

Yashwantrao Chavan College of Science, Karad

Department of Electronics

Departmental Facilities

Instrument List with SOPs


INDEX



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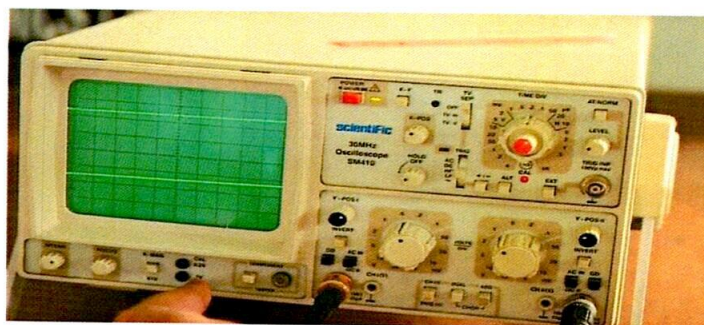
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DEPARTMENT OF ELECTRONICS

STANDARD OPERATING PROCEDURE

| | | |
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| Date: | CATHODE RAY OSCILLOSCOPE | Ref.No: |
| Page: | Responsibility: HOD & FACULTY | Rev.No: |

CATHODE RAY OSCILLOSCOPE (CRO)



The following precautions are required to be taken while handling cathode ray oscilloscope(CRO)

1. The input ac supply should have proper earthing facility.
2. After tuning on the CRO, the intensity and focussing adjustments must be pressing X-Y knob.
3. done after AC/DC knob should be properly adjusted as per AC/DC measurements.
4. Check the external probes.
5. Test the square wave pattern by connecting Y probe to test square wave terminal .
6. The voltage level and time base are adjusted so as to get display within the screen range.
7. The students are instructed to turn off the CRO when not needed.
8. A strict instruction is given to the students to get their circuits checked from their respective

Teacher incharge before the CRO is turned on.



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USES BY THE CRO :-

1. The CRO is used to measure the voltage and time characteristics of an electrical signal.
2. It can display both static and dynamic signal and can measure a wide range of voltage and time Scales.
3. Is a versatile electrical instrument used for displaying, measuring ,and analyzing Waveforms and various other electrical phenomena .
4. The CRO's are used in huge application like radio stations for observing the transmitting and receiving the properties of the signal.
5. The CRO is used to measure the voltage, Current, Frequency, inductance, admittance, resistance, and power Power factor.
6. CRO is used to observe the waveform in the screen. It is used in the lab to check the output Waveform Of the circuit element.



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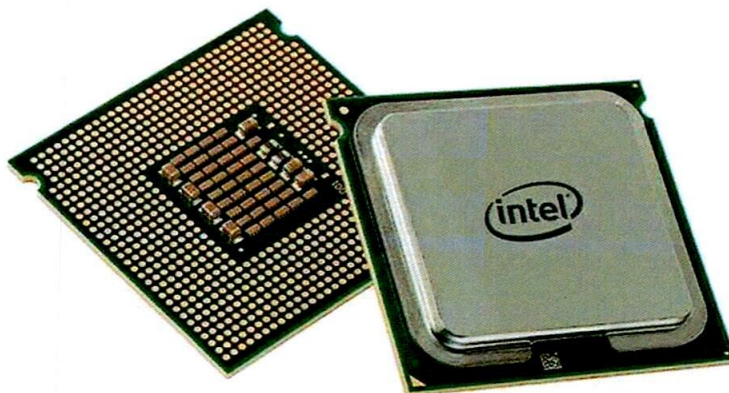
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| Date: | MICROPROCESSOR | Ref.No: |
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MICROPROCESSOR



The following precautions are required to be taken while handling Microprocessor

1. For microprocessor trainer kit use the power supply provided with trainer kit.
2. Connect the plug pin of power supply to 230 volt AC socket.
3. Insert the 5/12volt DC connector of power supply in appropriate socket on 2 3 4 5 trainer kit.



