

Best Practice -02

Virtual Lab



Vasundhara Bahuddeshiya Samajik Sanstha's

Siddhivinayak Technical Campus
Shegaon, Dist-Buldhana-444303 (Maharashtra)

Session 2022-23

Best Practice No. 2: Virtual Lab Program**Objectives:-**

1. To provide remote-access to Labs in various disciplines of Science and Engineering for scholar students.
2. To arouse curiosity in students and help them to learn basics and advanced concepts through remote.
3. To provide a complete Learning Management System around the Virtual Labs to provide students demonstrations and self-evaluation.
4. To provide remote access to costly equipment and resources, which are otherwise available locations.

Context:-

As part of the NME-ICT (National Mission on Education through ICT), an initiative of MHRD, Government of India, the Virtual Labs project is a collaborative undertaking of Amrita University, IIT's, Delhi, Kanpur, Kharapur, Bombay, Madras, Roorkee, Guwahati, IIIT Hyderabad, NITK Surathkal, COE Pune and Dayalabagh Educational Institute.

Through the use of virtual labs- A revolutionary technology-enhanced educational tool, laboratory learning is being extended beyond the walls of the classroom. Virtual labs are immersive media-rich online learning environments, where user's canper form physical laboratory experiments in a computer simulated environment - Anytime, Anywhere. Whereas traditional physical laboratories require tremendous resources, virtual labs are cost effective whilst providing near hands on experience of experimentation. Virtual labs provide an educational experience that helps broaden learner's perspective. Amrita's VALUE virtual labs apply new learning technologies that are exciting and fun for the new generation of students. We are the nodal centre for virtual lab, with following objectives & features for different discipline in Science and Engineering.

DisciplinesandDomains:-

1. Electronics & Tele-Communications Engineering
2. Computer Science & Engineering

3. Electrical Engineering
4. Mechanical Engineering
5. Civil Engineering
6. Physical Sciences
7. Biotechnology & Biochemical Engineering
8. Chemical Engineering

Practice:-**Step 1- 1st Pre lab session**

- ❖ Introductory Discussion:
 - What is virtual lab?
 - Need & benefits of Virtual Lab in today's era.
 - Review of current technologies and development methodologies used in virtual labs for the STEM (Science, Technology, Engineering and Mathematics) subjects.
 - How to use virtual lab & how to perform the experiments using virtual labs. Take a glance of experiments to be conducted from next lab session

Step 2- 2nd Pre lab session onwards

- Ask to search the background, history of particular experiment concept to be conducted, through reference books, research papers and by watching related videos from internet.
- Conduct discussion on the survey done by student related to concept between lab instructor and student before actual performance of experiment on virtual lab.
- Lab instructor will try to provide brief about procedure to be followed during experiment performance

Step 3rd - Post lab session

- Evaluate the student on the basis Viva On Experiment with following mark distribution,

Performance	Concept Understanding	Innovative Idea	Out Of Mark
10	05	05	20

- Also evaluate and grade the last week Take home assignment.

- Conducted brief group experiences during session on
- Problem faced during performance
- Difference between physical & virtual lab students has observed.
- Observations and conclusion & result gained at the end of experiment.
- Techniques and skills gained during virtual lab session.

Step 4th - Take home assignments

- On the basis of experiment, different type of problems given to the student for practice.
- Give the designing assignment to the students, if applicable.
- Survey Assignment as
- To find the different ways to perform the particular experiment, expect used in virtual lab
- Real life use of concept.
- Case studies related to the topic.
- Animation creation for illustration of topic, if possible.
- Testing and validation on different range of inputs and outcome.

