

ECE1008	Electronics Hardware Troubleshooting	L	T	P	J	C
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Prerequisite:	Nil	Syllabus Version				
		1.0				
Course Objectives:						
1. To understand the process of identification and testing of various electronic components and instruments.						
2. To introduce the troubleshooting methods of electronic circuits.						
3. To understand the process of PCB layout and implementation of various circuits on it.						
Course Outcomes:						
1. Perform testing and identification of various electronic components and instruments.						
2. Perform trouble shooting of simple electronic circuits						
3. Perform soldering, basic operations of hardware trouble shooting on a PCB.						
4. Construct and Implement basic application oriented circuits on PCB.						
Student Learning Outcomes (SLO): 1,14,18						
# List of possible experiments:						
1. Study of Measuring, Testing, Power Supply Instruments and Breadboard.						
2. Testing and Trouble shooting of Diodes and Transistors.						
3. Trouble shooting of Clamper and Clipper Circuits.						
4. Trouble shooting and testing of power supply.						
5. Use of C.R.O to find Mid-band Voltage gain and Frequency Response of Amplifiers.						
6. Trouble shooting and Testing of NMOS Inverter, NMOS NOR and NAND Logic with Pull-Up resistor						
7. Trouble shooting and Testing of NMOS and Diode connected with Pull-Up resistor for A specific logic.						
8. PCB layout and hardware troubleshooting of simple audio amplifier.						
9. Trouble shooting and testing of power Inverter.						
10. Trouble shooting and testing of multi-meter.						
11. Trouble shooting and testing of equalizer circuits.						
12. Trouble shooting and testing of emergency light.						
1. THE STUDY OF MEASURING INSTRUMENTS, TESTING INSTRUMENTS AND POWER SUPPLY.						3 Hours
Short description:- The objective of this experiment is to gain some hand on experience with the tools that is used in the electronic testing and measuring equipment's. A breadboard has a construction base for prototyping of electronic circuits. Solderless breadboard does not required soldering, it is reusable. In general breadboard consist of power rail, DIP support and terminal strips.						
2. TESTING AND TROUBLE SHOOTING OF DIODES AND TRANSISTORS.						2 Hours
Short description: In diodes faults are determined using multi-meter by checking forward and reverse bias resistances. In digital multi-meter diode is tested by connecting diode test function.						

T. Jeyaraj



In Transistors upper and lower 3dB frequencies, bandwidth & gain frequency are determined by using CRO. Phase difference is determined by applying two signals on channel 1 and channel 2	
3. TROUBLE SHOOTING OF CLAMPER AND CLIPPER CIRCUITS. <u>Short description:</u> - Trouble shooting the problems related to clipper and clamper circuits. Study of nonlinearities in diode and analysis of charging and discharging time of capacitors.	2 Hours
4. USE OF C.R.O TO FIND MID-BAND VOLTAGE GAIN AND FREQUENCY RESPONSE OF BASIC AMPLIFIERS. <u>Short description:</u> Outputs and input of amplifier is connected to channel 1 and channel 2. Output amplitude of amplifier is independent of the input frequency variation which gives mid-band gain of the amplifier. By adjusting tuning knob of function generator 3-dB frequency can be determined.	2 Hours
5. TROUBLE SHOOTING AND TESTING OF POWER SUPPLY. <u>Short description:</u> -A regulated power supply expected to have constant output voltage or current despite variation in load current or input supply. Conversely, output of an unregulated power supply changes significantly when its input voltage or load current changes. Power supply should be ripple free and concerning filter circuits are designed carefully.	2 Hours
6. TROUBLE SHOOTING AND TESTING OF NMOS INVERTER, NMOS NOR AND NAND LOGIC WITH PULL-UP RESISTOR. <u>Short description:</u> - All logic circuit is consists of an N-channel MOSFET and pull-up resistor. Strong zeroes and strong ones are to be expected at the outputs. To elevate back-gate effects Bulk is to be biased properly. Small device lengths are preferred which reduces both static and dynamic power dissipation.	2 Hours
7. TROUBLE SHOOTING AND TESTING OF NMOS DIODE CONNECTED WITH PULL-UP RESISTOR FOR A SPECIFIC LOGIC. <u>Short description:</u> - When input voltage is high and greater than V_T , NMOS is ON. The input Supply voltage is applied to the gate and output is applied to the LED. By this arrangement a unique logic is implemented other than basic logic gates.	2 Hours
8. PCB LAYOUT AND HARDWARE TROUBLESHOOTING OF SIMPLE AUDIO AMPLIFIER. <u>Short description:</u> - study of audio amplifier is an electronics amplifier that amplify low power audio signal (signal composed primarily of frequencies ranges between 20 to 20KHz) to a levelsuitable for driving loudspeakers is implemented on PCB and issues related to amplifier layout on PCB are rectified.	3 Hours
9. TROUBLE SHOOTING AND TESTING OF POWER INVERTER. <u>Short description:</u> - Study of issues related to input-output power of the inverter and fuseof the inverter. Study of performance parameters related to the changing of DC	3 Hours

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to AC which is dependent on input voltage, output voltage, frequency and overall power handling.		
10. TROUBLE SHOOTING AND TESTING OF ELECTRONIC COMPONENTS USING MULTI-METER. <u>Short description:</u> -Troubleshooting the electronics devices and components to check whether they are working properly. Before testing components proper mode should be selected and pins of components should be inserted in their respective slots.		3 Hours
11.TROUBLE SHOOTING AND TESTING OF EQUALIZER. <u>Short description:</u> -Trouble shooting the circuit for correction of frequency dependent distortion in telecommunication. Study of signal which is send to bank of filter and the signal which is passed as a portion of the signal present in its own frequency range.		3 Hours
12.TROUBLE SHOOTING AND TESTING OF EMERGENCY LIGHT. <u>Short description:</u> - Study and controlling of charging currents in battery. Study of minimizing the switching delays. When battery is fully charged power should cut-off and leakages of battery charge should be minimized when not in use.		3 Hours
Total laboratory hours:		30 hours
Text Books:		
1.	D. A. Neamen, <i>Electronic Circuit Analysis and Design</i> 3/e, Tata McGraw-Hill, New Delhi, 2007.	
Reference Books:		
1.	Jacob Millman, Christos C Halkias and Satyabrata Jit, "Electronic devices and circuits" Tata McGraw Hill 2nd Edition , 2007	
Mode of evaluation: Continuous Assessment & Final Assessment Test (FAT)		
Recommended by Board of Studies		13/06/2015
Approved by Academic Council	37 th AC	Date 16/06/2015

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