculate the resistance | 9volt battery |
| 3 | Colour code | Use the colour code to identify the following resistors/; 330, 1k, 2.7k,10k, 27k, Confirm the reading with the help of the MM | |
| 4 | Bread Board | Understanding the connections of a breadboard. Use a simple torch bulb and two hook up wires to check the rails. Use the MM and hook-up wires to do the same | if a suitable torch bulb is not available then two parallel opposite direction diodes with a dropper resistor needs to be got ready to act as a sudo torch cell |
| 5 | Pot | Connect a 10k pot to the upper and lower power supply rails. Apply voltage and measure the wiper arm | Use 9 v battery |
| 6 | Capacitor | Identify 3 caps including one electrolytic. Observe the polarity | 104 ceramic, 103 polyester & 1000uf |
| 7 | Transformer | Identify the primary and secondary of a 9v transformer. Give supply voltage to the primary and measure the ac output | Special care is to taken while connecting to the 220 volt supply |
| 8 | Battery eliminator | Connect the above transformer with a premade bridge rectifier (IN4001). Check the dc voltage . Place a LED and resistor on the bread board and give it supply form the made battery eliminator | A bridge ckt must be premade on a small bit of strip board Use 1000uf cap |

| | | | |
|----|------------------------|---|---|
| 9 | Diode | Use a MM to check a diode IN4001, place the diode in the bread board with a torch bulb and power up. Reverse the diode and observe that the bulb does not glow | if a suitable torch bulb is not available then two parallel opposite direction diodes with a dropper resistor needs to be got ready to act as a sudo torch cell |
| 10 | LED | Observe three different colour LEDs Place each one on the Breadboard, connect a 330 resistor. Change the resistor value. Check the polarity of the LED with a MM | Use a Red, Yellow, Green LED Use the made battery eliminator for DC power |
| 11 | Transistor | Identify a NPN & PNP transistor. Use the NPN transistor to construct a switching ckt on the breadboard (BB) lighting up a LED | BC148 & BC158 |
| 12 | Day / Night switch | Use a LDR to make a simple day night switch with a single transistor and an LED | |
| 13 | Free Running Flip flop | Use two transistors , two electrolytic caps, two LEDs and resistors to construct a FF on the BB | 10uf & 22uf pair Use two BC148s |
| 14 | Seven segment display | Place a 7 seg display on the bread board. Give the BB power from the battery eliminator. light up single segments. Light up at least 5 different numbers. Light up some HEX numbers ie A, B, C, D & F | Common cathode and 330 ohms resistors |
| 15 | 555 IC | Use a BB to make an astableosc which uses a LED as o/p | |
| 16 | Relay | Study a 12 volt relay. Identify the coil pins and the 3 contact pins | Small relay with a transparent case |
| 17 | Touch sw | Use a BB , 555 and relay to make a touch switch | Use a buzzer on the o/p of the relay |
| 18 | Siren | Use a 555 IC and the 10k pot to make a siren | Small speaker required |
| 19 | Running LED 4017 | Use the 555 astable mv + 4017 to construct a running LED display | 8 LEDs 330 ohm resistors are required |
| 20 | Solar cell | Wire up a solar cell to light a LED | |
| | | | |

MYLLIEM PRESBYTERIAN HIGHER SECONDARY SCHOOL









RKM SECONDARY SCHOOL MYLLIEM