4. After making the power ON, name of the manufacturer will be displayed on the seven segment display of the trainer kit.
5. Follow the instructions given in the user manual to load & execute program.

USES BY THE MICROPROCESSOR :-

1. Microprocessors are used in many other electronic devices, including Cell phones , kitchen appliances, automobile emission-control and timing devices, Electronic games, telephone switching systems, thermal controls in the homes and Security system.
2. It has basically three types, they are follows :
CISC (Complex Instruction Set Computer)
RISC (Reduced Instruction Set Computer)
EPIC (Explicitly Parallel Instruction Computer)
3. Through the use of input and output connection they can monitor and control the devices in real time.
4. Through the use of input and output connection they can monitor and control the devices in real time.



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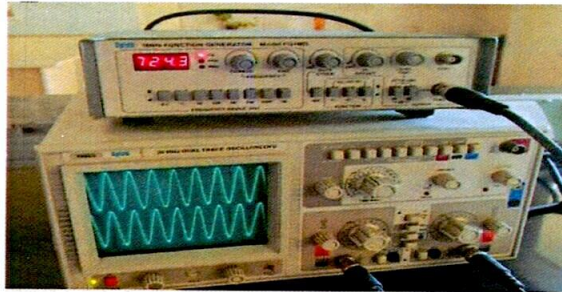
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| Date: | FREQUENCY GENERATOR | Ref.No: |
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FREQUENCY GENERATOR



The following points need to be considered while handling Frequency Generator (FG)

1. The I/P AC should have proper earthing facility.
2. Required-function signal (sine wave, square wave, and triangular wave) should be selected.
3. Frequency range is selected by pressing frequency range knob.
4. The O/P voltage knob is initially selected for lower voltage & then voltage range is increased as per the requirements.
5. The-frequency variable knob should be smoothly handled.
6. F.G. should be turned off as soon as its use is over.
7. The zero error of variable knob should be clearly noticed while taking the experimental readings.



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| Date: | POWER SUPPLIES | Ref.No: |
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POWER SUPPLIES (Regulated and dual)



The following points need to be considered while handling POWER SUPPLIES (Regulated and dual)

1. The I/P AC should have proper earthing facility.
2. It is essential to choose power supply as per the requirement of the expt./project.
3. Before we turn ON the supply a care should be taken to keep the variable voltage knob at zero level
4. Proper voltage range is selected as per the requirement of the experimental kit or Project.
5. A care should be taken that the experimental kits are not overloaded.
6. Proper fusing facility is a must for every power supply.
7. Turn off the power supply when its use is over.



USES BY THE POWER SUPPLIES (Regulated and dual) :-

1. A dual-regulated power supply is an important part of the workbench of electronic circuit, it is used to power many audio types of equipment such as preamplifiers, mixers, equalizers, or any other device that needs 24V dual power.
2. The main function of a power supply is to convert electric current from a source to the correct voltage, current, and frequency to power the load.
3. Dual power supplies are circuit that generate two different output voltage from a single input source.
4. A regulated power supply with multiple regulators can offer multiple output voltage for operating different devices.



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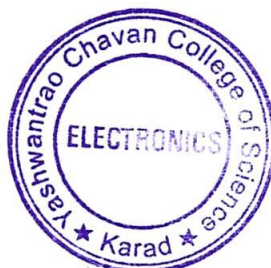
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| Date: | CONSTANT CURRENT SOURCE | Ref.No: |
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CONSTANT CURRENT SOURCE



The following points need to be considered while handling constant current source

1. The I/P AC should have proper earthing facility.
2. Current ranges are properly selected with due judgements as per the requirements of the experimental kit or project.
3. Overload protection is a must for constant current source.
4. Proper current range be selected as per the requirement of the experimental kit or project.
5. Heat sinks of proper size & design must be attached especially to power transistors used in the circuit of constant current source.
6. Turn off the constant current source when its use is over.