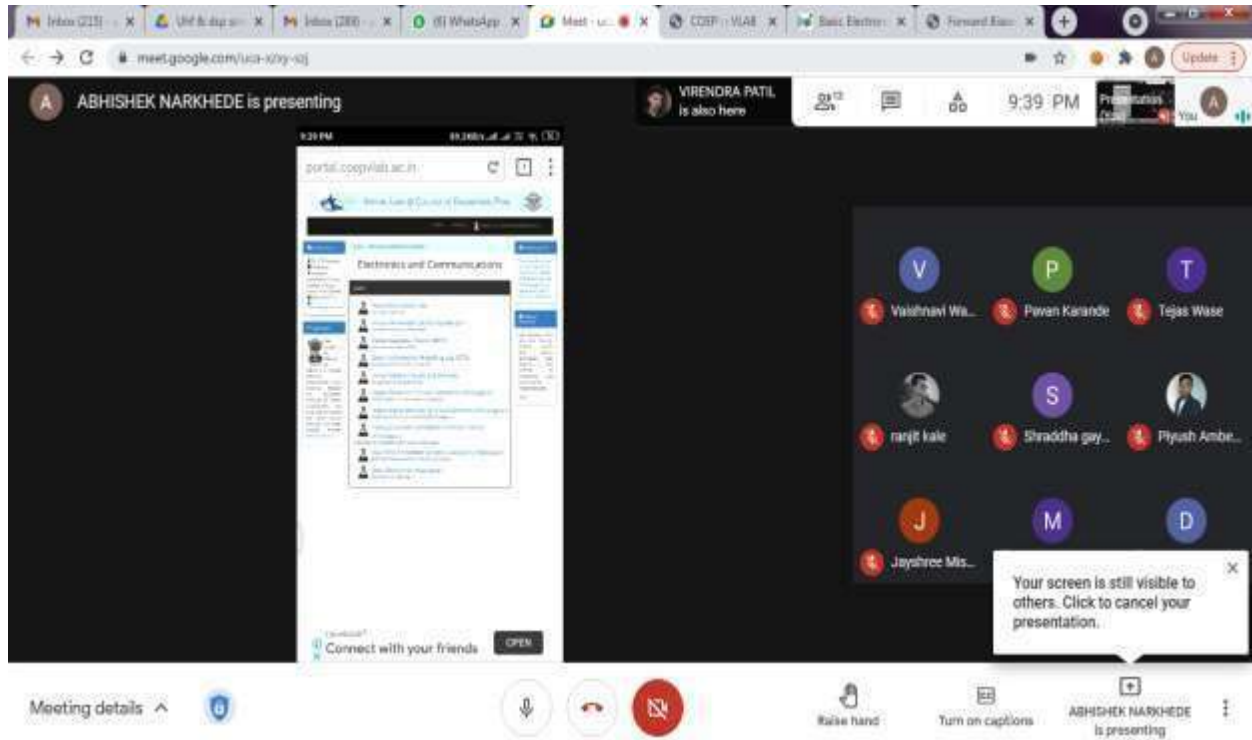
Evidence of Success:-



The screenshot shows the Virtual Labs @ College of Engineering Pune website. The top navigation bar includes 'Home', 'About Us', and 'Contact Us'. Below the navigation bar is a search bar and a list of lab categories: 'All of Electronics Service Centre, School of Pharmacy & Biotech, Chemistry, Instrumentation, Robotics'. The main content area features a search form with fields for 'Search by', 'Lab Name', 'Lab Code', 'Experiment Name', 'Lab Name', 'Address', and 'City'. Below the search form is a table titled 'Overall Uses of V LAB in Session 2022-2023'.

User ID	Department	Lab	Experiment	Today Time	Total Time
10000000000000000000	Electronics and Communications	Digital logic processing which defines a change	Block of carrying forward effect of programming	0:1:10	0:1:10
10000000000000000000	Electronics and Communications	Digital logic processing which defines a change	Block of carrying forward effect of programming	0:1:10	0:1:10
10000000000000000000	Physics/Electronics	Experiment of Lab (Lab) (Lab)	Topic of carrying forward effect of programming	0:1:10	0:1:10
10000000000000000000	Electronics and Communications	Digital logic processing which defines a change	Block of carrying forward effect of programming	0:1:10	0:1:10

Overall Uses of V LAB in Session 2022-2023



Practical Demonstration to Student Online



Practical Demonstration to Student Offline

Full Wave Rectifier

INSTRUCTION

OSCILLOSCOPE

CIRCUIT

CONTROLS

Frequency: 1000 Hz, Amplitude: 1 V

Channel 1: 1.0 V/div, Channel 2: 1.7 V/div

Timebase: 0.1 ms/div

CALCULATION

$V_{rms} = \frac{V_m}{\sqrt{2}}$, V_m is the peak voltage
 $V_m = \frac{2 \cdot V_{rms}}{\sqrt{2}}$
 Ripple Factor = $\frac{V_r}{V_{dc}}$ since, $V_r = \sqrt{(V_{dc} - V_m)^2}$

Practical Perform by Student and Share this Output

RC Integrator

INSTRUCTION

OSCILLOSCOPE

CIRCUIT

CONTROLS

Frequency: 1000 Hz, Amplitude: -2 V

Channel 1: 10.2 V/div, Channel 2: 1 V/div

Timebase: 0.1 ms/div

Practical Perform by Student and Share this Output

Meeting Screenshot of Students and Faculty regarding Virtual lab



An MHRD Govt of India Initiative

StudentsMeeting



Faculty Meeting



Screenshot of Practical Performed by Students



The screenshot shows a web browser window with the URL `portal.coepnib.ac.in/lab/auth/home.html?mpt=55&nl=1&lang=1&itm=1`. The page title is "Moment Of Inertia-Connecting Rod". The header includes "Home", "Mechanical Engineering", "Vibration and Acoustics", and "M.I. of Connecting Rod". The College of Engineering, Pune logo is visible on the right.

