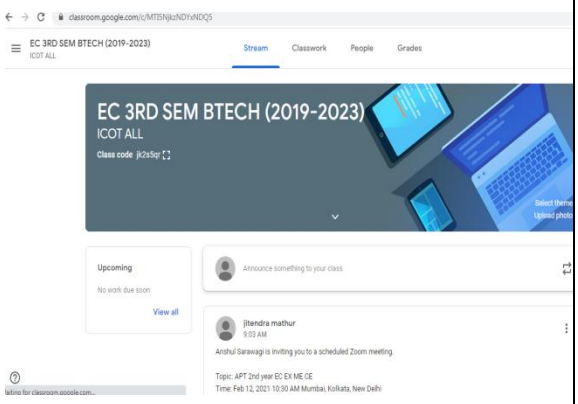
ICT TOOLS DETAILS

- **Electronics & Communication Engineering**

Following Pedagogical methods are included for innovation in teaching and learning by faculties (Also included in their course file)

S.N.	Pedagogical Methods	Detail of Method	PO Mapping
01	Flipped Classroom	Study material is available for the students' prior teaching.	PO1,PO2,PO3,PO4,PO5,PO12, PSO1,PSO2,PSO3
02	ON-SITE Teaching	Students are visited in various industries for practical and industry exposure of cell towers, switching techniques, transmitter and receivers, broadband communication, DTH Services, mobile to mobile communication, PLC, VLSI Design and embedded system etc. with subject teacher. 	PO1,PO2,PO3,PO5,PO6,PO7,PO8, PO12,PSO1,PSO2,PSO3
03	Google Class Room	Department has Google classroom where students are enrolled. Using Google class room faculties provide the teaching	PO1,PO2,PO3,PO4,PO5,PO6,PO7,PO8,PO9,PO12, PSO1,PSO2,PSO3

		materials, assignments, quiz questions and lab manuals. 	
04	Presentation	The students give the presentation on difficult topics and relevant subjects, students deliver presentations to the rest of their classmates. This significantly boosts students' confidence and their learning experience.	PO1,PO2,PO8,PO10,PO12,PSO1,PSO3
05	NPTEL Video	Institute has adopted the NPTEL local chapter and provided the study materials.	PO1,PO2,PO3,PO4,PO5,PO6,PO7,PO8,PO9,PO12, PSO1,PSO2,PSO3
06	Interactive lectures	Lectures are delivered in a way to make it more interactive to the large number of students. The prerequisite knowledge of the topic has provided to students to make interactive lectures at both ends. The course outcomes are well attained while delivering the lectures by defining the proper lesson plan for the subjects.	PO1,PO2,PO3, PO5, PO8, PO10,PO12, PSO1,PSO2,PSO3
07	Demonstration	Practical demonstration of applicability of theoretical concept in real world is given	PO2,PO3,PO4,PO5,PO9, PO10,PO12,

		through program execution, charts, and videos. Students are engaged completely for assigned lab hours. Demonstrations strengthen the lifelong learning capability of students.	PSO1,PSO2,PSO3
08	Group discussions	Group discussions are useful for students in order to analyze the understanding about the concept regarding subject. Also group discussions are learning and sharing information which covers large information about the topic.	PO1, PO2,PO3,PO4,PO5,PO9, PO10,PO11, PO12, PSO1,PSO2,PSO3
09	Learning Management system	It used by the students as part of Interactive teaching learning process. It consists of PPTs, NPTEL videos link, assignments, open access book and journals, university question papers and tutorials etc. which are uploaded by the concern faculty and can be easily access by the students.	PO2,PO3,PO4,PO5,PO9, PO10,PO12, PSO1,PSO2,PSO3
10	Use of Question Bank	Question Banks consisting of variety of questions are given to the students for acquaintance with variety of questions.	PO2,PO3,PO4,PO5,PO9, PO10,PO11, PO12, PSO1,PSO2,PSO3
11	**Virtual labs**	Faculties conduct some experiments on virtual lab for the practical exposure of the students.	PO2,PO3,PO4,PO5,PO9, PO10,PO11, PO12, PSO1,PSO2,PSO3
12	**Adherence to Bloom's taxonomy**	The mid-term tests for all subjects in the department are made in strict adherence to the Bloom's taxonomy. This ensures that the learning as well as the assessment mechanism is based on standard practices of the academic fraternity worldwide.	PO1,PO2,PO3, PO5, PO8, PO10,PO12, PSO1,PSO2,PSO3
13	**Personal counseling**	This has helped many students in dealing with academic as well as personal problems	PO1,PO2,PO3, PO5, PO8, PO10,PO12,

		in the department and faculties.	PSO1,PSO2,PSO3
14	**Major/Minor Projects**	Understandings through development in terms of software solutions and hardware implementation.	PO1,PO2,PO3, PO5, PO8, PO10,PO12, PSO1,PSO2,PSO3
15	**Content Beyond Syllabus**	To meet-out current Industry demand and fill the gap.	PO1,PO2,PO3, PO5, PO8, PO10,PO12, PSO1,PSO2,PSO3
16	**Spoken Tutorial**	Process of active learning method which improves understanding. To learn and use open source software.	PO1,PO2,PO3, PO5, PO12, PSO1,PSO2,PSO3
17	**Feedback**	Institute has detailed feedback mechanism where feedbacks are collected at various level, analyzed and necessary corrective actions are taken.	PO1,PO2,PO3, PO5, PO8, PO10,PO12, PSO1,PSO2,PSO3

All Labs Virtual Lab Link

S/No.	LAB NAME	SEMESTER	Link
1	EC303 -Digital System Design	3rd	https://de-iitr.vlabs.ac.in/
2	EC304 -Electronic Devices	3rd	http://vlabs.iitkgp.ac.in/be/#
3	EC305 -Network Analysis	3rd	http://vlabs.iitb.ac.in/vlabs-d
4	EC306 -EMI Lab	3rd	https://sl-coep.vlabs.ac.in/StrainGuage/Reference.html?
5	EC-402 -Signal & System	4th	https://www.iitg.ac.in/cseweb/vlab/Signal-System-Lab/signalsystem/Signals%20and%20their%20properties (simulator).html
6	EC-405 -Analog Circuits	4th	https://ae-iitr.vlabs.ac.in/
7	EC-406 Simulation Lab	4th	https://www.etti.unibw.de/labalive/
8	EC 501-Microprocessor & its Application	5th	http://vlabs.iitb.ac.in/vlabs-dev/labs_local/microprocessor/labs/explist.php
9	EC 502 - Digital Communication	5th	https://www.etti.unibw.de/labalive/
10	EC 505 -CNTL Lab	5th	https://www.iitk.ac.in/mimt_lab/vlab/
11	EC-601 -Digital Signal Processing	6th	http://vlabs.iitkgp.ac.in/dsp/
12	EC- 605 -Data Communication Lab	6th	http://vlabs.iitb.ac.in/vlabs-dev/labs_local/computer-networks/labs/explist.php

13	EC-606- Microcontroller and Embedded System	6th	http://vlabs.iitkgp.ernet.in/rtes/index.html
14	EC701 - VLSI Design	7th	https://vlsi-iitg.vlabs.ac.in/
15	EC704 - Microwave Lab	7th	https://www.iitk.ac.in/mimt_lab/vlab/index.php
16	EC-801 Optical Fiber Communication	8th	http://vlabs.iitb.ac.in/vlabs-dev/labs/physics-basics/labs/numerical-aperture-measurement-iitk/simulation.html

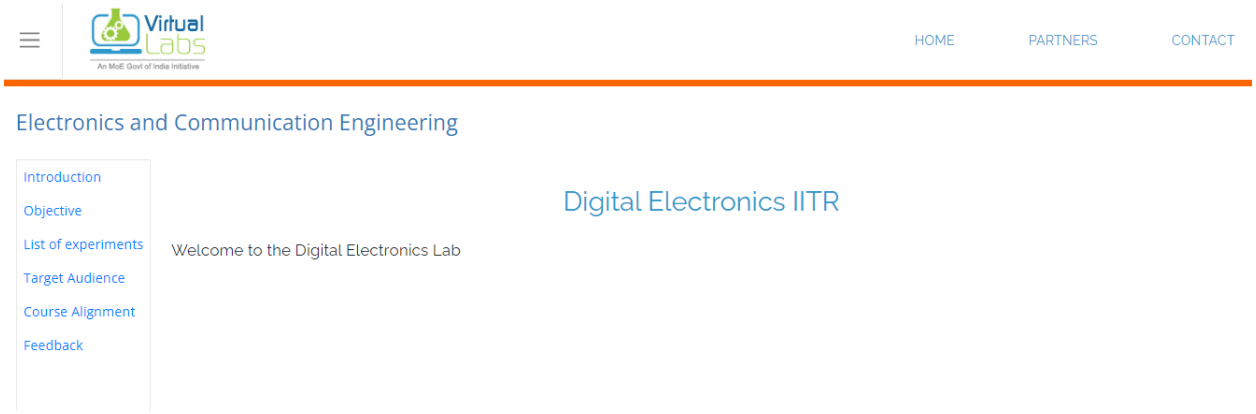
IES College of Technology, Bhopal

BE – 3rd Semester

VIRTUAL LAB MANUAL

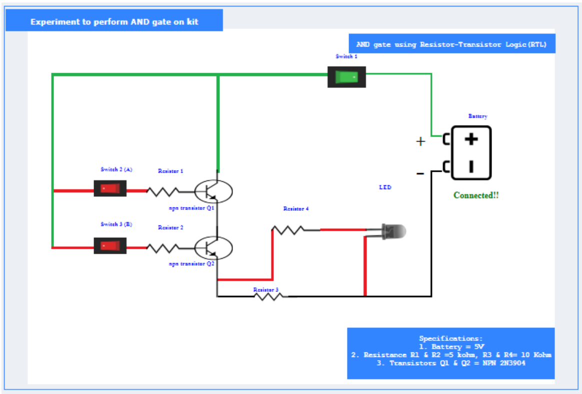
DIGITAL ELECTRONIC

Department of Electronics & Communication Engineering

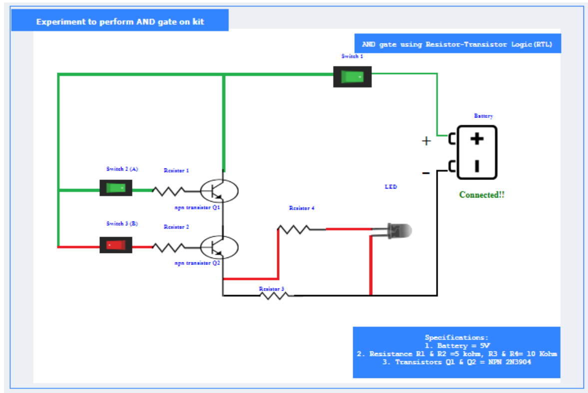


LIST OF EXPERIMENTS

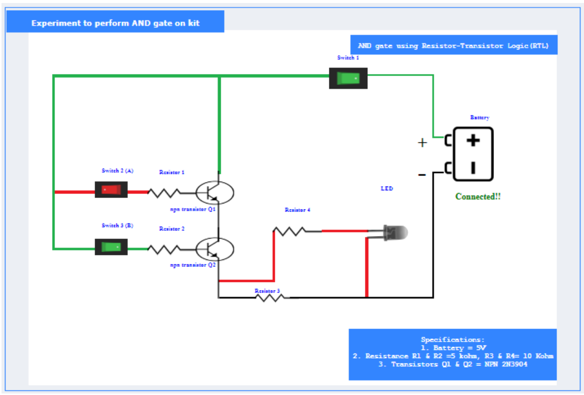
S.No	Name of Experiment
	tronics IITR Digital Electronics IITR 1. Verification and interpretation of truth table for AND, OR, NOT, NAND, NOR, Ex-OR, Ex-NOR gates 2. Construction of half and full adder using XOR and NAND gates and verification of its operation 3. To Study and Verify Half and Full Subtractor 4. Realization of logic functions with the help of Universal Gates (NAND, NOR) 5. Construction of a NOR gate latch and verification of its operation 6. Verify the truth table of RS, JK, T and D flip-flops using NAND and NOR gates 7. Design and Verify the 4-Bit Serial In - Parallel Out Shift Registers 8. Implementation and verification of decoder or de-multiplexer and encoder using logic gates 9. Implementation of 4x1 multiplexer and 1x4 demultiplexer using logic gates 10. Design and verify the 4- Bit Synchronous or Asynchronous Counter using JK Flip Flop 11. Verify Binary to Gray and Gray to Binary conversion using NAND gates only 12. Verify the truth table of one bit and two bit comparator using logic gates



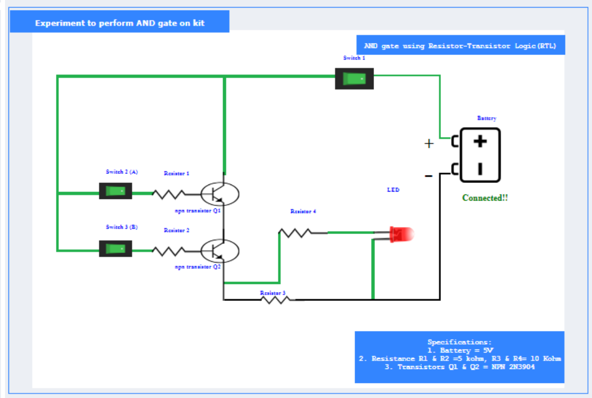
Experiment to perform AND gate on kit
AND gate using Resistor-Transistor Logic (RTL)
Switch 1
Battery
+
-
Connected!!
Switch 2 (A)
Resistor 1
npn transistor Q1
LED
Resistor 4
Switch 3 (B)
Resistor 2
npn transistor Q2
Resistor 3
Specifications:
1. Battery = 5V
2. Resistance R1 & R2 =5 kohm, R3 & R4= 10 Kohm
3. Transistors Q1 & Q2 = NPN 2N3904



Experiment to perform AND gate on kit
AND gate using Resistor-Transistor Logic (RTL)
Switch 1
Battery
+
-
Connected!!
Switch 2 (A)
Resistor 1
npn transistor Q1
LED
Resistor 4
Switch 3 (B)
Resistor 2
npn transistor Q2
Resistor 3
Specifications:
1. Battery = 5V
2. Resistance R1 & R2 =5 kohm, R3 & R4= 10 Kohm
3. Transistors Q1 & Q2 = NPN 2N3904