USES BY THE CONSTANT CURRENT SOURCE

1. Constant- current power supplies are used to power LED lighting and charge rechargeable batteries.
2. To operate the power supply to a voltage value higher than the voltage value calculated by Ohm's law from the current value to be passed through the load and the resistance value of the load.
3. Constant current source is a device supplied by an AC or DC source and it will maintain the same current regardless of the load resistance.
4. This comes in use When a circuit need a steady current supply ,without fluctuations.



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| Date: | DIGITAL PANEL METER | Ref.No: |
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DIGITAL PANEL METER (DPM)



1. DPM should be selected as per voltage / current range requirement of the experimental kit/project.
2. Overloading of DPM should be avoided.
3. To increase utility life of DPM, see that LED or LCD segments of DPM should not be over intense .
4. The backup battery supply of DPM should be checked time to time.
5. In case of DPM having built in power supply, its voltage should be checked time 4 5 to time.



USES BY THE DIGITAL PANEL METER (DPM) :-

1. Digital panel meter present numerical information that's easy to read
2. Used extensively in process control equipment they are inexpensive. way to present data from instrumentation such as thermocouples, humidity and pressure sensors.
3. The signal comes from a sensor ,whose input is converted into diital form And then displayed as a variable.
4. Digital panel meter are digital display intended to be mounted in a panel Such as a control panel.
5. They typically read some type of input ,be it a voltage, current,or resistance And display its value digitally.



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A handwritten signature in blue ink, appearing to be "J. K. Chavan".

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| Date: | DIGITAL MULTIMETER | Ref.No: |
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DIGITAL MULTIMETER



The following points need to be considered while handling digital multimeter

1. Check the voltage of back up batteries of digital multimeter time to time.
2. The students should be given proper training for handling different functions of digital multimeters.
3. The proper voltage current ranges be selected as per the requirements of 3. experimental kit/projects.
4. Check connecting probes of digital multimeter time to time.
5. Turn off the instrument as soon as its use is over.



USES BY THE DIGITAL MULTIMETER

1. A digital multimeter ,or DMM, measure and verify multiple electrical quantities, including voltage ,current and resistance.
2. It's a daily diagnostic tool used by technician and electrical engineers and combine the feature of a voltmeter, ammeter and ohmmeter.
3. A multimeter is mainly used to measure the three basic electrical characteristic of voltage, current, and resistance.
4. Use a meter to check wall outlets for voltage
5. The digital multimeter (DMM) is widely available in compact or small size.
6. It has high accuracy than the analog multimeter.




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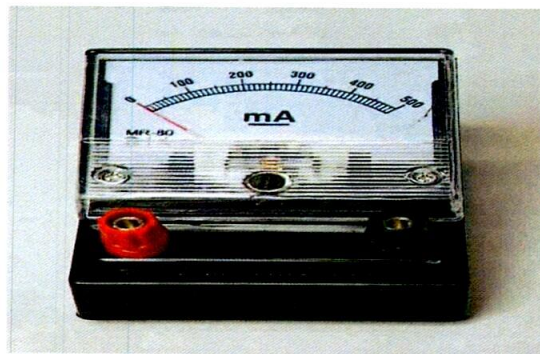
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| Date: | ANALOG VOLTMETER & AMETER | Ref.No: |
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ANALOG VOLTMETERS & AMETERS



The following points need to be considered while handling analog voltmeters & ammeters.

1. Proper selection of analog voltmeters & ammeters should be done as per the requirements of experimental kit/project.
2. Since mechanical part of analog voltmeters & ammeters is too delicate for overloading hence due precaution is necessary to see that the pointer does not go out of scale.
3. Zero adjustment is necessary before its use.
4. The terminals of analog voltmeter & ammeter should be tight & electrically intact.




6. Overdampig, overloading damages the analog voltmeter. Since they are not usually provided by overload protection.
7. These meters are required to be neatly handled as mechanical shocks/vibrations May damage the instrument.