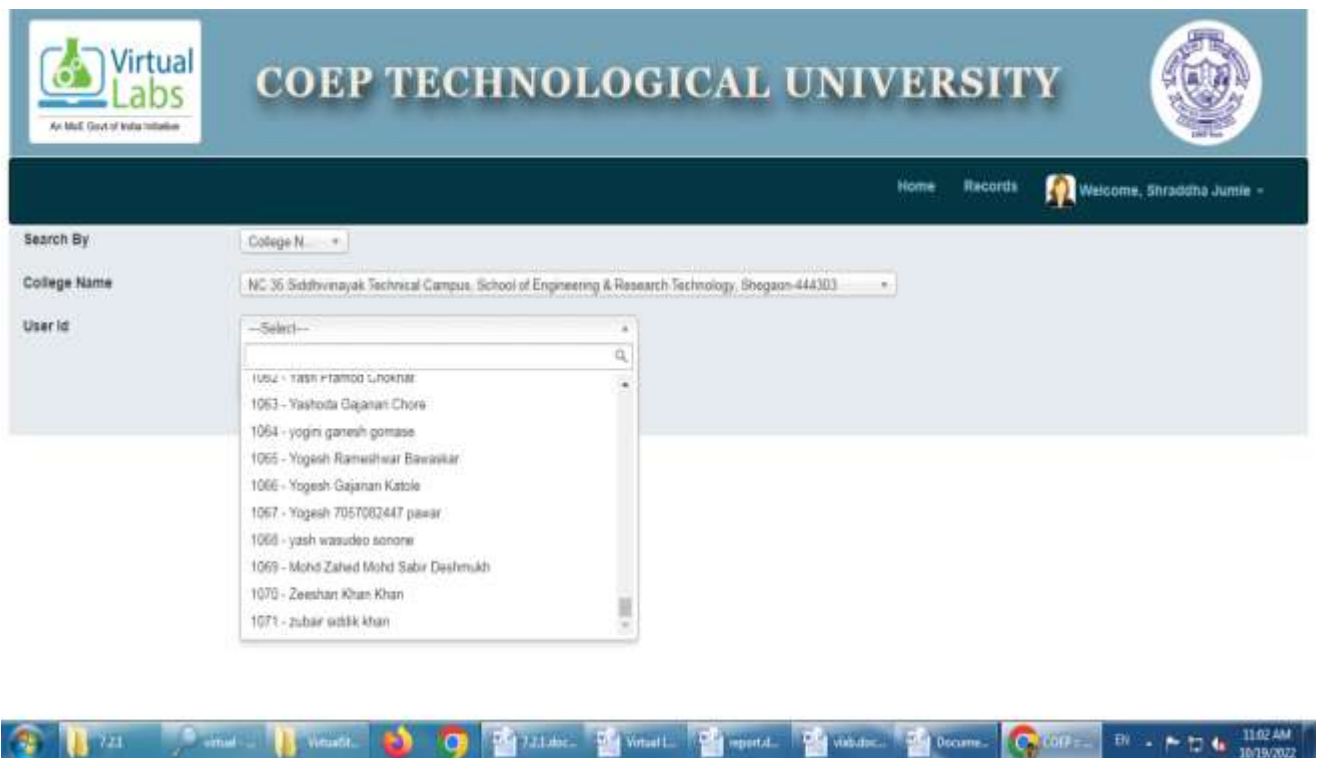
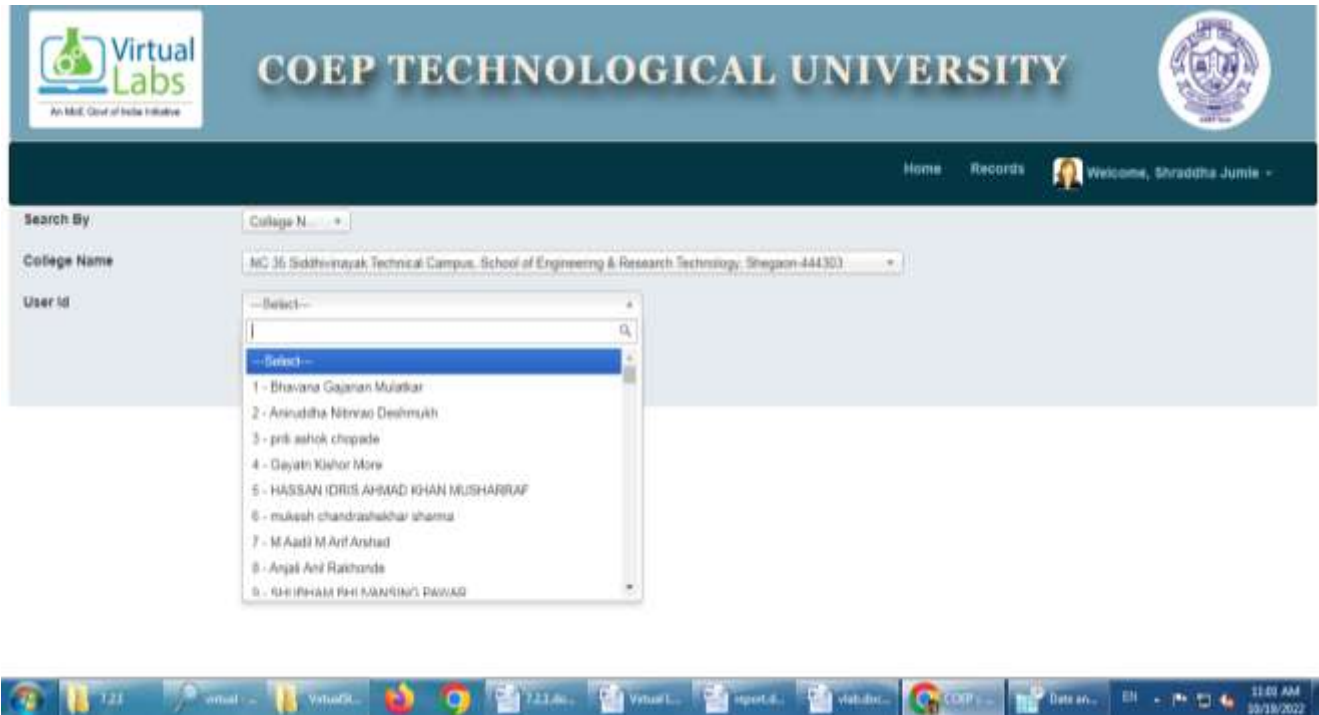
The main interface features a diagram of a connecting rod on the left and a control panel on the right. The control panel includes the following fields and buttons:

- Mass of Connecting Rod(M): kg
- Length(L): m
- Click Here to set the connecting rod into Oscillations
- Period of 10 Oscillations:
- Period of 1 Oscillations(1/10):
- Buttons for "Trial 1", "Trial 2", and "Trial 3" (each with a "Start" and "Stop" sub-button).
- Buttons for "Average Time Period T", "Calculate Moment of inertia, I_c ", and "Moment of inertia about the CG, I_g ".
- Buttons for "Reset" and "Print".

The Windows taskbar at the bottom shows the time as 11:03 AM on 9/21/2021.



Screenshot Showing Virtual Lab Utilization



A
Annual Report
On
Virtual Lab

Submitted by,

Prof. K. P. Kankale



Vasundhara Bahuddeshiya Samajik Sanstha's

Siddhivinayak Technical Campus

Shegaon, Dist-Buldhana-444 303 (Maharashtra)

2022-2023

Introduction:-

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Objectives of Virtual Lab:-

1. To provide remote-access to Labs in various disciplines of Science and Engineering for scholar students.
2. To arouse curiosity in students and help them to learn basics and advanced concepts through remote.
3. To provide a complete Learning Management System around the Virtual Labs to provide students demonstrations and self-evaluation.
4. To provide remote access to costly equipment and resources, which are otherwise available locations.

Salient Features:-

1. Virtual Labs will provide to the students the result of an experiment by one of the following methods (or possibly a combination)
Modeling the physical phenomenon by a set of equations and carrying out simulations to yield the result of the particular experiment. This can, at-the-best, provide an approximate version of the 'real-world' experiment.
2. Providing measured data for virtual lab experiments corresponding to the data previously obtained by measurements on an actual system.
3. Remotely triggering an experiment in an actual lab and providing the student the result of the experiment through the computer interface. This would entail carrying out the actual lab experiment remotely.
4. Virtual Labs will be made more effective and realistic by providing additional inputs to the students like accompanying audio and video streaming of an actual lab experiment and equipment.
5. For the 'touch and feel' part, the students can possibly visit an actual laboratory for a short duration.