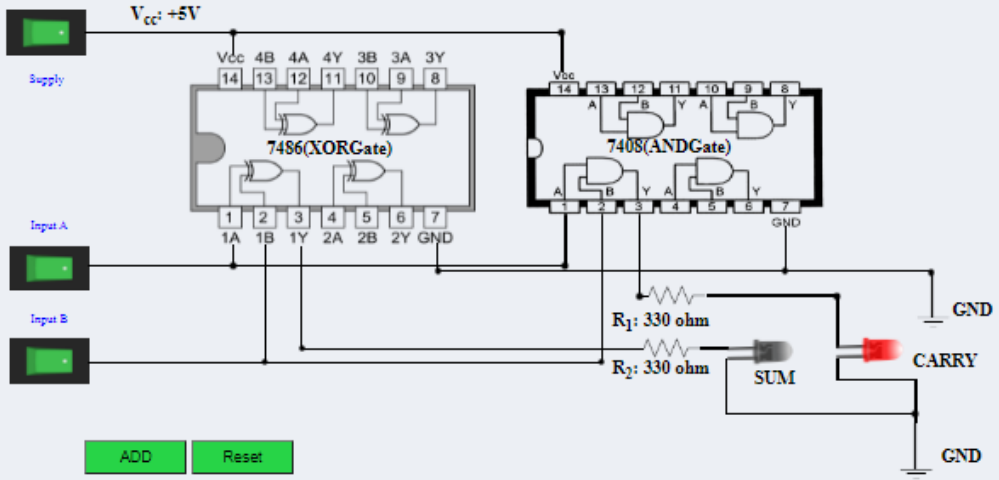


Experiment to perform AND gate on kit
AND gate using Resistor-Transistor Logic (RTL)
Switch 1
Battery
+
-
Connected!!
Switch 2 (A)
Resistor 1
npn transistor Q1
LED
Resistor 4
Switch 3 (B)
Resistor 2
npn transistor Q2
Resistor 3
Specifications:
1. Battery = 5V
2. Resistance R1 & R2 =5 kohm, R3 & R4= 10 Kohm
3. Transistors Q1 & Q2 = NPN 2N3904



Experiment to perform AND gate on kit
AND gate using Resistor-Transistor Logic (RTL)
Switch 1
Battery
+
-
Connected!!
Switch 2 (A)
Resistor 1
npn transistor Q1
LED
Resistor 4
Switch 3 (B)
Resistor 2
npn transistor Q2
Resistor 3
Specifications:
1. Battery = 5V
2. Resistance R1 & R2 =5 kohm, R3 & R4= 10 Kohm
3. Transistors Q1 & Q2 = NPN 2N3904

Experiment to perform logic of half adder on kit

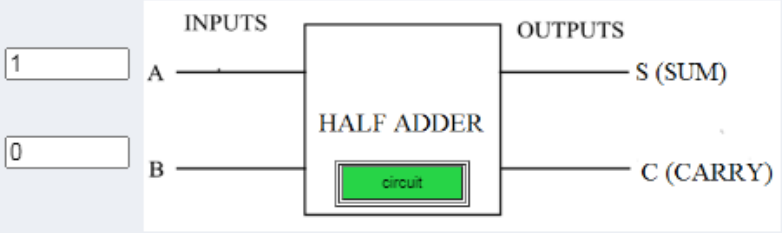


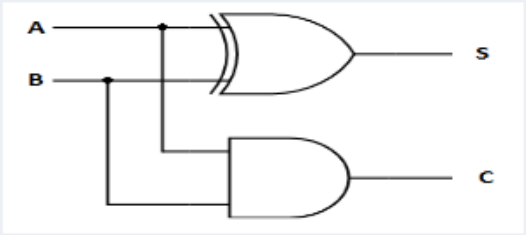
ADD Reset

TRUTH TABLE Print

Serial No.	Input A	Input B	Sum	Carry
1	0	0	0	0
2	1	0	1	0
3	0	1	1	0
4	1	1	0	1

Verification of truth table for HALF ADDER



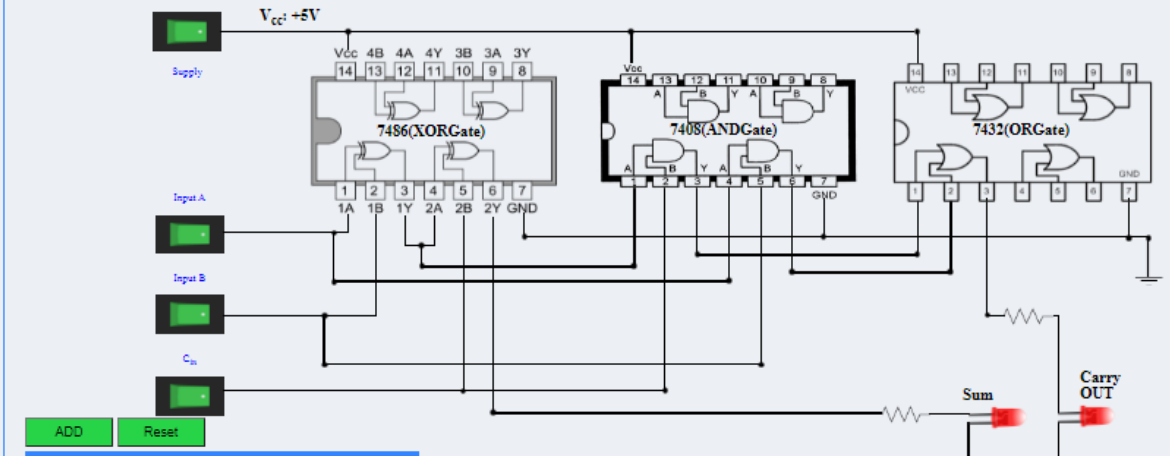


TRUTH TABLE Print

Serial No.	A	B	Sum	Carry	Remarks
1	0	0	0	0	Correct
2	1	0	1	0	Correct
3	0	1	1	0	Correct
4	1	1	0	1	Correct
5	1	0	0	1	Incorrect

Reset

Experiment to perform logic of Full Adder on kit

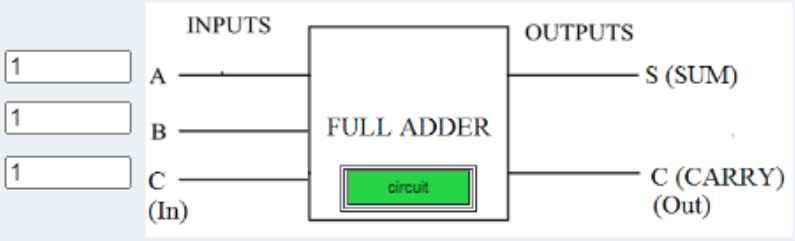


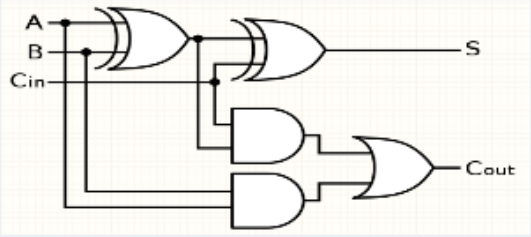
ADD Reset

TRUTH TABLE Print

Serial No.	Input A	Input B	C_{in}	Carry OUT	Sum
1	0	0	0	0	0
2	1	0	0	0	1
3	0	1	0	0	1
4	1	1	0	1	0
5	0	0	1	0	1
6	1	0	1	1	0
7	1	1	1	1	1

Verification of truth table for FULL ADDER

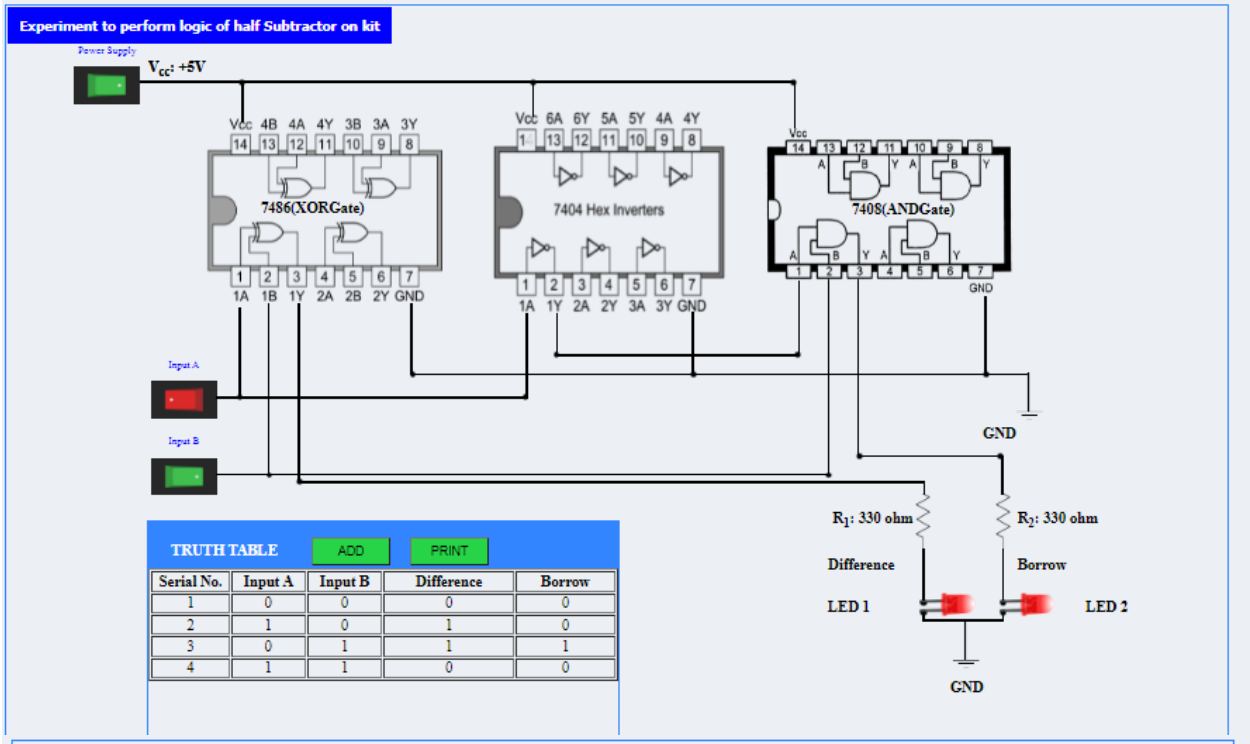


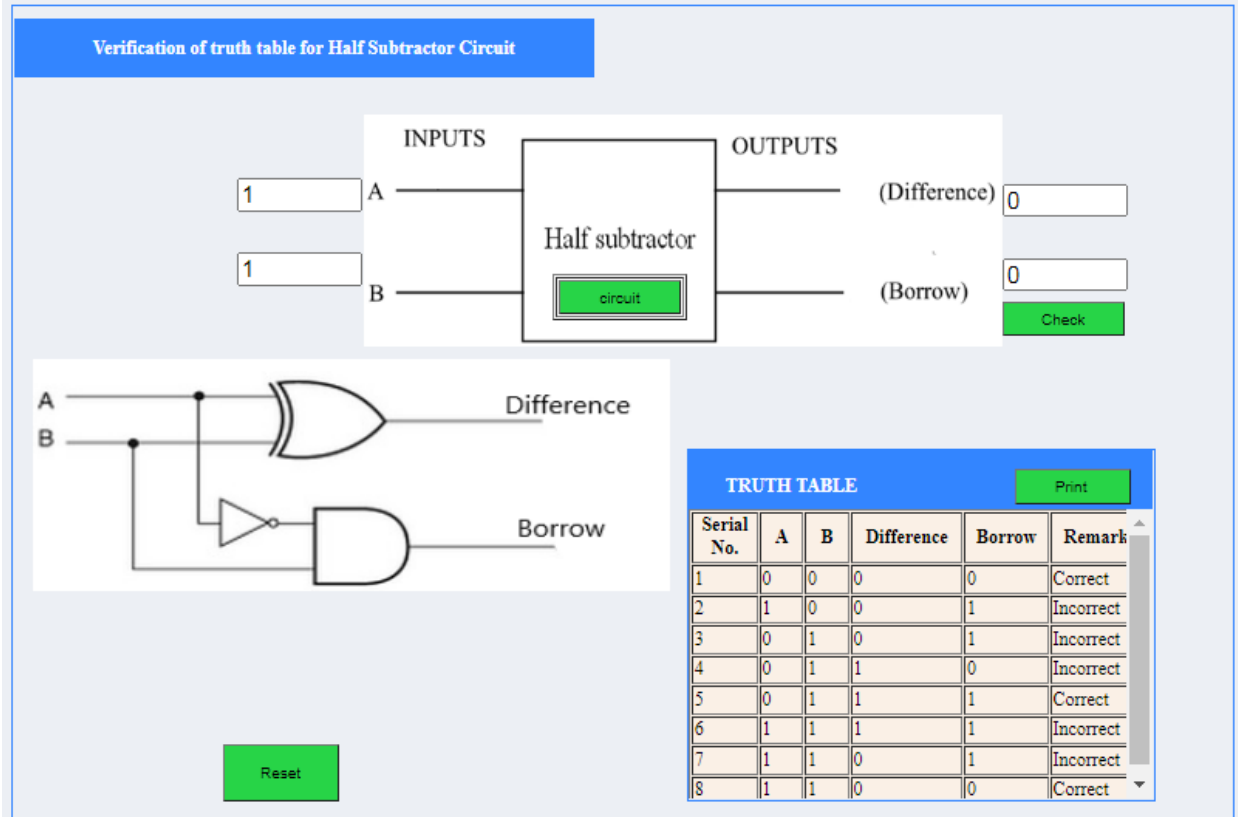


TRUTH TABLE Print

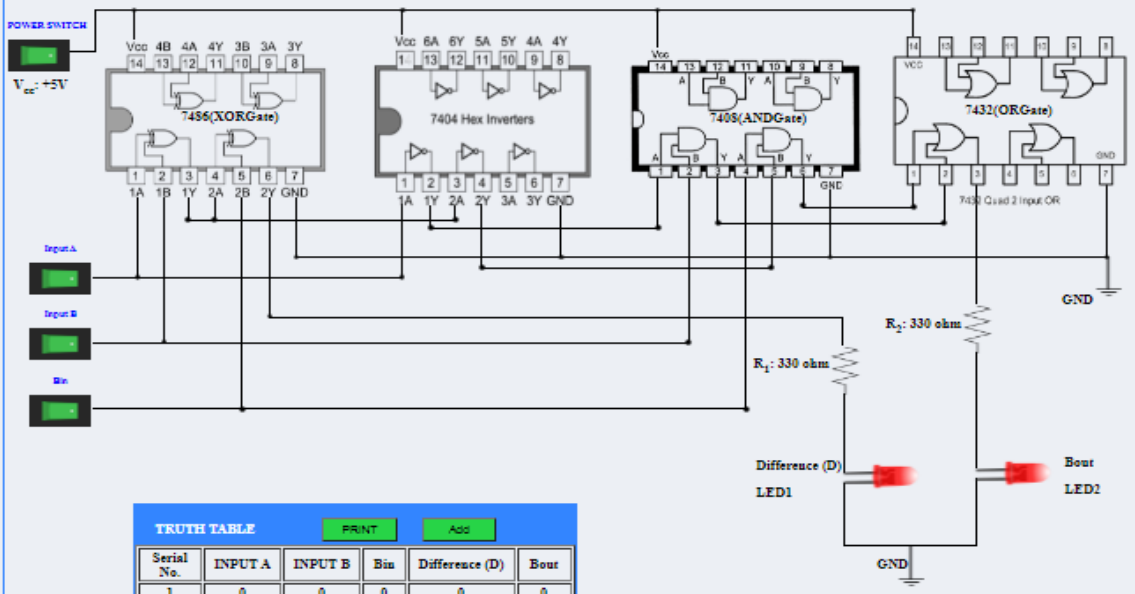
Serial No.	A	B	C_{in}	Sum	C_{out}	Remarks
1	0	0	0	0	0	Correct
2	1	0	0	1	0	Correct
3	0	1	0	1	0	Correct
4	1	1	0	0	1	Correct
5	0	0	1	0	1	Incorrect
6	1	0	1	0	1	Correct
7	1	1	1	0	1	Incorrect