USES BY THE ANALOG VOLTMETER & AMETERS :-

1. A voltmeter is connected in parallel with a device to measure its voltage, While an ammeter is connected in series with a device to measure its current.
2. An analogue voltmeter is used mainly for measuring the AC voltage.
3. Both of these devices are used in electric circuit but the major difference Between a voltmeter and an ammeter is ammeter comes in handy for measuring the flow of current whereas the voltmeter comes in handy for measuring the voltage or emf across two points in an electric circuit.
4. Analog ammeter ,also known as current meters, are metered instrument that Measure current flow in amperes.




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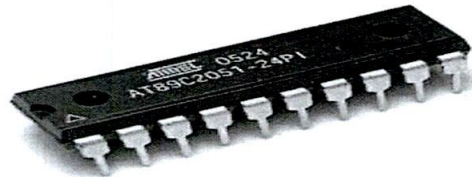
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| Date: | MICROCONTROLLER | Ref.No: |
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MICROCONTROLLER



The following points need to be considered while handling MICROCONTROLLER

1. For microcontroller trainer kit, use the power supply & keyboard provided with trainer kit .
2. Connect the plug pin of power supplies to 230v AC socket.
3. Insert the SV DC connector of power supply in proper socket of trainer kit.
4. Connect the keyboard connector in keyboard sockets on trainer kit.
5. After making the power on, name of the manufacturer will be displayed on on LCD display of trainer kit.
6. Follow the instructions given in the user manual to load and execute the program and check the O/P of the program.



USES BY THE MICROCONTROLLER :-

1. Microcontroller is a compressed micro computer manufactured to control The function of embedded system in office machines, robots, home appliances, Motor vehicles, and a number of other gadget.
2. A microcontroller is a comprise component like – memory, peripheral and Most importantly a processor.
3. Low time required for performing operation.




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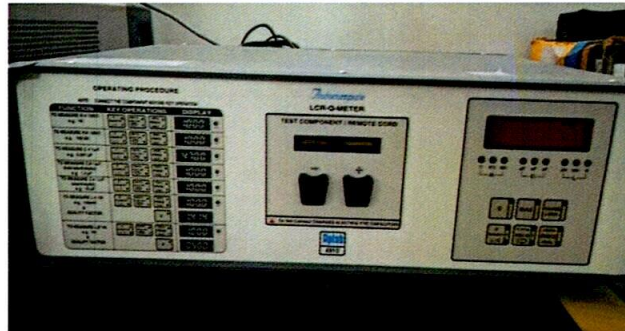
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| Date: | LCR-Q METER | Ref.No: |
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LCR-Q METER



1. Switch On the LCR-Q meter
2. Connect the component under test to the probes of LCR-Q meter
3. Select the proper frequency 100 Hz or 1 kHz.
4. Press Q/Bias/Rage lock/R-L/C/EQV Ckt as per the requirement
5. Display will show the value of R or C or L the Display
6. After measurement switch off the meter
7. Disconnect the component under test



USES BY THE LCR-Q METER

1. LCR-Q meter is a measuring instrument which is used to measure value of inductance (L), capacitance(C), resistance(R), and the Q- factor or quality factor of inductor and D-factor of capacitor.
2. LCR meter is a type of electronic test equipment used to measure the Inductance (L), Capacitance (C), and Resistance (R) of an electronic Component.


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| Date: | CATHODE RAY OSCILLOSCOPE | Ref.No: |
| Page: | Responsibility: HOD & FACULTY | Rev.No: |

Subject - In house Calibration of Cathode Ray Oscilloscope

Ref. Doc. -

Responsibility:- Faculty

Calibration for frequency

| Sr.No | Activity |
|-------|---|
| 1 | Turn on the transformer (0-3V or 0-6V), through dimmerstat. |
| 2 | Apply o/p of transformer to the Y plate of CRO |
| 3 | Adjust the times per division knob of CRO to get single wave stable pattern |
| 4 | Adjust volts/ division knob of CRO to get the wave within the range |
| 5 | Measure frequency of wave, by measuring its period on CRO |
| 6 | If frequency equal to 50Hz, CRO is calibrated for frequency |