Disciplines and Domains:-

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2. Computer Science & Engineering
3. Electrical Engineering
4. Mechanical Engineering
5. Civil Engineering
6. Physical Sciences
7. Biotechnology & Biochemical Engineering
8. Chemical Engineering

EOI with Amrita Vishwa Vidyapeetham Kerala

The Nodal Centre Program

The Nodal Centre Programme is an exciting new venture which allows people to follow the progress of VALUE Virtual Labs and provides a platform for everyone to contribute towards the future development of Virtual Labs and experiments. This program, like our Virtual Labs Workshop is sponsored by MHRD (NME-ICT), therefore there are no registration fees, no software products, no hidden costs. We are looking for expressions of interest from reputed educational and research institutions for the establishment of Virtual Labs on their premises. The Nodal Centre Programme has the following benefits and objectives:

- Information on upcoming events.
- Invitation to Nodal Centre activities and forums.
- Assistance with faculty & student Virtual Labs training.
- Computer infrastructure assessment.
- Updates and feedback on virtual labs development.
- Student internship opportunities.
- Networking with a vast collection of colleges and institutions.
- Encouraging the sharing of information for improving the quality of education and strengthening the skills of future engineers in India.

All of these benefits are available to those institutions who meet the modest requirements listed in the Form for Expression of Interest to the right and are selected to be Nodal Centers.

BECOMING A NODAL CENTRE

If you are interested in enjoying the benefits of becoming a Nodal Centre please bring a completed and signed (by the head of your institution) Form for Expression of Interest to the Virtual Labs Workshop. If this is not possible you may fax (+91 476 280 4517), scan and email (virtual_labs@amrita.edu), or mail the Form for Expression of Interest to:

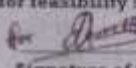
Dr. Krishnashree Achutan, Head, VALUE@Amrita,
Amrita Vishwa Vidyapeetham, TBI Building, Amritapuri Campus,
Amritapuri, Clappana P.O., Kollam - 690525

Expression of Interest

VIRTUAL LABS NODAL CENTRE PROGRAMME
AMRITA VISHWA VIDYAPEETHAM
 An initiative of NME-ICT, MHRD FORM
FOR EXPRESSION OF INTEREST

1. **Name of Institution** - Sidhivinayak Technical Campus, School of Engineering & Research Technology, Shegaon-44203(MS).
2. **Address**- Khamsaon - Shegaon Road, Tq- Shegaon, Dist- Buldhana (MS), 44203.
3. **Affiliated to**- SGBAU Amravati & MSBTE Mumbai.
4. **AICTE/UGC approval**- AICTE & DTE Approved.
5. **Branch of Science or Engineering/Student Population**
 - a). BSc Chemistry/MSc Chemistry- NIL.
 - b). BSc Physics/MSc Physics - NIL.
 - c). B Tech/M Tech - 600.
 - d). Polytechnic - 750.
 - e).
6. **Name of the Proposed Nodal Coordinator**- Prof. Abhishek P. Narkhede.
Department- Electronics & Telecommunication Engineering.
Area of Interest- Communication Engineering.
Address- Vill Chikhali, Kd P- Lanjud, Tq- Khamsaon, Dist- Buldhana 44204.
Contact Details- 09860404893 & Email ID- abhi.narkhede@gmail.com.
7. **Name of the Second Nodal Coordinator**- Prof. R. P. Bombhakar.
Department- Applied Science & Humanities.
Area of Interest- Engineering Physics.
Address- At- Nimgaon, Tq- Nandura, Dist- Buldhana (MS), 443404
Contact Details- 09930277490 & Email ID- rbombhakar@gmail.com.
8. **Name of the Director/Principal**- Prof. A. N. Rakhonde.
9. **Certified that:**
 1. The institute is recognized by AICTE/UGC.
 2. We have the necessary infrastructure (dedicated time on 5-10 personal computers with a broadband internet connection) for implementation of Virtual Labs.
 3. Students will not be charged an extra fee to use the Virtual Lab facility.
 4. Strict adherence to standard laid down laboratory procedures will be followed.

A Technical Evaluation team may visit our institution on or after 16/05/2016 for feasibility studies. **Principal**

for  **S.T.C. School of Engineering & Research Technology**
 Signature of the Head of the Institution
 Road, Khamsaon-44203

Date 04/04/2016



Vasundhara Bahuddeshiya Samajik Sanstha's
SIDDHIVINAYAK TECHNICAL CAMPUS
 Approved by AICTE New Delhi and DTE Mumbai. Affiliated to SGBAU Amravati & MSBTE Mumbai.
 Khamgaon Road, Shegaon, Pin: 444203, Maharashtra, India
 Phone: 8080977719. Web: stc.org.in, Email: stc.shegaon@stc.org.in



Session 2022-2023

List of Virtual Co-coordinator:-

Vasundhara Bahuddeshiya Samajik Sanstha's
Siddhivinayak Technical Campus
 School of Engineering & Research Technology
 Department of Electrical Engineering
 Session 2022-23

Ref. No.: STC/SERT/EE/TN-31/2022-23
 Date: 16/9/2022

NOTICE

All the faculties of all branches are requested to submit the name of virtual lab co-ordinators along with their phone numbers on the following page.