Reset


Experiment to perform logic of half Subtractor on kit
Power Supply
Vcc: +5V
7486(XORGate)
7404 Hex Inverters
7408(ANDGate)
GND
Input A
Input B
R1: 330 ohm
R2: 330 ohm
Difference
Borrow
LED 1
LED 2
GND
TRUTH TABLE
ADD
PRINT
Serial No. | Input A | Input B | Difference | Borrow
1 | 0 | 0 | 0 | 0
2 | 1 | 0 | 1 | 0
3 | 0 | 1 | 1 | 1
4 | 1 | 1 | 0 | 0


Verification of truth table for Half Subtractor Circuit
INPUTS
OUTPUTS
1
A
1
B
Half subtractor
circuit
(Difference)
0
(Borrow)
0
Check
A
B
Difference
Borrow
TRUTH TABLE
Print
Serial No. | A | B | Difference | Borrow | Remark
1 | 0 | 0 | 0 | 0 | Correct
2 | 1 | 0 | 0 | 1 | Incorrect
3 | 0 | 1 | 0 | 1 | Incorrect
4 | 0 | 1 | 1 | 0 | Incorrect
5 | 0 | 1 | 1 | 1 | Correct
6 | 1 | 1 | 1 | 1 | Incorrect
7 | 1 | 1 | 0 | 1 | Incorrect
8 | 1 | 1 | 0 | 0 | Correct
Reset

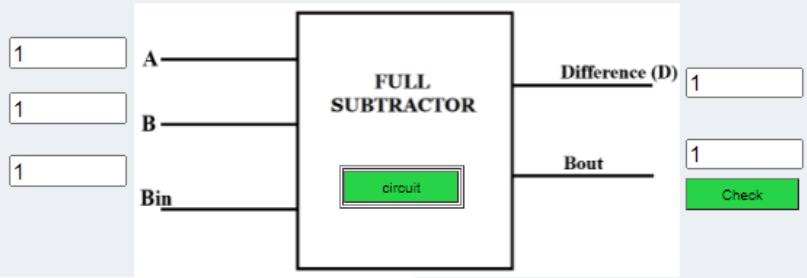
Experiment to perform logic of Full Subtractor on kit

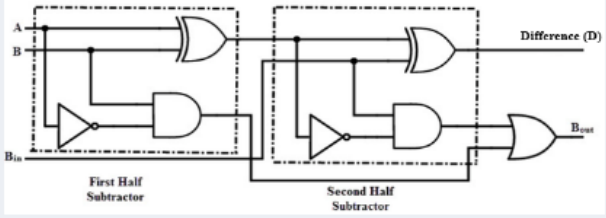


TRUTH TABLE PRINT Add

Serial No.	INPUT A	INPUT B	Bin	Difference (D)	Bout
1	0	0	0	0	0
2	1	0	0	1	0
3	0	1	0	1	1
4	1	1	0	0	0
5	0	0	1	1	1
6	1	0	1	0	0
7	1	1	1	1	1

Verification of truth table for Full Subtractor Circuit

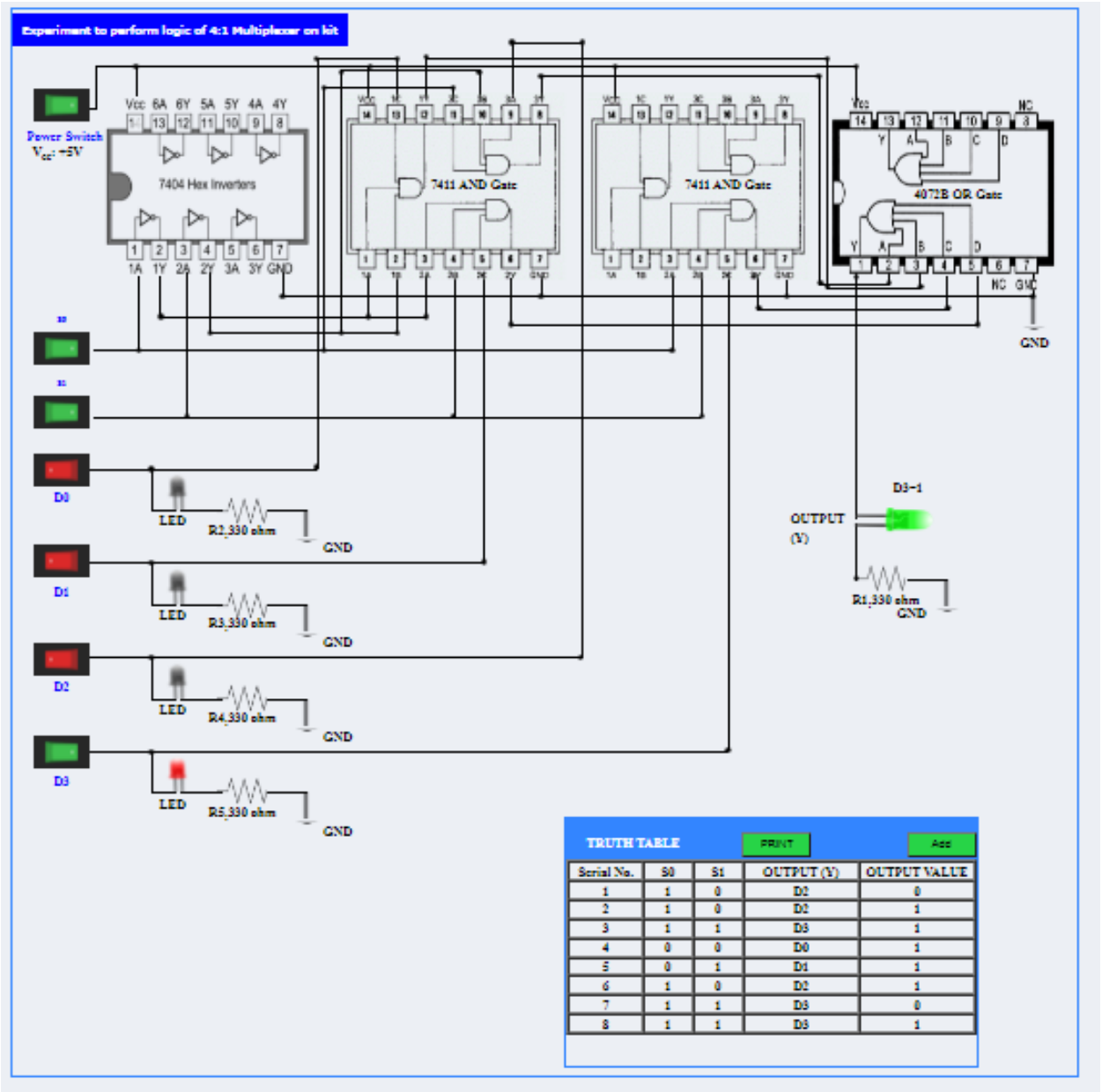




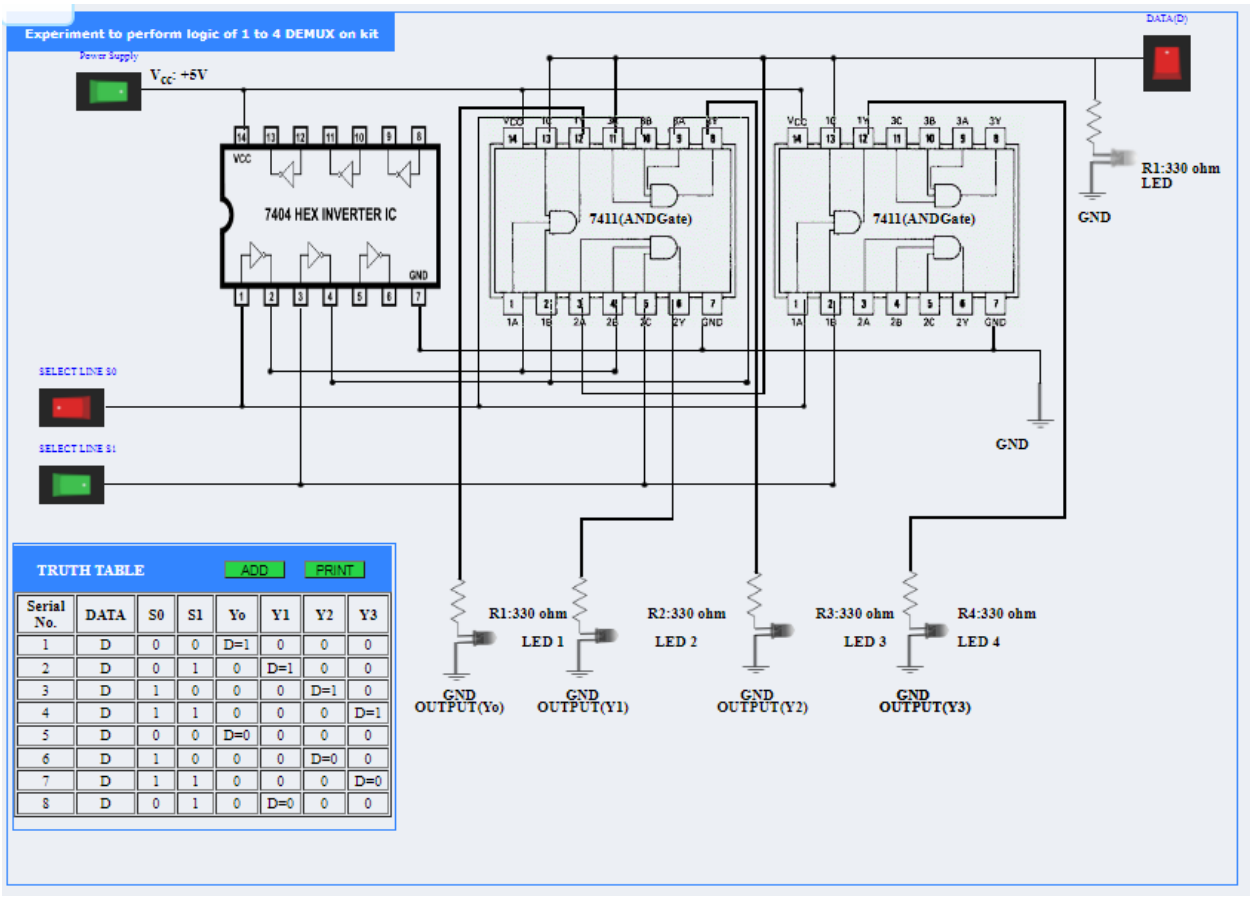
Reset

TRUTH TABLE Print

Serial No.	A	B	Bin	D	Bout	Remarks
1	0	0	0	0	0	Correct
2	1	0	0	1	0	Correct
3	1	1	0	1	1	Incorrect
4	1	1	0	0	1	Incorrect
5	1	1	0	1	0	Incorrect
6	1	1	0	0	0	Correct
7	1	1	1	1	0	Incorrect
8	1	1	1	1	1	Correct



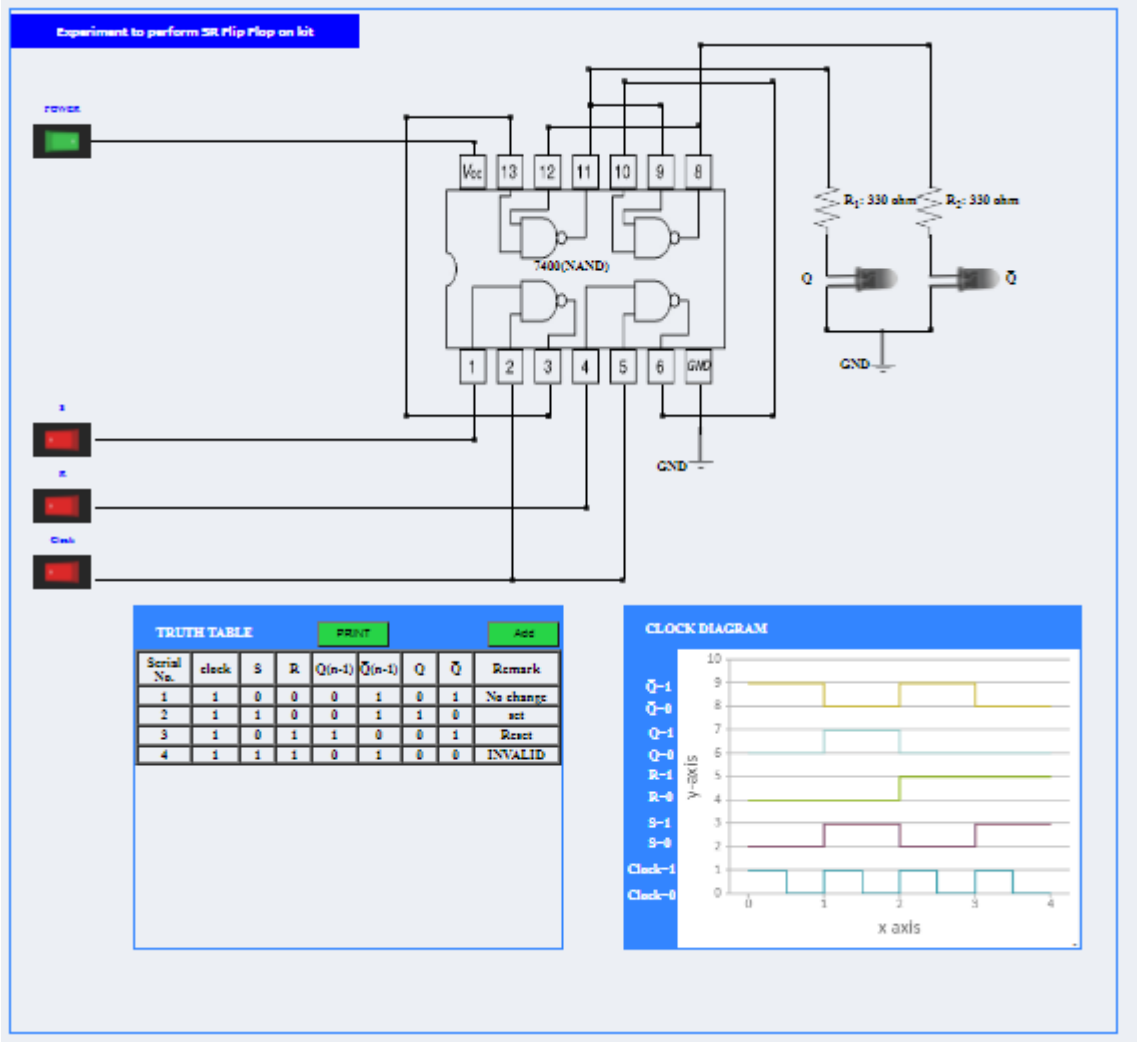
Serial No.	S0	S1	OUTPUT (Y)	OUTPUT VALUE
1	1	0	D2	0
2	1	0	D2	1
3	1	1	D3	1
4	0	0	D0	1
5	0	1	D1	1
6	1	0	D2	1
7	1	1	D3	0
8	1	1	D3	1



