

1	Name of Course	<b>C.C. in Electronic Test &amp; Measuring Instruments ( 308107)</b>																																								
2	Max. Nos. of Student	25 Students																																								
3	Duration	6 Months																																								
4	Type	Full Time																																								
5	Nos. Of Days / Week	6 Days																																								
6	Nos. Of Hours /Days	7 Hrs																																								
7	Space Required	Laboratory = 1000 Sq feet Class Room = 200 Sq feet <b>TOTAL = 1200 Sq feet</b>																																								
8	Entry Qualification	<b>S.S.C.+ Any Course in Instrumentation Group of MSBVE</b>																																								
9	Objective Of Syllabus/ introduction	Awareness of Safety precautions. Awareness of Instrumentation. Awareness of Electronic Test & Measuring Instruments. Awareness of Repair & Maintenance of Electronic Test & Measuring Instruments.																																								
10	Employment Opportunity	The trainee will either to be able to take up jobs with agencies which Develop, maintain and repair Electronic Test & Measuring Instruments or with working experience will be in a position to start his own independent Business.																																								
11	Teacher’s Qualification	Diploma in Instrumentation Engineering.																																								
12	Training System	Training System Per Week <table><tr><td><b>Theory</b></td><td><b>Practical</b></td><td><b>Total</b></td></tr><tr><td>12 Hours</td><td>30 Hours</td><td>42 Hours</td></tr></table>						<b>Theory</b>	<b>Practical</b>	<b>Total</b>	12 Hours	30 Hours	42 Hours																													
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13	Exam. System	<table><tr><th>Sr. No.</th><th>Paper Code</th><th>Name of Subject</th><th>TH/PR</th><th>Hours</th><th>Max. Marks</th><th>Min. Marks</th></tr><tr><td>1</td><td><b>30810711</b></td><td>Electronic Test &amp; Measuring Instruments</td><td>TH-I</td><td>3 hrs</td><td>100</td><td>35</td></tr><tr><td>2</td><td><b>30810721</b></td><td>Basic Electronic &amp; Electronics Instrumentation.</td><td>PR-I</td><td>3 hrs</td><td>100</td><td>50</td></tr><tr><td>3</td><td><b>30810722</b></td><td>Electronic Test &amp; Measuring Instruments</td><td>PR-II</td><td>6 hrs</td><td>200</td><td>100</td></tr><tr><td></td><td></td><td><b>TOTAL</b></td><td></td><td></td><td><b>400</b></td><td><b>185</b></td></tr></table>						Sr. No.	Paper Code	Name of Subject	TH/PR	Hours	Max. Marks	Min. Marks	1	<b>30810711</b>	Electronic Test & Measuring Instruments	TH-I	3 hrs	100	35	2	<b>30810721</b>	Basic Electronic & Electronics Instrumentation.	PR-I	3 hrs	100	50	3	<b>30810722</b>	Electronic Test & Measuring Instruments	PR-II	6 hrs	200	100			<b>TOTAL</b>			<b>400</b>	<b>185</b>
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1	<b>30810711</b>	Electronic Test & Measuring Instruments	TH-I	3 hrs	100	35																																				
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# SYLLABUS

## Electronic Test & Measuring Instruments

Practical – II	Theory – I
a) Familiarization with various tools and its proper use. b) Familiarization with trainer model of : i) Analog multimeter ii) Digital multimeter iii) Pulse generator iv) Function generator v) Sinewave/squarewave generator vi) Regulated power supply vii) Storage CRO & CRO viii) Digital panel meter ix) LCR- Q meter x) Logic probes xi) Frequency counters	a) Introduction to various tools and their application ,like screw driver, plier, Nose plier, cutter, tweezers, magnifying lens, spanner, LN key, soldering iron, desoldering pump. b) Introduction of various test instruments physically and to know operation and its measurement.
Identification of components a) Resistor i) Find value with colour coding & multimeter ii) Finding wattage b) Capacitor i) Types of capacitor ii) Polarized & Non Polarized type capacitor iii) Value reading with colour coading, multimeter & LCR-Q meter. c) Inductor - value reading with LCR-Q meter.	Theory, Classifications and colour coding of various passive components like : a) Resistor b) Capacitor c) Inductor
Identification of components a) Diode-Variou type of diodes, Testing and reorganization of diode leads with coading and multimeter. b) Transistor lead identification (B,E,C) and its testing with multimeter . c) NPN/PNP transistor d) Signal transistor/power transistor e) Type of FET, N-channel, P-channel ,testing of FET f) Identification and testing of MOSFET/UJT/IGBT	Theory of various Active components like: a) Diode b) Zener diode c) Tunnel diode d) Transistor (BJJ) e) FET f) MOSFET g) UJT,(f) IGBT
Identification and testing of : a) SCR : with multimeter/by suitable biasing b) Diac: with multimeter c) Triac: with multimeter by suitable biasing d) Digital IC testing with digital IC tester and logic probes e) Analog IC testing with analog IC tester f) Testing of transformer	Theory of : a) SCR b) Diac c) Triac d) Step up & step-down transformer e) Isolation transformer f) Variac g) Introduction to digital IC h) Introduction to Analog IC