Name		phone no.
1. S. D. Tayade	- Civil	8999802830
2. P. P. Nodhude	- Eate	9860406293
3. S. V. Rathod	CSE	9588684959
4. K. P. Gajke	Mech	
5. K. P. Kamkate	Elect	8829235594

ppkarkate
 Virtual lab co ordinator
 (Prof. K. P. Kamkate)

[Signature]
 Principal
 (Dr. A. G. Kulkarni)

Vasundhara Bahaddeshiya Samajik Sanstha's

Siddhivinayak Technical Campus

Approved by AICTE, New Delhi, DTE Mumbai & Affiliated to SGBAU, Amravati,
Accredited by NAAC, Bangalore

Expression of Interest for setting up Virtual Labs' Nodal Centre (VLNC)

Name of the Institute: Siddhivinayak Technical Campus
Shegaon

Address: Shegaon-Khamgaon Road, Shirasgaon Nile, Shegaon
Tq. Shegaon Dist- Buldhana

Pin Code: 444203

Latitude: 20.737708

Affiliated to: Sant Gadge Baba Amravati University Amravati

Approved By (AICTE/UGC/University): AICTE

Approval Number: I-465030131

Branch of Engineering / Science: Civil engineering, Computer Sci. & Engineering, Mechanical Engineering
Electrical (Electronics & Power) Engineering, Electronic & Tele. Engineering

Number of Students / Faculties: 329*, 30

Total number of computers available for Virtual Labs use: 15

Internet bandwidth (in mbps):

Name of the Head of Institute / Principal: Dr. Anant G. Kulkarni

Email: dranantgkulkarni@stc.org.in

Proposed Nodal Centre Coordinator (NCC): Prof. Kanchan P. Kankale

Email: Kanchanpkankale@gmail.com

Department: Electrical Engineering

Acronym of Institute: STC,

Longitude: 76.614471

AISHE Code: C-42830

Total: 359


Mobile: 9826181319

Mobile: 8329235594

It is certified that

- The institute is recognized by the AICTE/UGC.
- The institute has necessary and adequate infrastructure to host the Virtual Labs.
- Strict adherence to standard lab procedures and cyber security laws will be followed.
- Virtual Labs may withdraw/stop connectivity without giving any prior notice or reasons.
- This EOI for Virtual Labs usage is valid up to 31st December 2023 and requires renewal by the coordinating institute for continued support.

Signature & Stamp
Head of Institute / Principal
Principal
Siddhivinayak Technical Campus
Shegaon 444203 (MS)



Date: 5/1/2023



1. Send the HARD COPY of this EOI to Virtual Labs team.
2. Keep the HARD COPY with you in a Virtual Labs file for the record.

Campus : Shegaon - Khamgaon Road, Shirasgaon Nile, Shegaon Dist. Buldhana, Maharashtra, 444203
Post Box Address : Siddhivinayak Technical Campus, Post Box No. 09, Khamgaon 444303 MS
Ph. 07263-220333, Mob. 8080977719, 8080855580 Email : stc.shegaon@stc.org.in, web-stc.org.in

Vaundhara Bahaddeshiya Samajik Sanstha's

Siddhivinayak Technical Campus

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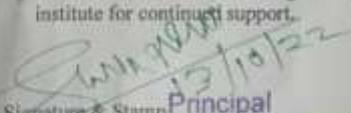




Expression of Interest for setting up Virtual Labs' Nodal Centre (VLNC)

Name of the Institute: Siddhivinayak Technical Campus	Acronym of Institute: STC, Shegaon
Address: Shegaon-Khamgaon Road, Shirasgaon Nile, Shegaon	
Tq. Shegaon Dist- Buldhana	
Pin Code: 444203	
Latitude: 20.737708	Longitude: 76.614471
Affiliated to: Sant Gadge Baba Amravati University, Amravati	
Approved By (AICTE/UGC/University): AICTE	
Approval Number: 1-465030131	AISHE Code: C-42830
Branch of Engineering / Science: Civil Engineering, Computer Sci. & Engineering, Mechanical Engineering Electrical (Electronics & Power) Engineering, Electronic & Tele. Engineering	
Number of Students / Faculties: 329*, 30	Total: 359
* Not Newly admitted Students	
Total number of computers available for Virtual Labs use: 15	
Internet bandwidth (in mbps): 100 mbps	
Name of the Head of Institute / Principal: Dr. Anant G. Kulkarni	
Email: dranantgkulkarni@stc.org.in	Mobile: 9826181319
Proposed Nodal Centre Coordinator (NCC): Prof. Kanchan P. Kankale	
Email: kanchanpkankale@gmail.com	Mobile: 8329235594
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Signature & Stamp: 
Principal
Siddhivinayak Technical Campus
Shegaon 444203 (M. S.)