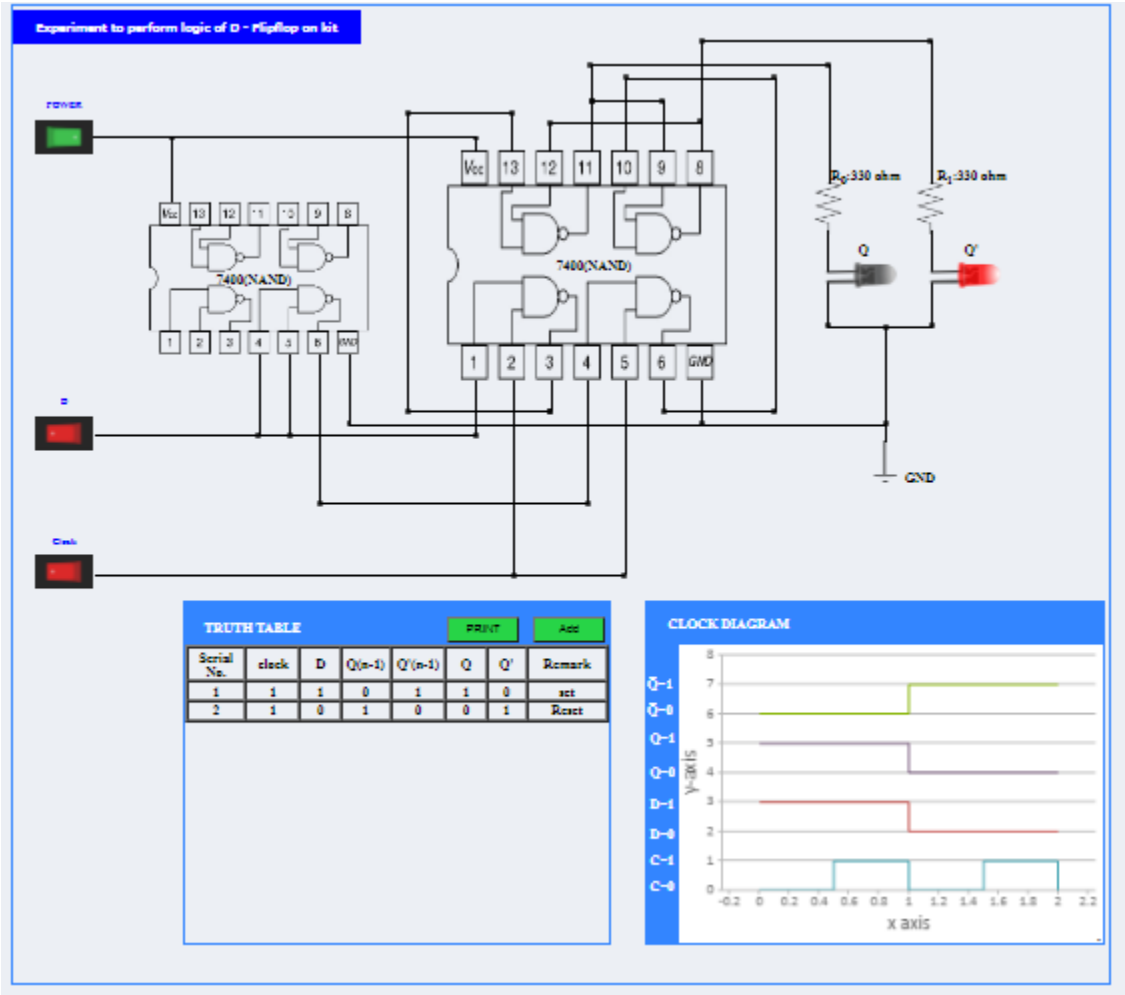
TRUTH TABLE ADD PRINT

Serial No.	DATA	S0	S1	Yo	Y1	Y2	Y3
1	D	0	0	D=1	0	0	0
2	D	0	1	0	D=1	0	0
3	D	1	0	0	0	D=1	0
4	D	1	1	0	0	0	D=1
5	D	0	0	D=0	0	0	0
6	D	1	0	0	0	D=0	0
7	D	1	1	0	0	0	D=0
8	D	0	1	0	D=0	0	0

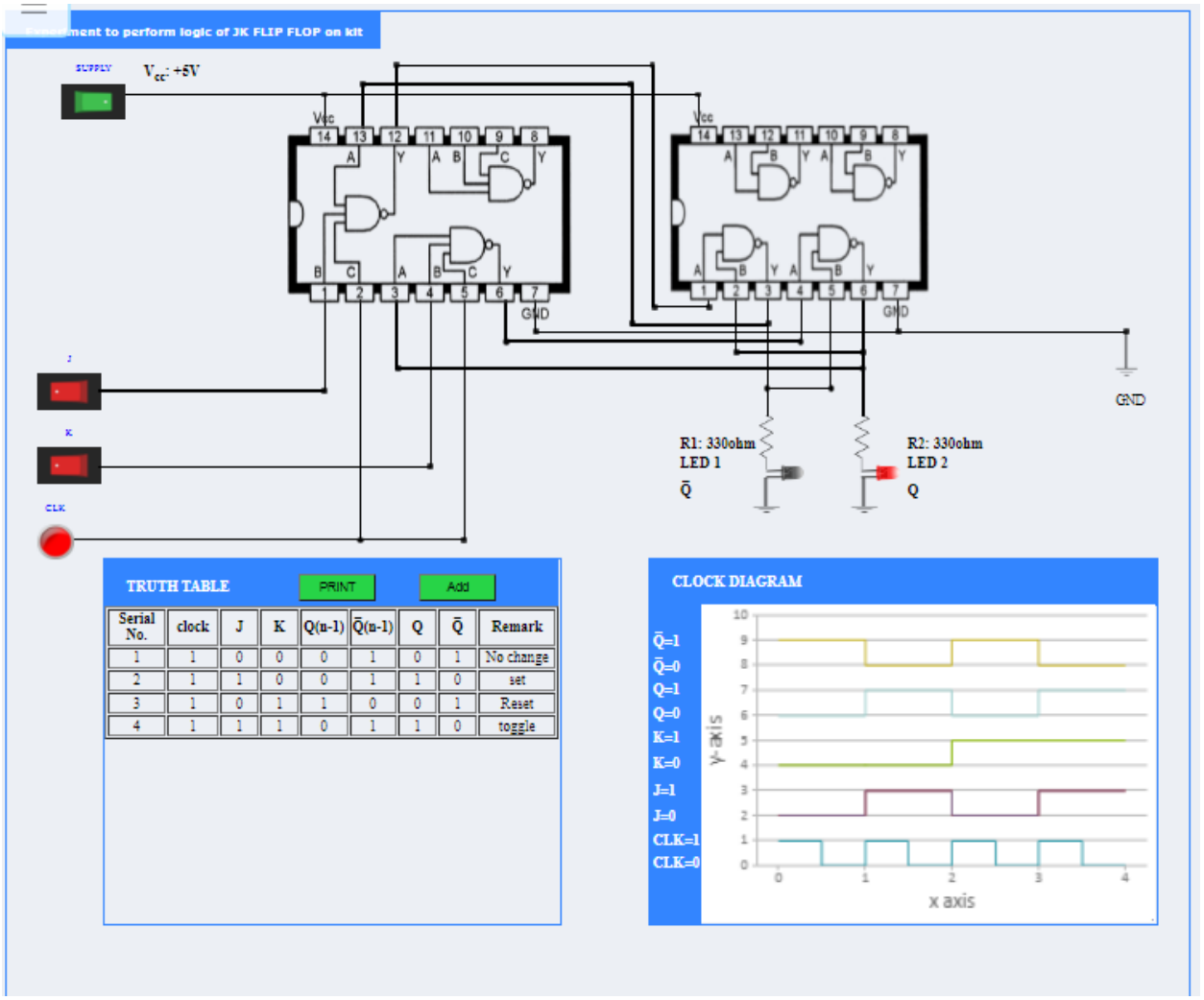
R-S Flip -Flop


Experiment to perform SR Flip Flop on kit
POWER
Vcc
13
12
11
10
9
8
7400(NAND)
1
2
3
4
5
6
GND
R1: 330 ohm
R2: 330 ohm
Q
Q̄
GND
S
R
Clock
TRUTH TABLE
PRINT
Add
Serial No.
clock
S
R
Q(n-1)
Q̄(n-1)
Q
Q̄
Remark
1 1 0 0 0 1 0 1 No change
2 1 1 0 0 1 1 0 set
3 1 0 1 1 0 0 1 Reset
4 1 1 1 0 1 0 0 INVALID
CLOCK DIAGRAM
Q̄-1
Q̄-0
Q-1
Q-0
R-1
R-0
S-1
S-0
Clock-1
Clock-0
y-axis
x axis

D Flip -Flop

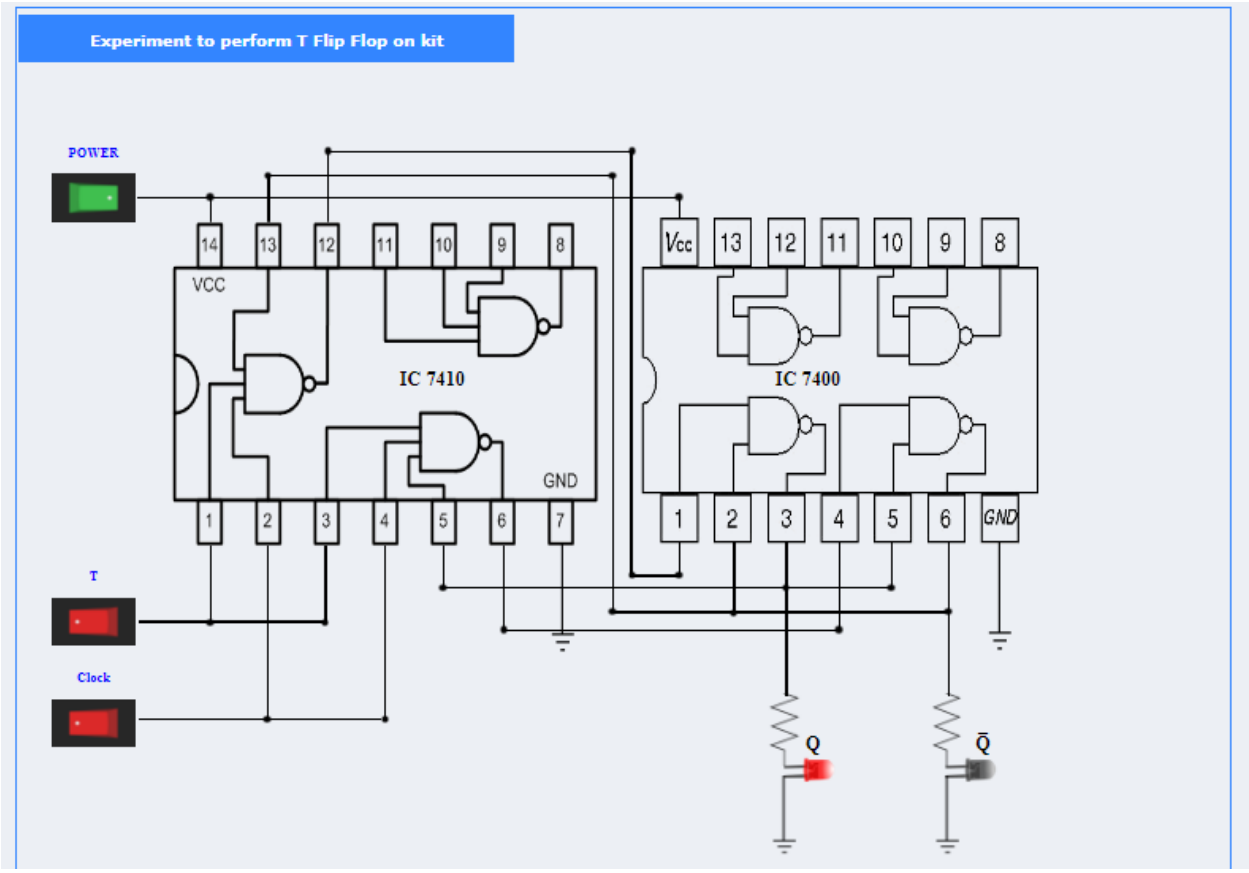

Experiment to perform logic of D - Flipflop on kit
POWER
D
Clock
7400(NAND)
7400(NAND)
Vcc
GND
R_0:330 ohm
R_1:330 ohm
Q
Q'
TRUTH TABLE
PRINT
Add
Serial No.
clock
D
Q(n-1)
Q'(n-1)
Q
Q'
Remark
1
1
1
0
1
1
0
set
2
1
0
1
0
0
1
Reset
CLOCK DIAGRAM
Q'-1
Q'-0
Q-1
Q-0
D-1
D-0
C-1
C-0
y-axis
x axis

J-K Flip -Flop



Serial No.	clock	J	K	Q(n-1)	Q̄(n-1)	Q	Q̄	Remark
1	1	0	0	0	1	0	1	No change
2	1	1	0	0	1	1	0	set
3	1	0	1	1	0	0	1	Reset
4	1	1	1	0	1	1	0	toggle

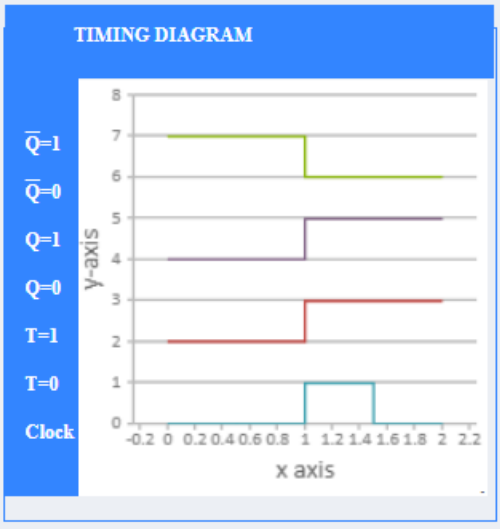
J-K Flip -Flop



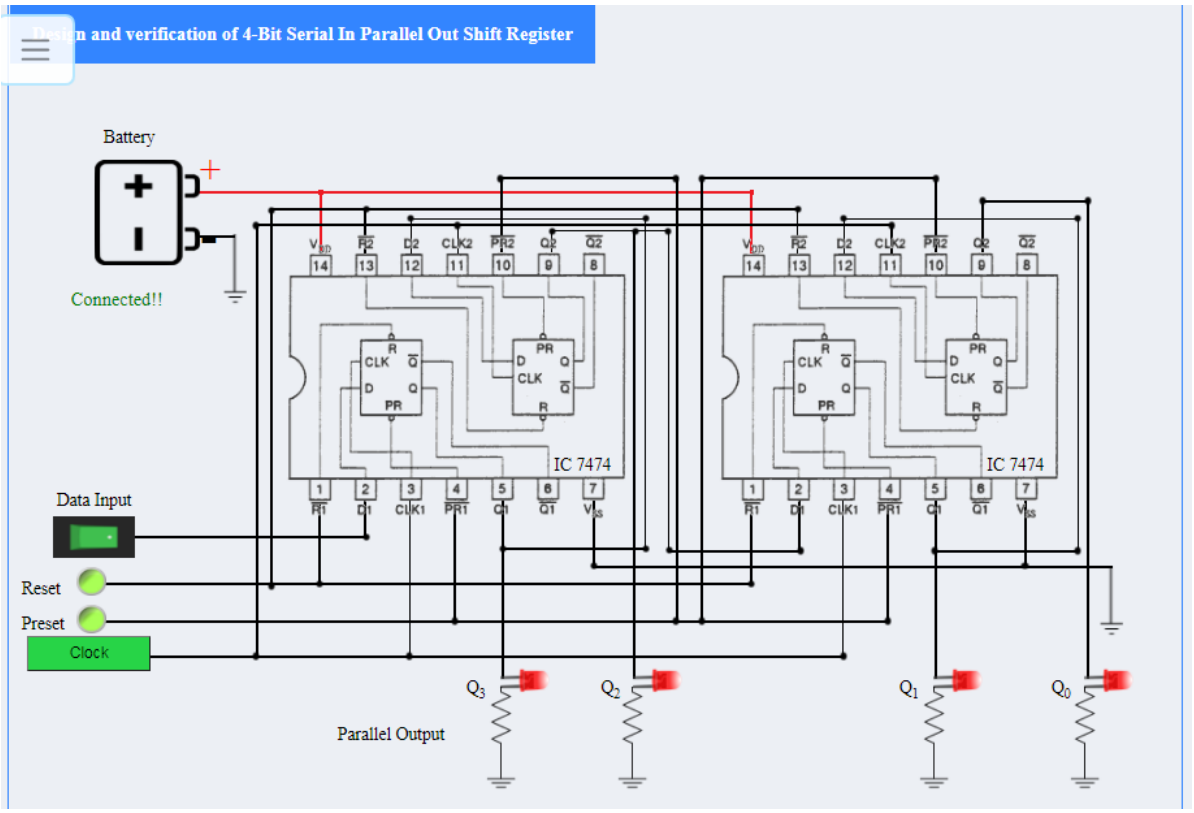
TRUTH TABLE

Add Print

Serial No.	Clock	T	Q_{n-1}	$\bar{Q}_{n-1}$	Q	$\bar{Q}$	Remarks
1	0	0	X	X	0	1	No Change
2	1	1	0	1	1	0	Toggle