a) Calibration of Analog multimeter b) Construction and repair of moving coil meter. c) Tracing circuit and identification of components d) Ac voltage measurement e) DC current measurement f) Resistance measurement	Study of Analog multimeter a) Block diagram & specifications b) Construction of moving coil meter c) DC voltage measurement circuit d) Resistance measurement circuit e) DC current measurement circuit
a) Circuit diagram, reading and tracing of circuits b) Calibration of instruments c) Measurement with h) AC/DC voltage i) AC/DC current j) Resistance k) Capacitance/frequency l) hfe/transistor testing	Study of digital multimeter a) Block diagram and specification b) Displays, LED/SCD type c) Introduction to A/D converter d) Study of IC used in DMM/display driver IC, 7106, IC7107 e) AC / DC voltage measurement circuit description f) AC / DC current measurement circuit description g) Resistance measurement circuit
a) To know the operation of pulse generator b) Calibration of pulse generator c) Generating wave form and testing on CRO d) Changing of frequency and pulse repetition rate and see wave form on CRO	Study of pulse generator for block diagram and circuit diagram of (a) Trigger Circuit (b) Gating circuit (c) Auto/Manual circuit (d) Wave form Inversion Circuit
a) Operation and calibration of function generator b) Generation of various wave form on CRO and its measurements c) Tracing of circuit Test point measurement on CRO	Study of function generator a) Specification and block diagram b) Study of various circuit diagram
a) Tracing of circuit b) Calibration of instruments c) Observation of Sin/Square wave on CRO and its measurements d) Measurements of wave form at various test points	Study of Sin & square wave signal generator a) Specification and block diagram  b) Study of various circuit diagrams
1) Familiarisation with the power supply a) Testing of power supply circuit b) Tracing of circuit and components c) Line regulation/load regulation/ripple d) Calibration ;of voltage/currents DPMS e) Working with Regulated Power Supply ICs 2) Familiarization with SMPS a) Testing of voltage current waveform on CRO b) Study of duty cycle control logic and its ICs	Power supply: 1) Regulated Power Supply a) Need of regulated power supply b) Various type of circuits of regulated power supply c) Regulated power supply ICs 2) SMPS a) Block diagram and circuit diagram of SMPS b) Specifications of SMPS c) SMPS ICs

<p>Familiarization of front panel, operating knobs of CRO and switches-</p> <p>a) Calibration of CRO</p> <p>b) Measurements</p> <p>    i) Frequency</p> <p>    ii) Voltage AC/DC</p> <p>    iii) Current AC/DC</p> <p>c) Component testing</p> <p>d) Storage of Data/wave forms in storage CRO</p> <p>e) Direct digital display output in storage CRO</p>	<p>Study of simple and storage type of cathode ray oscilloscope</p> <p>a) Specification and block diagram</p> <p>b) Coupling circuit</p> <p>c) X Amplifier/Amplifier circuit</p> <p>d) Trigger Amplifier</p> <p>e) Trigger switching circuit</p> <p>f) Time base circuit</p>
<p>Familiarization with the front panel and digital display.</p> <p>a) Calibration of DPM</p> <p>b) Application of input voltage and reading output</p> <p>c) Tracing of circuit and components</p>	<p>Study of Digital Panel Meter: a) Block diagram of DPM b) Circuit diagram and its study c) IC used- 7106 or any other d) Study of 7-segment display</p>
<p>Familiarization with the front panel, digital read out and various operating switches-</p> <p>a) Measurement of resistance</p> <p>b) Measurement of Capacitance</p> <p>c) Measurement of inductance</p> <p>d) Measurement of quality factor.</p>	<p>Study of LCR-Q meter</p> <p>a) Block diagram of LCR-Q meter</p> <p>b) Circuit diagram and its study</p>
<p>Familiarization with various high/low /unstable stage output LED of logic probes-</p> <p>a) Checking of digital IC with the logic probes</p> <p>b) Checking of pulse wave form with logic probes</p>	<p>Study of Logic Probes-</p> <p>A) Block diagram of Logic Probes</p> <p>B) Circuit diagram study of logic probes</p>
<p>Familiarization of digital display and various knobs of frequency counter a) Connecting a function generator to</p>	<p>Study of digital frequency counter-</p> <p>a) Block diagram and circuit diagram study of the frequency counter</p>
<p>a) frequency counter and read the output frequency</p> <p>b) Tracing of circuit of frequency counter</p> <p>c) Checking the various test point on CRO</p>	<p>b) Study of various IC of frequency counter</p> <p>c) Circuit diagram study of digital display decoder of frequency counter</p>
<p>a) Reading of block diagram and circuit diagram on PCBs</p> <p>b) Tracing the circuit diagram</p> <p>c) Study and specification of various analog/digital ICs in instruments</p> <p>d) Detecting faulty components</p> <p>e) Creating the fault in instruments and rectify it.</p>	<p>Trouble shooting, Repair and maintenance of analog multimeter, digital multimeter, CRO, pulse generator, function generator, sine/square wave generator, power supply, SMPS, LCR-Q meter, logic probe and digital frequency counter</p>
<p>a) Calibration of instruments given to the points on the PCBs.</p> <p>b) Calibration by matching with the standard instruments.</p> <p>c) Finding the error in readings.</p>	<p>Calibration and error calculation of all above instruments</p>