Date: _____

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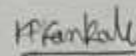
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Vasundhara Bahuddeshiya Samajik Sanstha's
SIDDHIVINAYAK TECHNICAL CAMPUS
 Shegaon-Khangaon Road, Shegaon, Pin: 444203, Maharashtra, India
 Session 2022-23

Time Table Virtual lab


Day	10:15-11:15	11:15-12:15	12:15-1:00	1:00-2:00	2:00-3:00	3:00-3:15	3:15-4:15	4:15-5:00	
Monday			Recess	Electrical Engineering (4th year) Central Lab 01&02		Recess			
Tuesday								Mechanical Engineering (3rd year) Central Lab 01 &02	
Wednesday					Electronics and Telecommunication Engg (2nd year) DSP Lab AG-09				Electronics and Telecommunication Engg (3rd year) DSP Lab AG-09
Thursday									Mechanical Engineering (2nd year) Central Lab 01 &02
Friday	Civil Engineering (2nd, 3rd year and 4th) Central Lab 01 &02				Mechanical Engineering (4th year) Central Lab 01 &02				
	10.15-11.15	11.15-12.15	12.15-12.30	12.30-1.30	1.30-2.30				
Saturday	Computer Science& Engg (2nd, 3rd year) Central Lab 01 &02		Recess	Electrical Engineering (2nd and 3rd year) Central Lab 01&02					



Prof K.P.Kankale
V-Lab Co-coordinator



Dean
Prof. A.P. Narkhede



Dr Anant G. Kulkarni
Principal(Engineering)

InstitutionalBestPractice-2

Practice:-

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- Case studies related to the topic.
- Animation creation for illustration of topic, if possible.
- Testing and validation on different range of inputs and outcome.



Total No. of Students Appear for V LAB Session 2022-2023

Sr. No	Name of Department	Total No Student
01	Civil Engineering	119
02	Mechanical Engineering	104
03	Electrical Engineering	92
04	Electronics & Telecommunication Engg.	52
05	Computer Science & Engineering	93
	Total	460

Prof. K. P. Kankale
Institute V LAB
Coordinator



Vasundhara Bahuddeshiya Samajik Sanstha's
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Department of Electrical Engineering
Session 2022-2023

Practical list

Year: -Third Year & Final Year

Branch: - Electrical Engineering (E&P)

Subject: Virtual Lab

Sr .No.	Name of Practical
1.	Load Test On Separately Excited DC Motor
2.	Speed Control of Separately Excited DC Motor
3.	No Load Test on Three Phase Induction Motor
4.	Blocked Rotor Test on Three Phase Induction Motor
5.	Open Circuit Test on Three Phase Alternator
6.	Short Circuit Test on Three Phase Alternator
7.	Load Test on Three Phase Alternator
8.	V and Inverted V curves of Synchronous Motor



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 Phone: 8080977719. Web: stc.org.in, Email: stc.shegaon@stc.org.in
Department of Electronics & Telecommunication Engineering
 Session 2022-2023



Practical list

Year: - Second /Third Year

Branch:- Electronics & Telecommunication Engg.

Subject: Virtual Lab

Sr. No.	Name of Practical
1.	To design parallel LC circuit and find out the current flowing through each component.
2.	To verify Kirchoff's Current Law & Kirchoff's Voltage Law.
3.	The aim of this lab exercise is to experimentally create the Current vs. Voltage for an actual solar cell under various illumination conditions.
4.	To determine the refractive index of the material of a prism.
5.	To calculate the beam divergence and spot size of the given laser beam.
6.	To draw the static current-voltage (I-V) characteristics of a Zener diode
7.	To study and verify B-H Curve.



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Department of Electronics & Telecommunication Engineering
 Session2022-2023



Practical list

Year:- Final Year

Branch: - Electronics & Telecommunication Engg.

Subject:-Virtual Lab

Sr.No.	Name of Practical
1.	To draw the static current-voltage (I-V) characteristics of a Zener diode
2.	To study and verify B-H Curve.
3.	To plot the characteristics of thermister and hence find the temperature coefficient of resistance.
4.	To construct a Zener diode voltage regulator and measure its line and load regulation.
5.	<ul style="list-style-type: none"> • To determine the Hall voltage developed across the sample material. • To calculate the Hall coefficient and the carrier concentration of the Sample material.
6.	To determine the resistivity of semiconductors by Four probe Method.
7.	To find the resolving power of the prism.