Design and verification of 4-Bit Serial In Parallel Out Shift Register



Add Print

TRUTH TABLE

Serial No.	Clock	Data Input	Q_3	Q_2	Q_1	Q_0
1	1	1	1	0	0	0
2	2	1	1	1	0	0
3	3	1	1	1	1	0
4	4	1	1	1	1	1
5	5	1	1	1	1	1
6	9	1	1	1	0	0
7	9	1	1	1	0	0
8	10	1	1	1	1	0
9	12	1	1	1	1	1
10	13	1	1	1	1	1

IES College of Technology, Bhopal

BE – 3rd Semester

VIRTUAL LAB MANUAL

ELECTRONIC DEVICES

(EC - 303)

Session – JULY 2018

Department of Electronics & Communication Engineering

LIST OF EXPERIMENTS

S.No	Name of Experiment
	➢ Ohm's Law ➢ VI Characteristics of a Diode ➢ Half Wave Rectification ➢ Full Wave Rectification ➢ Zener Diode-Voltage Regulator ➢ BJT Common Emitter Characteristics** ➢ BJT Common Base Characteristics**

Virtual Labs
An MoE Govt of India Initiative

BASIC ELECTRONICS VIRTUAL LABORATORY

Welcome to Basic Electronics Virtual Laboratory!

INTRODUCTION LIST OF EXPERIMENTS INSTRUCTION TECHNOLOGY USED PEOPLE FEEDBACK

Introduction

The Virtual Labs Project started as an initiative from the Ministry of Human Resource and Development (MHRD) to create online interactive media which would help students learn difficult concepts in various domains. As a part of this initiative, a virtual laboratory for Basic Electronics has been developed. The objective of this lab is to perform experiments in the Basic Electronics labs virtually, and yet have close to real life experience. The platform is focused on learning aspects as much as on performing the experiments.

Virtual Labs for Teachers

Virtual Labs has the potential to bring paradigm shift in the way courses are taught today.For example, the teachers can take it to the class and demonstrate live examples while they are teaching difficult concepts to the students. Many difficult concepts are already integrated in the provided course icurriculum. It can also complement the existing labs, wherein the students can be given assignments before or after the lab. The teacher can actively coordinate that effort to enable inclusive learning for all the students.

Virtual Labs for Students

Students will get a feel of the real lab, as all lab equipment, components and lab behavior would be mimicked in the system. Extensive 2D animations is used to provide real like look and feel to the students. The instruments and components are modeled accurately to provide real like response. Interactive animations are also provided at a lot of places to enable student learning.

Key features of Virtual Labs

1. Available 24X7. So students can learn difficult concepts at their own pace.
2. Real looking components, to give the user a feel of the real laboratory.
3. Step by step wizard to guide the students through the experiments.

List of experiments

- Experiments Developed
    1. Familiarisation with Resistor
    2. Familiarisation with Capacitor
    3. Familiarisation with Inductor
    4. Ohm's Law
    5. VI Characteristics of a Diode
    6. Half Wave Rectification
    7. Full Wave Rectification
    8. Capacitative Rectification
    9. Zener Diode–Voltage Regulator
    10. BJT Common Emitter Characteristics**
    11. BJT Common Base Characteristics**
    12. Studies on BJT CE Amplifier
    13. RC Frequency Response
    14. RC Differentiator and Integrator
    15. Black Box
    16. Study of basic properties of Operational Amplifier: Inverting and Non-Inverting Amplifiers**
    17. Study of Differentiator and Integrator using Operational Amplifier**

Instruction

Virtual lab supports open source browsers(Google Chrome, Mozilla Firefox, Internet Explorer). If the simulation doesn't run in Mozilla Firefox and Internet Explorer upgrade the software, since HTML 5 doesn't support Internet Explorer 7.0 version.
It supports the Mozilla Firefox of 51.0.1 version.
It supports the Internet Explorer of 11.0.31.

Upgrade Mozilla Firefox

1. **Open your Mozilla Firefox browser**. Click the Firefox button in the top-left corner.
2. Hover your mouse over the Help menu. If you don't see the menu bars, press the **Alt** key. Select About Firefox. If a download is available you'll see Download update. If you don't see download update your browser is up to date and no further action is required.
3. Wait for updates to install. If there are updates available for Firefox, they will be automatically downloaded and installed. The About Firefox screen will show the progress.

Upgrade Internet Explorer

1. **Click the Start button**. You can find it in the lower left corner of your screen. This will open Windows Update.
2. Type **Update** in the search box.
3. Click **Windows Update**. You'll be able to click this option from the list of results.
4. Click **Check for updates.** You can find this option in the left pane. You will then receive a message telling you that important updates are available or that optional updates are available.
5. Click the message. This will let you view the updates that are available.
6. Select the Internet Explorer updates that you want.
7. Click **OK.**
8. Click **Install Updates.**If you're prompted for your password or confirmation, type the password and provide confirmation.

Clear cache and cookies

Clear browser cache(optional) and restart web browser(Internet Explorer, Mozilla Firefox, Google Chrome,Opera, Apple Safari, etc.). browser's cache, which helps pages load faster, make it easier for you to browse the web.Clearing your browser's cache and cookies means that website settings will be deleted and some sites might appear to be a little slower because all of the images have to be loaded again.

Clear Cache in Google Chrome

1. Open Chrome.
2. On your browser toolbar, click **More ..**
3. Point to **More tools**., and then **click Clear browsing data**..
4. In the "Clear browsing data" box, click the checkboxes for Cookies and other site and plug-in data and Cached images and files.
5. Use the menu at the top to select the amount of data that you want to delete. Choose beginning of time to delete everything.
6. Click **Clear browsing data**..

Clear Cache in Mozilla Firefox

1. From the **History** menu, select **Clear Recent History**. If the menu bar is hidden, press Alt to make it visible.
2. From the **Time range to clear**: drop-down menu, select the desired range; to clear your entire cache, select **Everything**.
3. Next to "Details", click the down arrow to choose which elements of the history to clear; to clear your entire cache, select all items.
4. Click **Clear Now**.
5. Exit/quit all browser windows and re-open the browser.

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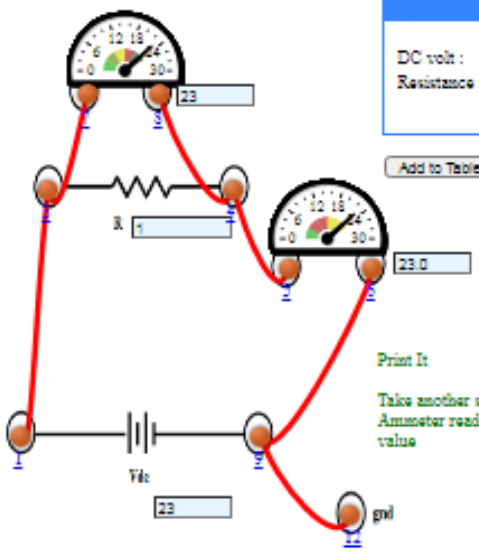
INSTRUCTION

EXPERIMENTAL TABLE

Resistance: 1 KΩ

Serial No.	Voltage(Volt) V	Current(milliAm mA
1	2	2.00
2	3	3.00
3	4	4.00
4	6	6.00

Ohm's Law



CONTROLS

DC volt : Volt

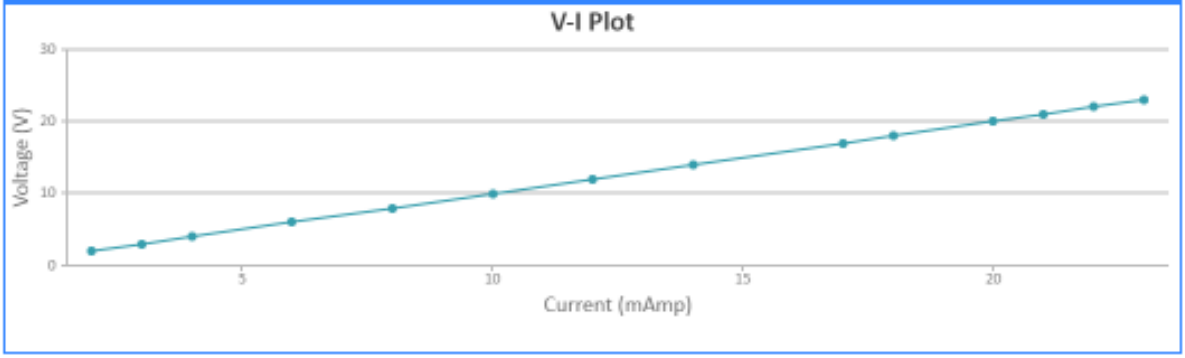
Resistance : Kohms

Add to Table | Plot | Clear | Check connection | Delete all connection

Print It

Take another sets of Voltmeter and Ammeter readings for another Resistance value

GRAPH PLOT



Virtual Labs
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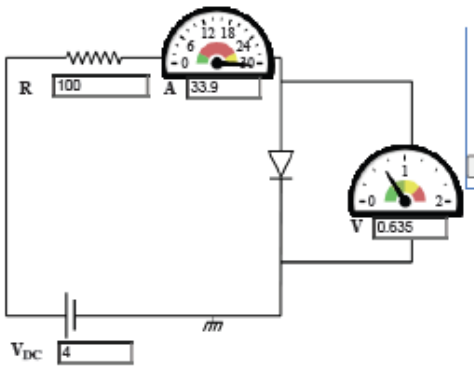
Forward Bias Silicon Diode

INSTRUCTION

EXPERIMENTAL TABLE

Serial No.	Forward Voltage(Volt)	Forward Current(mAmp)
1	0	0
2	0.593	1.99
3	0.596	2.99
4	0.599	3.99
5	0.605	6.98
6	0.611	9.97
7	0.612	11.0
8	0.617	14.0
9	0.621	17.9
10	0.625	21.9
11	0.629	25.9
12	0.630	27.9
13	0.633	30.9
14	0.635	33.9



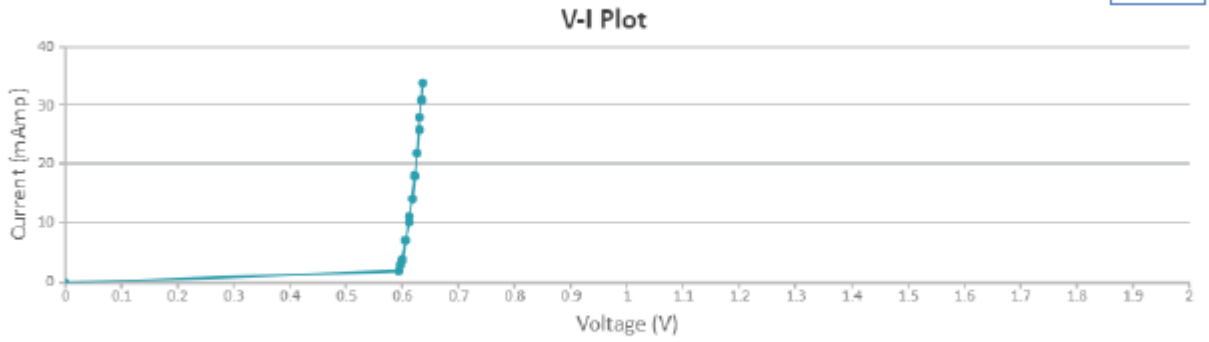
CONTROLS

Select Diode: 1N4001 V_F 0.6
DC volt : Volt
Resistance : ohms
Add to Table | Plot | Clear

Print It | Check for Reverse Bias

GRAPH PLOT

Print



Virtual Labs

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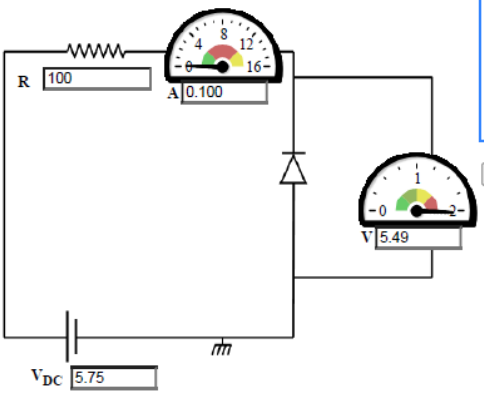
Reverse Bias – Silicon Diode

INSTRUCTION

EXPERIMENTAL TABLE

Serial No.	Reverse Voltage(Volt)	Reverse Current(μAmp)
1	0.170	0.100
2	0.439	0.100
3	1.09	0.100
4	2.18	0.100
5	2.61	0.100
6	5.49	0.100