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Subject - In house Calibration of Cathode Ray Oscilloscope

Ref. Doc. -

Responsibility:- Faculty

Calibration for frequency

| Sr.No | Activity |
|-------|---|
| 1 | Take standard calibrated digital voltmeter |
| 2 | Apply voltage of desired amount (ac/dc) to Y-plate of CRO |
| 3 | Measure the voltage on CRO |
| 4 | Now apply the same voltage to the terminals of calibrated digital voltmeter |
| 5 | If both the readings are same, the CRO is calibrated for voltage |

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| Date: | FREQUENCY GENERATOR | Ref.No: |
| Page: | Responsibility: HOD & FACULTY | Rev.No: |

Subject - In house Calibration for frequency generator

Ref. Doc. -

Responsibility:- Faculty

| Sr.No | Activity |
|-------|---|
| 1 | Take the frequency generator and CRO |
| 2 | Use transformer (step down) as a c. source, through dimmerstat |
| 3 | Apply o/p of transformer to Y plate of CRO, apply o/p of frequency generator (a.c., sinusoidal wave) to X plate of CRO |
| 4 | Adjust the frequency of the frequency generator, till we get a stable, single circle on the screen |
| 5 | The frequency readings on the dial / display of frequency generator, at a single stable circle on CRO is frequency of a. c. mains, which ought to be 50Hz |
| 6 | If frequency of frequency generator is 50 Hz at this stage frequency generator is calibrated |


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| Date: | DIGITAL MULTIMETER | Ref.No: |
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Subject - In house Calibration of digital Multimeter

Ref. Doc. -

Responsibility:- Faculty

(Voltage range)

| Sr.No | Activity |
|-------|--|
| 1 | Take standard regulated voltage source |
| 2 | Adjust its voltage to 5volt and apply it to standard load resistance 1000 ohm |
| 3 | Use standard calibrated digital multimeter to measure the voltage across 1000 ohm resistance |
| 4 | Note the standard voltage reading $VR_1 = \text{--- Volt}$ |
| 5 | Connect the meter under calibration across 1000ohm resistance and measure voltage reading $VR_2 = \text{--- Volt}$ |
| 6 | Determine error $V_{\text{error}} = VR_1 - VR_2$ |
| 7 | Calculate % error |
| 8 | error If the error is within the specified limit, mark it as OK |

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| Date: | DIGITAL MULTIMETER | Ref.No: |
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Subject - In house Calibration of digital Multimeter

Ref. Doc. -

Responsibility:- Faculty

(Current range)

| Sr.No | Activity |
|-------|--|
| 1 | Take standard regulated current source. |
| 2 | Adjust its current to 500mA and apply it to standard load resistance of 1000 ohm |
| 3 | Use standard calibrated digital multimeter to measure the current through 1000 ohm resistance |
| 4 | Note the standard current reading $IR_1 = \text{---mA}$ |
| 5 | Connect the meter under calibration in 1000 ohm resistance circuit and measure current $IR_2 = \text{---mA}$ |
| 6 | Determine error $I_{\text{error}} = IR_1 - IR_2$ |
| 7 | Calculate % error |
| 8 | If the error is within the specified limit, mark it as OK |

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| Date: | DIGITAL MULTIMETER | Ref.No: |
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Subject - In house Calibration of digital Multimeter

Ref. Doc. -

Responsibility:- Faculty

(Resistance range)

| Sr.No | Activity |
|-------|--|
| 1 | Take standard resistance from resistance box. |
| 2 | Measure its value with calibrated digital multimeter. Note the value $R_2 = \text{--- ohm}$ |
| 3 | Measure the same resistance with meter under calibration and note the 3 value of resistance $R_2 = \text{--- ohm}$ |
| 4 | Determine error $R_{\text{error}} = R_1 - R_2$ |
| 5 | Calculate % error |
| 6 | If the error is within the specified limit, mark it as OK |
| 7 | If necessary replace the battery |