## Basic Electronics & Electronics Instrumentation

<b>Practical - I</b>
<p>Identification of hand tools, Safety Precautions while working in Electronics Lab &amp; Electric Shock First Aid, and various measuring instruments, soldering- de- soldering Practice on wire, chassis and on PCB.</p> <ul style="list-style-type: none"> <li>• Identification specification &amp; testing of various kind of resistances, &amp; capacitors, Measurement by colour code</li> <li>• Familiarize with various types of switches.</li> <li>• Construct circuit with SPST, SPDT, and DPDT switches.</li> <li>• Familiarize miniature and micro switches, reed switches &amp; latches, sockets –connectors &amp; plugs, fuses, terminals, tags, legs &amp; thimbles, Relays and their contacts,</li> <li>• Familiarization with various types of variable resistors, the mister, LDR, VDR.</li> <li>• RC time. Constant</li> </ul>
<p>Forward and reverse characteristics of P N junction diode &amp; Zener Diode.</p> <ul style="list-style-type: none"> <li>• Plotting of various characteristics of Transistor</li> <li>• Biasing method of Transistors</li> <li>• Identification, Specification testing of Junction Diode &amp; Transistors, LED, Zener Diode</li> <li>• Fabrication and assembly of Full wave rectifier Ckt using Diodes, Adding to Pie Filter,</li> <li>• Adding to Series Regulated Ckt using Zener &amp; Series Transistor,</li> <li>• Build of voltage Divider , Doublers</li> </ul>
<p>Assemble and observe the outputs of mono stable, bi stable and A-stable multi vibrators using transistors and 1C555.</p> <ul style="list-style-type: none"> <li>• Assembles and observe the output of two input, two output bi stable multi-vibrator, .</li> <li>• Assemble Astable multi-vibrator as a VCO.</li> <li>• Construct and measure the output of simple inverter, SMPS.&amp; UPS</li> <li>• Characteristics of transistor As switch identification and Testing of FET,</li> <li>• Common Source and common drain Configuration,</li> <li>• Study of switching action of JFET CMOS BMOS &amp; MOSFET.</li> <li>• Construct and measure the output of MOSFET based inverter, SMPS.&amp; UPS</li> </ul>
<p>Testing of SCR by multi meter plot the forward characteristics of a SCR</p> <ul style="list-style-type: none"> <li>• Find the latching current and holding current of SCR,</li> <li>• AC switching circuit by UJT, plot the Characteristics of UJT, Construct and observe outputs of UJT firing circuit, light dimmer circuit,</li> <li>• Characteristics of DIAC, DIAC as a DC pulse generator, characteristics of TRIAC fan regulated</li> <li>• DC motor speed control method and armature current control method, SCR trainer kit.</li> </ul>
<p>Integrated Circuits: - Formation of diode, transistor, Resistor and constructional details-Different types of ICs.</p> <p>Assemble and verify truth table of OR, AND, NOT gate using discrete components.</p> <p>Verify truth table of NAND, NOR, XOR and XNOR gates.</p> <p>Study the inter conversion of gates by combination of another logic ckts</p> <p>Making of Min and Max Combination ckt using logic gate</p> <p>Study of Digital Logic Lab and perform various experiments of Flip Flops, Registers, and Counters.</p>

<p>Familiarization with common anode, cathode and seven segments, LED display, LCD display and display drivers,</p> <ul style="list-style-type: none"> <li>• Construct and observe output of resistive network and binary ladder.</li> <li>• D/A converter, observe the output of comparator with different inputs,</li> <li>• Familiarize with A/D converter</li> <li>• Familiarize with memory ICs, parallel expansion of memory ICs, EPROM ICs, EPROM programmer</li> </ul>
Measurement of LC & R, using LCR Bridge, Digital LC & R meter
<p>Measurement of AC, DC voltage, current using all types of Analog and digital meters, ramp type, Integrating type, Continuous Balance type.</p> <p>Study complete method of use of digital millimeter for its complete measurement provision like V,I,R, db, Temperature, capacitance, feature of testing of semiconductors, Frequency, feature of hold and memory provision</p>
<p>Use of Analog and Digital Frequency meter/Counter , Various Type of Timer, Timers and controllers</p> <p>Familiarization with operation, use &amp; application of CRO in detail .Measurement of Freq., Voltage, Phase &amp; Phase Difference using Single, Dual Trace, Storage Type Oscilloscope.</p> <p>Seeing and comparative analysis of wave shape using Oscilloscope.</p> <p>Plotting of Lissagus Pattern</p> <p>Familiarization with operation and use of various kind of signal generator, function generator, pulse generator</p>