CONTROLS

Select Diode: 1N4001 V_R 30

DC volt : Volt

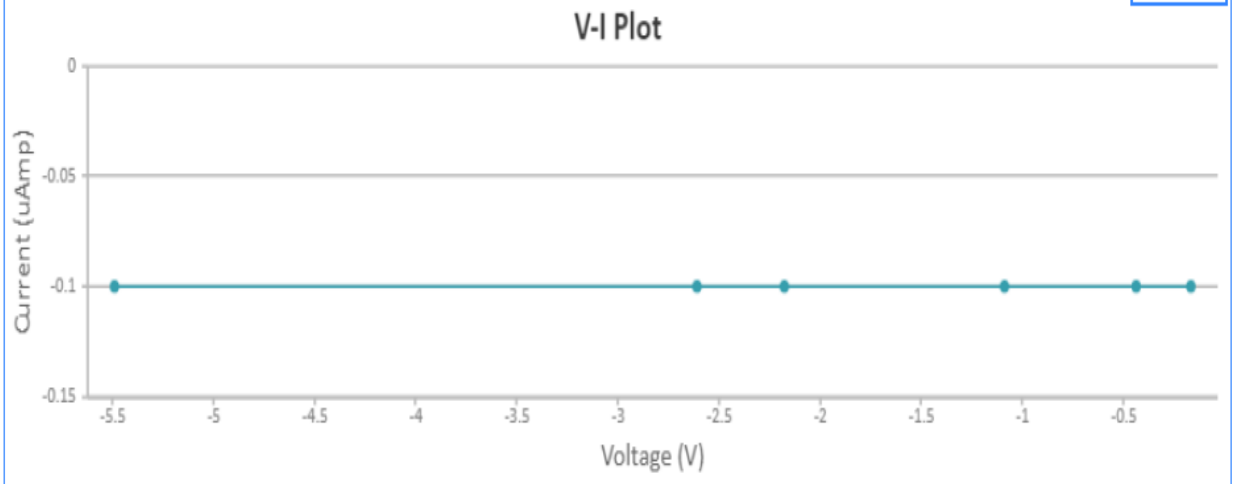
Resistance : ohms

Add to Table | Plot | Clear

Print It

GRAPH PLOT

Print



Virtual Labs

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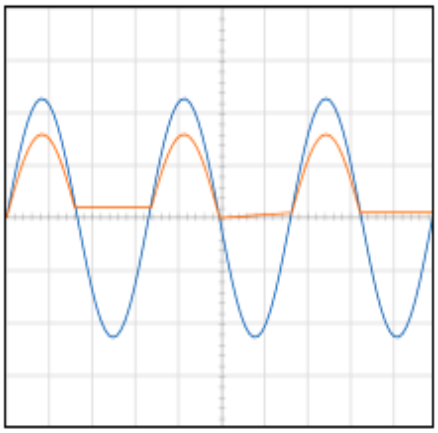
Half Wave Rectifier

INSTRUCTION

OSCILLOSCOPE



Channel 1 | Channel 2 | Ground | Dual

3000 *Frequency(Hz)*

1.6 *Amplitude(Volt)*

CALCULATION

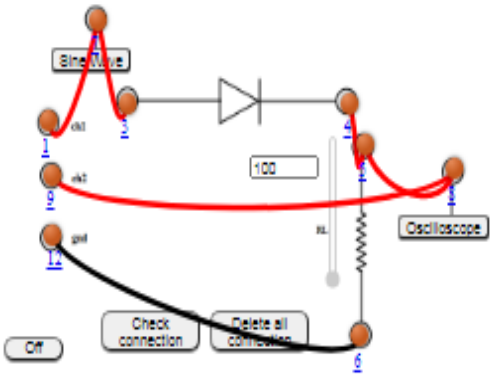
$V_{rms} = \frac{V_m}{2}$, V_m is the peak voltage

$V_{dc} = \frac{V_m}{\pi}$

Ripple Factor=$\frac{V_{ac}}{V_{dc}}$ Since, $V_{ac} = \sqrt{(V_{rms}^2 - V_{dc}^2)}$

Peak Current: 12.999999978338282 mA

CIRCUIT



CONTROLS

Virtual Oscilloscope Tutorial : Virtual Oscilloscope Tutorial

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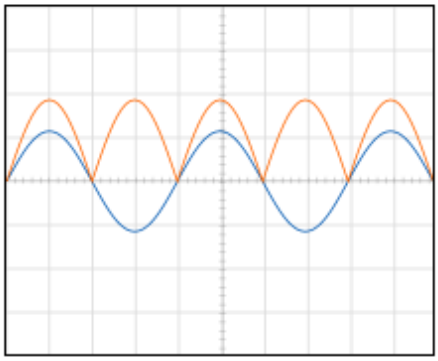
Full Wave Rectifier

INSTRUCTION

OSCILLOSCOPE



Channel 1 | Channel 2 | Ground | Dual

2500
Frequency(Hz)

1.8
Amplitude(Volt)

CALCULATION

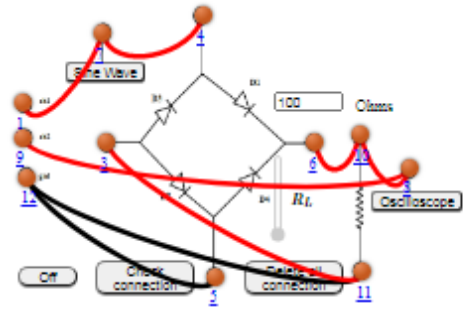
$V_{rms} = \frac{V_m}{\sqrt{2}}$, V_m is the peak voltage

$V_{dc} = \frac{2 \times V_m}{\pi}$

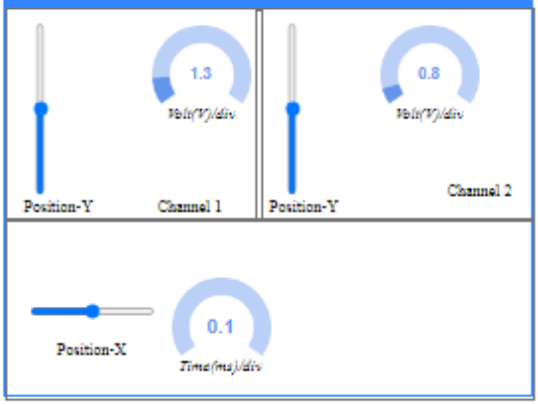
Ripple Factor=$\frac{V_{ac}}{V_{dc}}$ Since, $V_{ac} = \sqrt{(V_{rms}^2 - V_{dc}^2)}$

Peak Current: 2.9999999892691407 mA

CIRCUIT



CONTROLS



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Zener Diode - LINE Regulator

INSTRUCTION

EXPERIMENTAL TABLE

Zener Voltage(V_Z): 5.1 V
Series Resistance(R_S): 1 KΩ
Load Resistance (R_L): 2 KΩ

Serial No.	Unregulated supply voltage(V_S) V	Load Current(I_L) mAmp	Zener Current(I_Z) mAmp	Regulated Output Voltage(V_O) V	% Volta Regulati
1	0	2.55	0	0	NaN
2	1.6	2.55	0	1.6	100
3	3.6	2.55	0	3.6	100
4	5	2.55	0	5	100

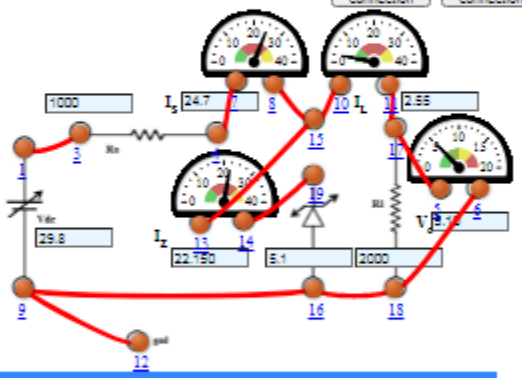
Print It

Take another sets of Output Volatge for another Zener value

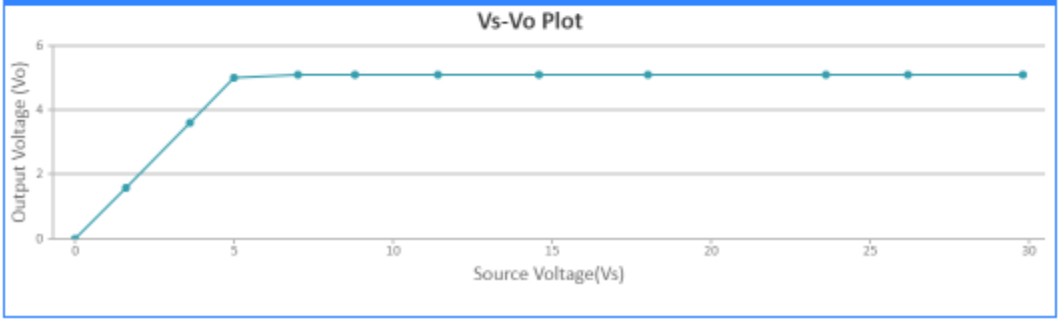
CONTROLS

DC volt : Volt
Zener Diode(V_Z) : Volt
Resistance(R_S) : Ohms
Resistance(R_L) : Ohms

Add to Table | Plot | Clear | Check connection | Delete all connection



GRAPH PLOT



Virtual Labs
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BJT- CE INPUT CHARACTERISTICS

INSTRUCTION

EXPERIMENTAL TABLE

Serial No.	Collector-Emitter Voltage 1.000 V	
	Base-Emitter Voltage V	Base Current(μA)
1	0.02000	2.058
2	0.1000	2.307
3	0.1800	2.586
4	0.2600	2.900
5	0.3400	3.251
6	0.4000	3.542
7	0.5000	4.085
8	0.6600	5.135
9	0.8200	6.453
10	0.9600	7.882
11	1.140	10.19
12	1.380	14.36
13	1.480	16.57

CONTROLS

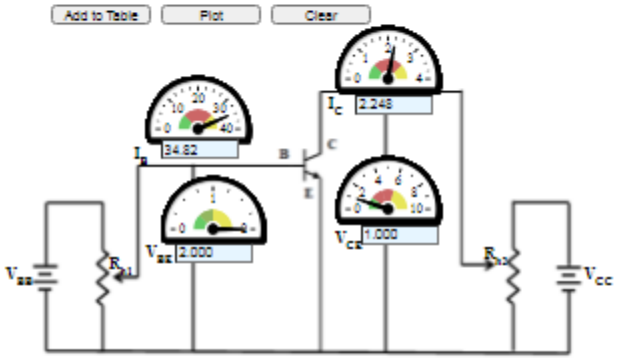
R_{b1} Ohms 100

R_{b2} Ohms 10

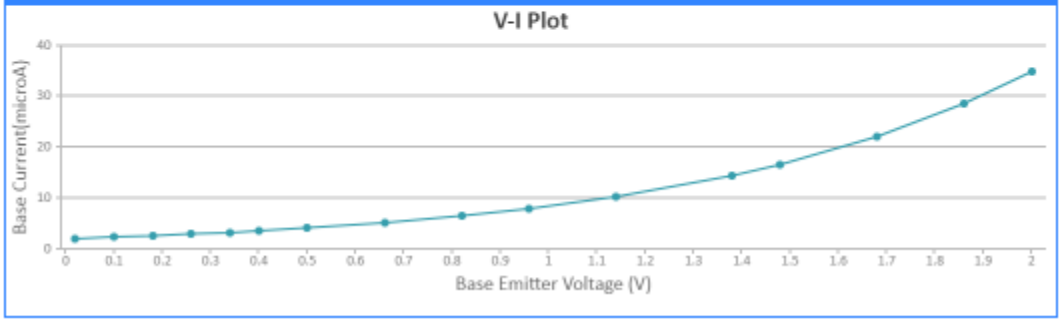
Print It

Take another sets of Base-Emitter and Base Current readings for another Collector-Emitter value

Add to Table | Plot | Clear



GRAPH PLOT



Virtual Labs
An MoE Govt of India Initiative

BJT- CE OUTPUT CHARACTERISTICS

INSTRUCTION

EXPERIMENTAL TABLE

Serial No.	Base-Current 15.35 µA	
	Collector-Emitter Voltage V	Collector Current mA
1	0.1000	3.290
2	0.7000	36.35
3	1.000	45.81
4	1.200	50.14
5	1.500	54.44
6	2.000	57.98
7	2.600	59.48
8	3.200	59.94
9	3.700	60.07
10	4.600	60.13
11	5.500	60.14
12	6.300	60.14

CONTROLS

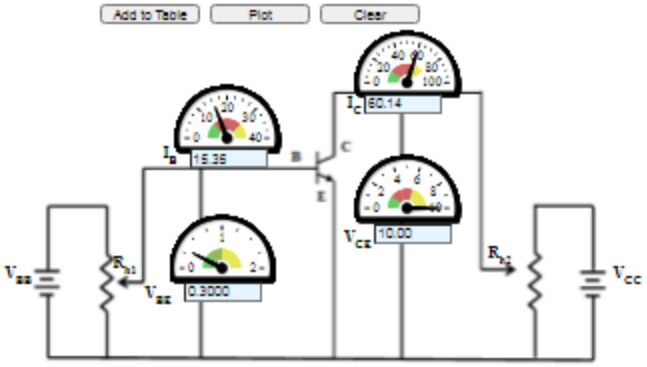
R_{b1} Ohms 15

R_{b2} Ohms 100

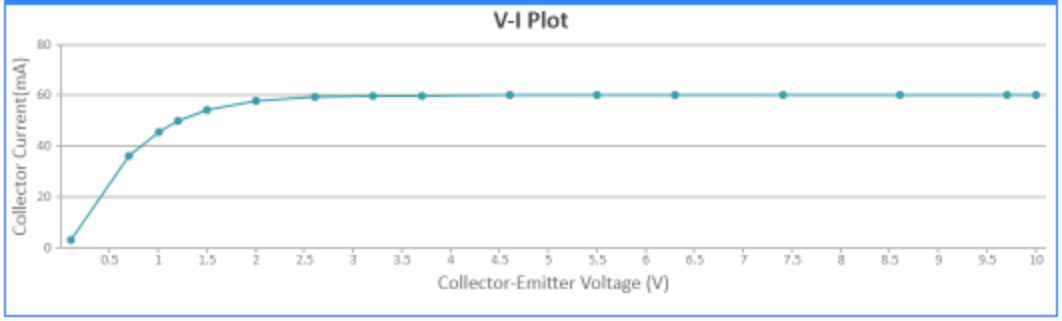
Add to Table | Plot | Clear

Print It

Take another sets of Collector-Emitter and Collector Current readings for another Base Current



GRAPH PLOT



Virtual Labs
An MoE Govt of India Initiative

BJT- CB INPUT CHARACTERISTICS

INSTRUCTION

EXPERIMENTAL TABLE

Serial No.	Base-Collector Voltage 1.000 V	
	Base-Emitter Voltage V	Emitter Current mA
1	0.02000	0.76
2	0.04000	0.78
3	0.06000	0.80
4	0.08000	0.82
5	0.2400	1.0
6	0.4000	1.3
7	0.4800	1.5
8	0.5600	1.6
9	0.6600	1.9
10	0.8000	2.3
11	0.9800	3.0
12	1.180	4.0