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Subject - In house Calibration of digital panel meter

Ref. Doc. -

Responsibility:- Faculty

(Voltage range)

| Sr.No | Activity |
|-------|---|
| 1 | Take standard regulated voltage source |
| 2 | Adjust its voltage to 5volt and apply it to standard load resistance 1000 ohm |
| 3 | Use standard calibrated digital multimeter to measure the voltage across 1000 ohm resistance |
| 4 | Note the standard voltage reading $VR_1 = \text{---- Volt}$ |
| 5 | Connect the meter under calibration across 1000ohm resistance and measure voltage reading $VR_2 = \text{---- Volt}$ |
| 6 | Determine error $V_{\text{error}} = VR_1 - VR_2$ |
| 7 | Calculate % error |
| 8 | error If the error is within the specified limit, mark it as OK |

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Subject - In house Calibration of digital Panel Meter

Ref. Doc. -

Responsibility:- Faculty

(Current range)

| Sr.No | Activity |
|-------|--|
| 1 | Take standard regulated current source. |
| 2 | Adjust its current to 500mA and apply it to standard load resistance of 1000 ohm |
| 3 | Use standard calibrated digital multimeter to measure the current through 1000 ohm resistance |
| 4 | Note the standard current reading $IR_1 = \text{---mA}$ |
| 5 | Connect the meter under calibration in 1000 ohm resistance circuit and measure current $IR_2 = \text{---mA}$ |
| 6 | Determine error $I_{\text{error}} = IR_1 - IR_2$ |
| 7 | Calculate % error |
| 8 | If the error is within the specified limit, mark it as OK |

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| Date: | DIGITAL STOP WATCH | Ref.No: |
| Page: | Responsibility: HOD & FACULTY | Rev.No: |

Subject - In house Calibration of digital Stop watch

Ref. Doc. -

Responsibility:- Faculty

(Voltage range)

| Sr.No | Activity |
|-------|--|
| 1 | Take the digital stop watch and mobile phone |
| 2 | Select the particular time and start the stop watch and mobile time at a time for duration of 60sec. |
| 3 | Time display on stop watch $T_1 = \text{---- Sec}$ |
| 4 | Time display on stop watch $T_2 = \text{---- Sec}$ |
| 5 | Determine error $T_{\text{error}} = T_1 - T_2$ |
| 6 | Calculate % error |
| 7 | If the error is within the specified limit, mark it as OK |

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DEPARTMENT OF ELECTRONICS

STANDARD OPERATING PROCEDURE

| | | |
|-------|-------------------------------|---------|
| Date: | VOLTMETER / AMMETER | Ref.No: |
| Page: | Responsibility: HOD & FACULTY | Rev.No: |

Subject - In house Calibration of Voltmeter

Ref. Doc. -

Responsibility:- Faculty

(Voltage range)

| Sr.No | Activity |
|-------|--|
| 1 | Take standard regulated voltage source |
| 2 | Adjust its voltage to 5volt and apply it to standard load resistance 1000 ohm |
| 3 | Use standard calibrated digital multimeter to measure the voltage across 1000 ohm resistance |
| 4 | Note the standard voltage reading $VR_1 = \text{--- Volt}$ |
| 5 | Connect the meter under calibration across 1000ohm resistance and measure voltage reading $VR_2 = \text{--- Volt}$ |
| 6 | Determine error $V_{\text{error}} = VR_1 - VR_2$ |
| 7 | Calculate % error |
| 8 | error If the error is within the specified limit, mark it as OK |

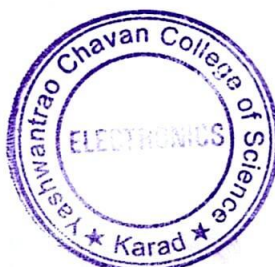


Prepared by AMR



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