CONTROLS

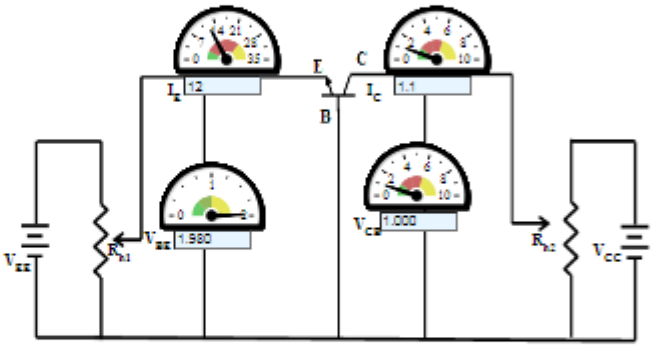
R_{b1} Ohms 99

R_{b2} Ohms 10

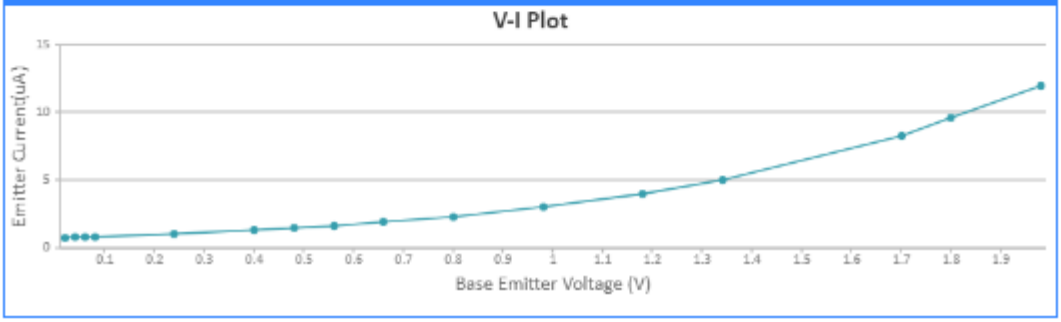
Print It

Take another sets of Base-Emitter Voltage and Emitter current readings for another Base-Collector value

Add to Table | Plot | Clear



GRAPH PLOT



Virtual Labs
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BJT- CB -OUTPUT CHARACTERISTICS

INSTRUCTION

EXPERIMENTAL TABLE

Serial No.	Emitter Current 0.76 mA	
	Base-Collector Voltage V	Collector Current mA
1	0.08000	0.06043
2	0.5800	0.3957
3	1.280	0.6484
4	1.780	0.7151
5	2.280	0.7413
6	3.280	0.7549
7	3.580	0.7558
8	4.480	0.7568
9	4.980	0.7569

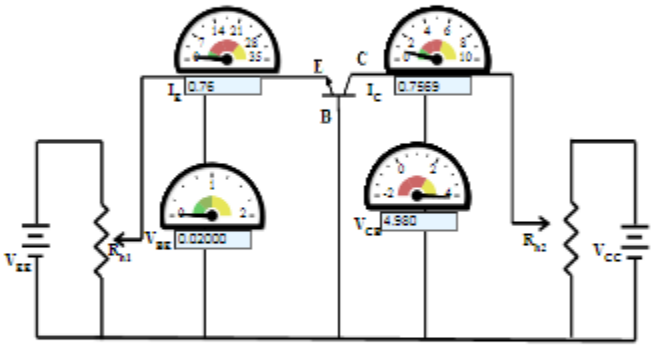
CONTROLS

R_{b1} Ohms 1
R_{b2} Ohms 50

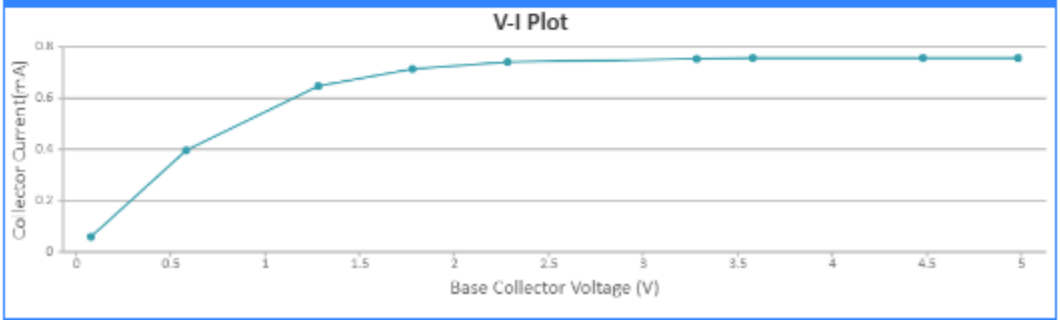
Print It

Take another sets of Base-Collector and Collector Current readings for another Emitter Current

Add to Table | Plot | Clear



GRAPH PLOT



Computing Facility within Department (Open Source Software)

S.N	Computing Facility Within Department
1	Two 30 system Computers lab
2	MATLAB Software
3	Open Source Software • LT-Spice • P-Spice • Lab View • E-Sim • Sci –Lab • Xilink Software • Tina Probe • PCB Expresses • PCB Artiest

Google Classroom Link

BTECH-3 SEM

https://classroom.google.com/c/MjI2NDIxNTczNDg3?cjc=3ps4qxl

BTECH-5 SEM

https://classroom.google.com/c/MTI5NjkzNDYxNDQ5?cjc=jk2s5qr

BTECH-7SEM

https://classroom.google.com/c/MjAxNzI0ODg2NTA2?cjc=c2y3npk

MTECH-1 SEM

https://classroom.google.com/c/NDUwMjk2MjMxODE3?cjc=6ybw7qo

MTECH-3 SEM

https://classroom.google.com/c/Mjg0NDA5OTk1MDkx?cjc=vvz77zd

DIPLOMA-3 SEM

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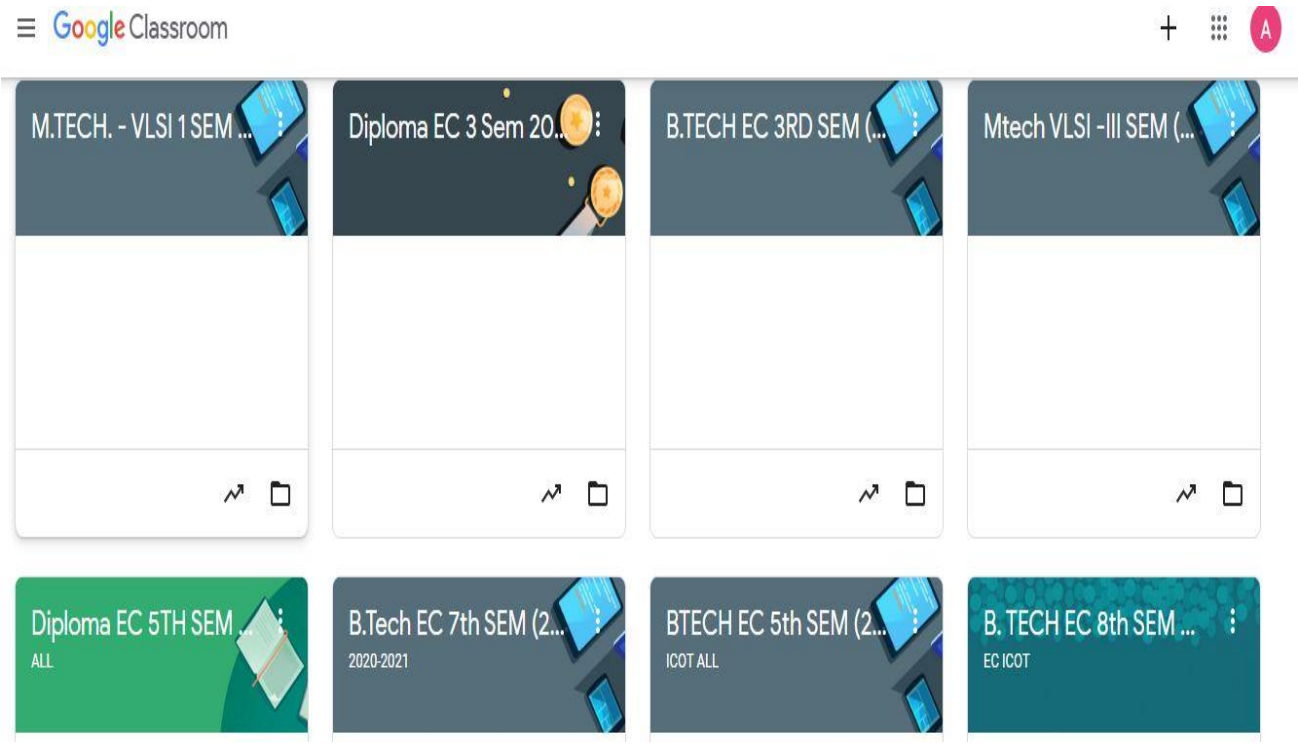
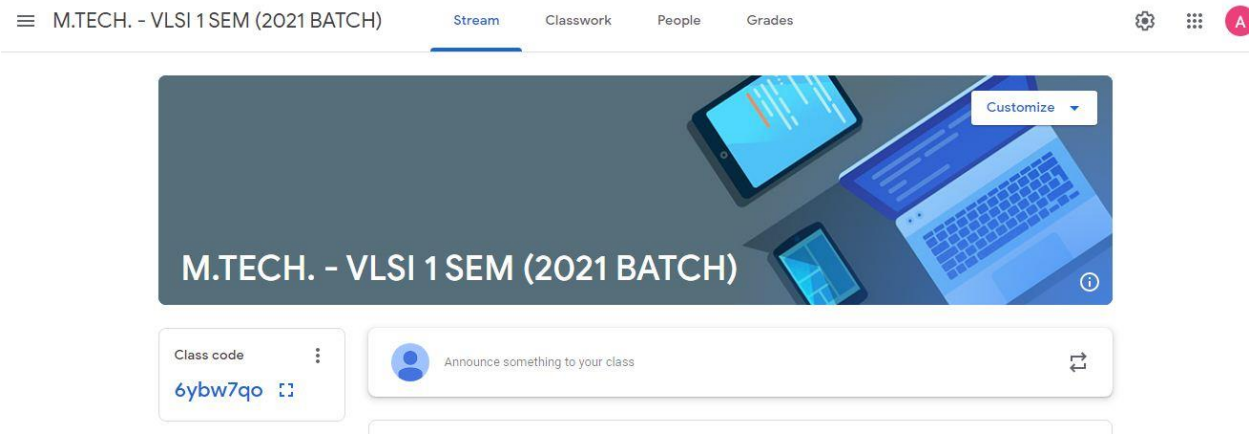
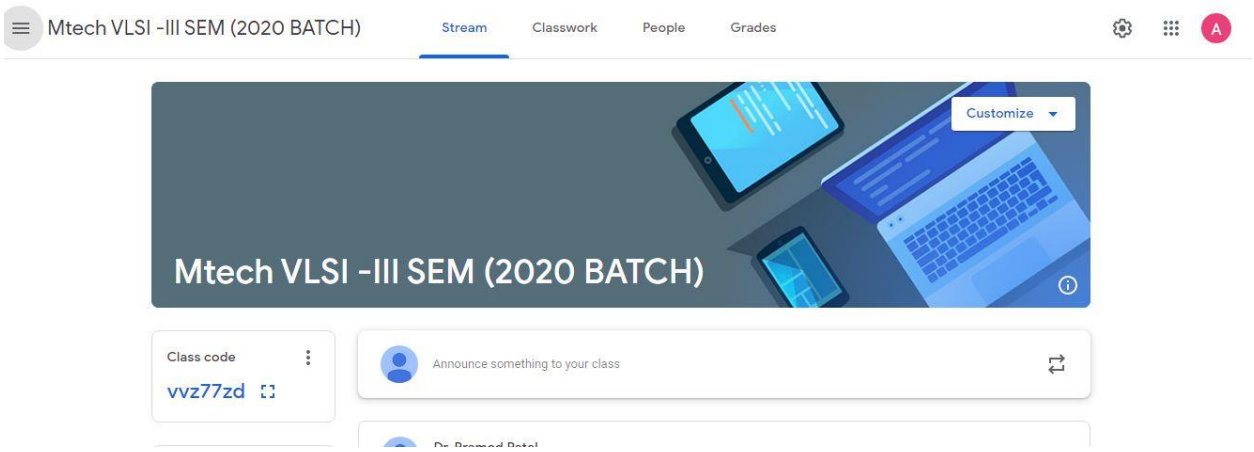
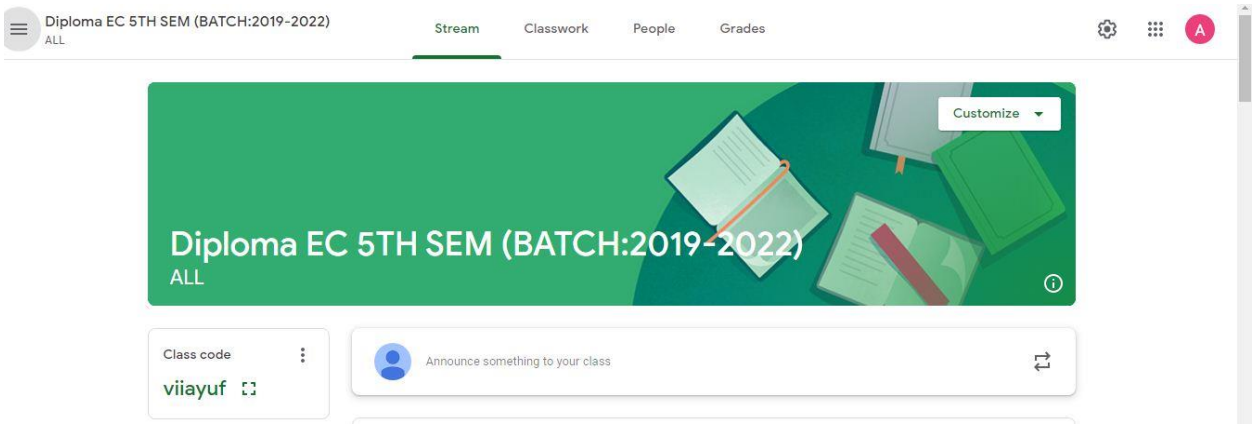
DIPLOMA-5 SEM

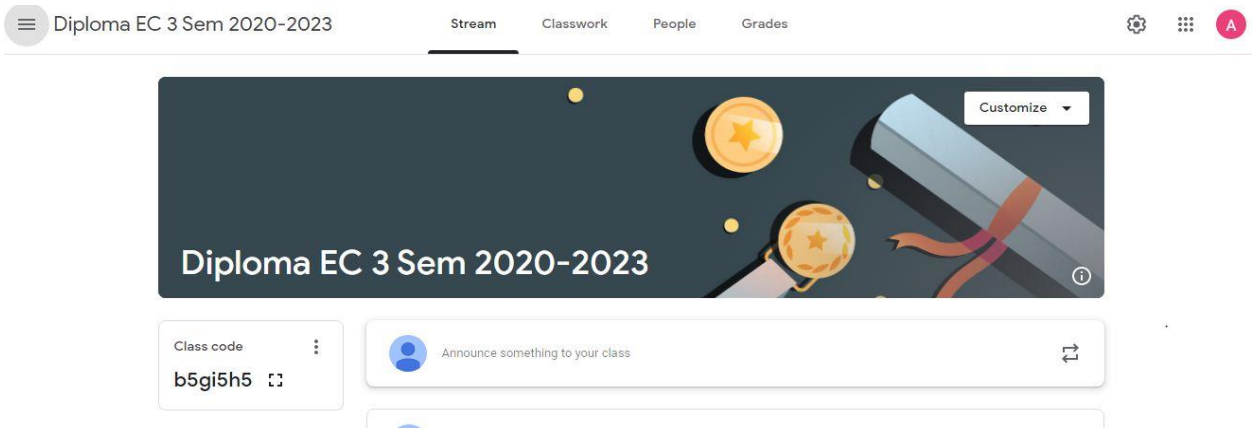
https://classroom.google.com/c/MTIzNTY2MzQyMDQ1?cjc=viiayuf


Google Classroom
M.TECH. - VLSI 1 SEM ...
Diploma EC 3 Sem 20...
B.TECH EC 3RD SEM (...
Mtech VLSI -III SEM (...
Diploma EC 5TH SEM ...
ALL
B.Tech EC 7th SEM (2...
2020-2021
BTECH EC 5th SEM (2...
ICOT ALL
B. TECH EC 8th SEM ...
EC ICOT


M.TECH. - VLSI 1 SEM (2021 BATCH)
Stream
Classwork
People
Grades
Customize
M.TECH. - VLSI 1 SEM (2021 BATCH)
Class code
6ybw7qo
Announce something to your class


Mtech VLSI -III SEM (2020 BATCH)
Stream
Classwork
People
Grades
Customize
Mtech VLSI -III SEM (2020 BATCH)
Class code
vvz77zd
Announce something to your class


Diploma EC 5TH SEM (BATCH:2019-2022)
ALL
Stream
Classwork
People
Grades
Customize
Diploma EC 5TH SEM (BATCH:2019-2022)
ALL
Class code
viiayuf
Announce something to your class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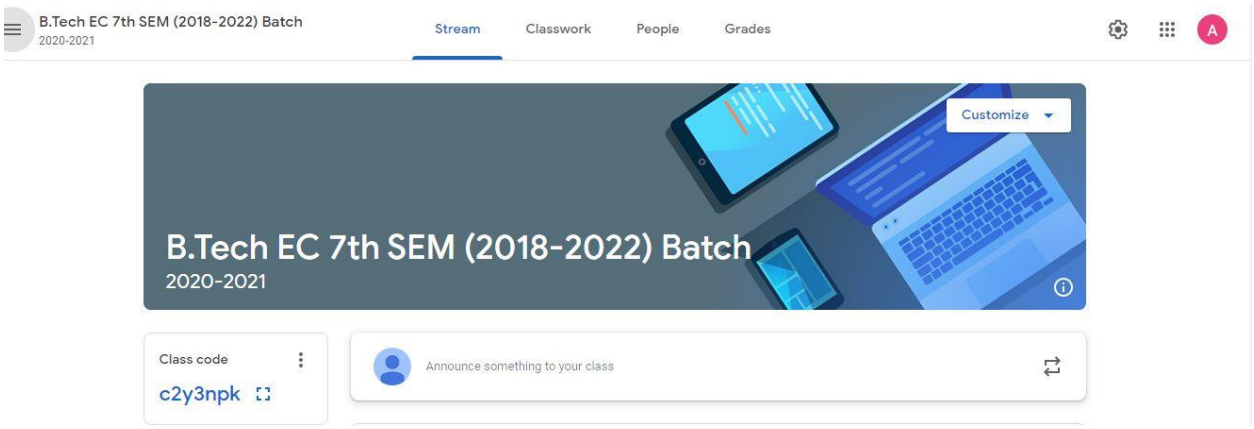
Announce something to your class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2020-2021
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Grades
Customize
B.Tech EC 7th SEM (2018-2022) Batch
2020-2021
Class code
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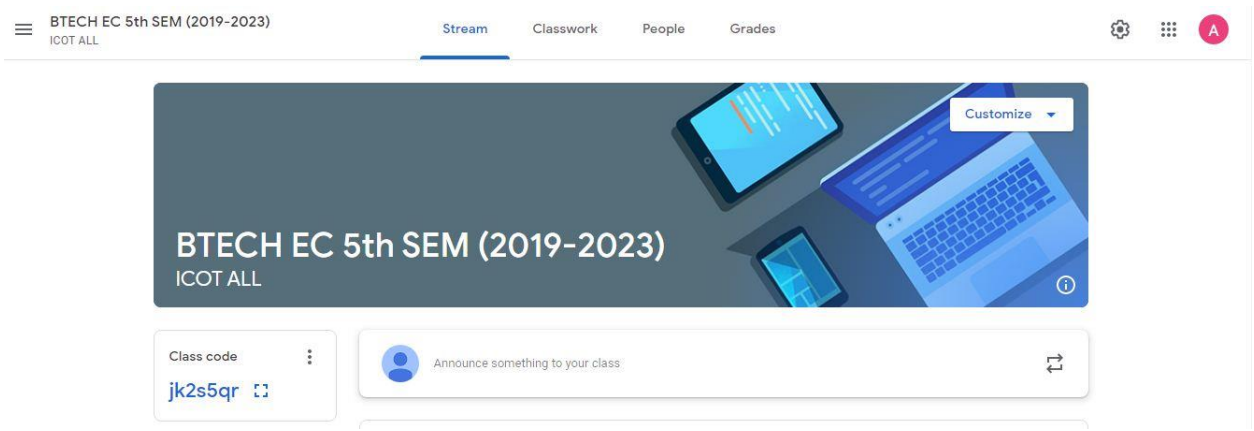
Announce something to your class


BTECH EC 5th SEM (2019-2023)
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Stream
Classwork
People
Grades
Customize
BTECH EC 5th SEM (2019-2023)
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Class code
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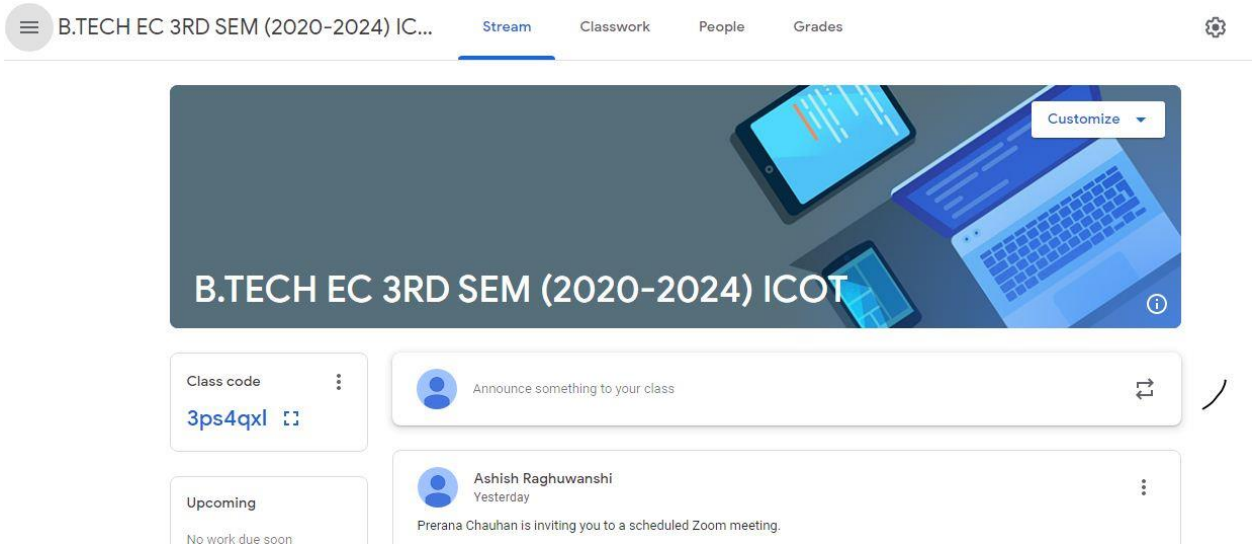
Announce something to your class


B.TECH EC 3RD SEM (2020-2024) IC...
Stream
Classwork
People
Grades
Customize
B.TECH EC 3RD SEM (2020-2024) ICOT
Class code
3ps4qxl
Announce something to your class
Upcoming
No work due soon
Ashish Raghuwanshi
Yesterday
Prerana Chauhan is inviting you to a scheduled Zoom meeting.

NPTEL LOCAL CHAPTER

1. Electronics & Communication Engineering

S.No	Course_ID	Course_Name	Professor_ Name	Phase	Type
1	117104074	Signals and Systems	Prof. K.S. Venkatesh	1	Video
2	117101056	Transmission Lines and EM Waves	Prof. R.K. Shevgaonkar	1	Video
3	117101050	Broadband Networks: Concepts and Technology	Prof. Abhay Karandikar	1	Video
4	117102060	Digital Signal Processing	Prof. S.C. Dutta Roy	1	Video
5	117101053	Information Theory and Coding	Prof. S.N. Merchant	1	Video
6	117102059	Communication Engineering	Prof. Surendra Prasad	1	Video
7	117102062	Wireless Communication	Prof. Ranjan Bose	1	Video
8	117103063	Basic Electronics	Prof. Chitralekha Mahanta	1	Video
9	117105085	Probability and Random Processes	Prof. Mrityunjoy Chakraborty	1	Video
10	117105075	Adaptive Signal Processing	Prof. Mrityunjoy Chakraborty	1	Video
11	117106086	Digital Circuits and Systems	Prof. S. Srinivasan	1	Video
12	117105079	Digital Image Processing	Prof. P.K. Biswas	1	Video
13	117105081	Digital Voice & Picture Communication	Prof. Somnath Sengupta	1	Video
14	117106089	High Speed Devices and Circuits	Prof. K.N. Bhat	1	Video
15	117106091	Solid State Devices	Prof. S. Karmalkar	1	Video
16	117106092	VLSI Circuits	Prof. S. Srinivasan	1	Video
17	117105080	Digital Systems Design	Prof. D. Roychoudhury	1	Video
18	117106087	Electronics for Analog Signal Processing - I	Prof. K. Radhakrishna Rao	1	Video
19	117106088	Electronics for Analog Signal Processing - II	Prof. K. Radhakrishna Rao	1	Video
20	117101051	Digital Communication	Prof. Bikash Kumar Dey	1	Video
21	117105082	MEMS and Microsystems	Prof. Santiram Kal	1	Video
22	117106093	VLSI Technology	Dr. Nandita Dasgupta	1	Video
23	117105084	Neural Networks and Applications	Prof. Somnath Sengupta	1	Video
24	117105078	Digital Computer Organization	Prof. P.K. Biswas	1	Video
25	117101001	Adv. Digital Signal Processing - Multirate and wavelets	Prof. V.M. Gadre	2	Video
26	117101002	Advanced Optical Communication	Prof. R.K. Shevgaonkar	2	Video
27	117108038	Circuits for Analog System Design	Prof. M.K. Gunasekaran	2	Video
28	117108044	Error Correcting Codes	Prof. P. Vijay Kumar	2	Video

29	117104099	Advanced 3G and 4G Wireless Mobile Communications	Prof. Aditya K. Jagannatham	2	Video
30	117108048	Pattern Recognition	Prof. P.S. Sastry	2	Video
31	117105101	Pattern Recognition and Application	Prof. P.K. Biswas	2	Video
32	117106031	Coding Theory	Dr. Andrew Thangaraj	2	Video
33	117106101	Basic Electrical Circuits	Dr. Nagendra Krishnapura	2	Video
34	117108040	Digital System design with PLDs and FPGAs	Prof. Kuruvilla Varghese	2	Video
35	117106108	NOC:Basic Electrical Circuits	Dr. Nagendra Krishnapura	2	Video
36	117104104	Digital Switching	Prof. Yatindra N Singh	2	Video
37	117106030	Analog IC Design	Dr. Nagendra Krishnapura	2	Video
38	117106034	VLSI Data Conversion Circuits	Dr. Shanthi Pavan	2	Video
39	117102012	RF Integrated Circuits	Dr. Shouribrata Chatterjee	2	Video
40	117106033	Semiconductor Device Modeling	Prof. S. Karmalkar	2	Video
41	117106114	NOC:Digital Circuits and Systems	Prof. Shankar Balachandran	2	Video
42	117106112	Embedded Software Testing	MADHUKESHWARA H M	2	Video
43	117106111	ARM Based Development	S.Chandramouleeswaran	2	Video
44	117106109	Advanced Logic Synthesis	Dhiraj Taneja	2	Video
45	117106113	Linux Programming & Scripting	Anand Iyer	2	Video
46	117104115	NOC:Principles of Modern CDMA/ MIMO/ OFDM Wireless Communications(Course sponsored by Aricent)	Prof. Aditya K. Jagannatham	2	Video
47	117106116	NOC:Networks and Systems(Course sponsored by Aricent)	Prof. V.G.K. Murti, C. S. Ramalingam, Dr. Andrew Thangaraj	2	Video
48	117104117	NOC:Probability and Random Variables/ Processes for Wireless Communications	Prof. Aditya K. Jagannatham	2	Video
49	117108097	Information Theory and Coding	Prof. Pavan S Nuggehalli	1	web
50	117101055	Signals and Systems	Prof. V.M. Gadre	1	web
51	117101058	VLSI Design	Prof. A.N. Chandorkar	1	web
52	117102061	Semiconductor Devices	Dr. G.S. Visweswaran	1	web
53	106103068	Computer Organization and Architecture	Prof. Jatindra Kumar Deka	1	web
54	106103069	Data Structures and Program Methodology	Dr. S.V. Rao,Dr. Pradip K Das	1	web
55	117103064	Digital Circuits	Prof. Anil Mahanta,Prof. Roy Paily	1	web

			Palanthinkal		
56	117103065	Electromagnetic Fields	Dr. Ratnajit Bhattacharjee	1	web
57	117103066	IC Technology	Prof. Roy Paily Palanthinkal,Prof. Indrajit Chakraborty	1	web
58	117103067	Probability and Random Processes	Prof. Prabin K Bora	1	web
59	117104069	Digital Image Processing	Prof. Sumana Gupta	1	web
60	117104070	Digital Signal Processing	Prof. Govind Sharma	1	web
61	117104071	High Speed Semiconductor Devices	Prof. Anjan Ghosh	1	web
62	117104072	Microcontrollers and Applications	Dr. S.P. Das	1	web
63	117105076	Communication Networks and Switching	Prof. S.L. Maskara	1	web
64	117105077	Digital Communication	Prof. R.V. Rajakumar,Prof. Saswat Chakrabarti	1	web
65	117105083	Multimedia processing	Prof. Somnath Sengupta	1	web
66	117107094	Analog Circuits	Dr. Pramod Agarwal	1	web
67	117107095	Basic Electronics	Dr. Pramod Agarwal	1	web
68	117101054	Optical Communication	Prof. R.K. Shevgaonkar,Prof. D.K. Ghosh	1	web
69	117101057	Transmission Lines and EM Waves	Prof. R.K. Shevgaonkar	1	web
70	117103017	Queuing Systems	Prof. S.K. Bose	2	Web
71	117108037	Biophotonics	Dr. Manoj Varma	2	Web
72	117106100	Pattern Recognition	Dr. K.Vijayarekha	2	Web
73	117103018	Signal Detection and Estimation Theory	Dr. R. Sinha	2	Web
74	117104022	Semiconductor Optical Communication Components and Devices	Dr. Utpal Das	2	Web
75	117107035	Advanced Antenna Theory	Dr. Amalendu Patnaik	2	Web
76	117103017	Queuing Systems	Prof. S.K. Bose	2	Web
77	117108037	Biophotonics	Dr. Manoj Varma	2	Web
78	117106100	Pattern Recognition	Dr. K.Vijayarekha	2	Web
79	117103018	Signal Detection and Estimation Theory	Dr. R. Sinha	2	Web
80	117104022	Semiconductor Optical Communication Components and Devices	Dr. Utpal Das	2	Web
81	117107035	Advanced Antenna Theory	Dr. Amalendu Patnaik	2	Web