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Department of Civil Engineering
Session 2022 -2023

Practical list

Year: -Third/Final Year

Branch: - Civil Engg.

Subject:-Virtual Lab

Sr. No.	Name of Practical
1.	To study the retaining wall.
2.	To determine the continuous beam experiment.
3.	To determine the plastic hinge.
4.	To determine IZOD impact test.
5.	To study the Mohr's circle.
6.	To study the deflection in beam.
7.	To determine the portal frame.



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Department of Mechanical Engineering

Session 2022 -2023

Practical list

Year:-Second/Third Year

Subject: - Virtual Lab

Branch:-Mechanical Engineering

Sr. No.	Name of Practical
1.	Rotating unbalance
2.	Free vibration of fix beam
3.	Study of ECM process
4.	Molding and casting of polyurethane parts
5.	Study the effect of process parameter sin ECG
6.	SDOF System –Arbitrary Excitation
7.	Free response of SDOF
8.	Forced response of SDOF
9.	Eight HRS final presentation and test class.



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Department of Mechanical Engineering

Session 2022 -2023

Practical list

Year:- Final Year

Subject: Virtual Lab

Branch:-Mechanical Engineering

Sr. No.	Name of Practical
1.	Computer controlled cutting of wooden object
2.	Determination of method factor for duct
3.	To study various thermal models for EDM
4.	To study pulsed heating of model
5.	Lasers pot welding using Nd YAG Laser system
6.	3D Machining
7.	Interface & Application Programming
8.	Fan Rating Test
9.	Eight HRS .final presentation and test class.



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Department of Computer Science & Engineering
 Session 2022 -2023



Practical list

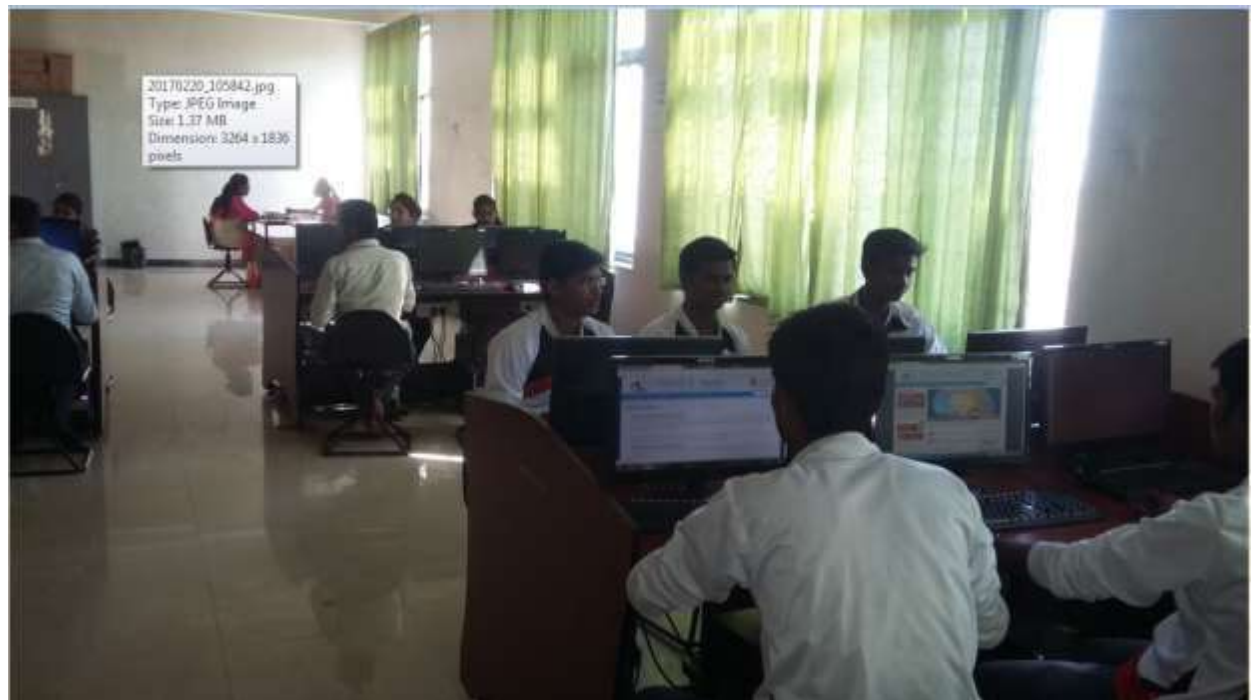
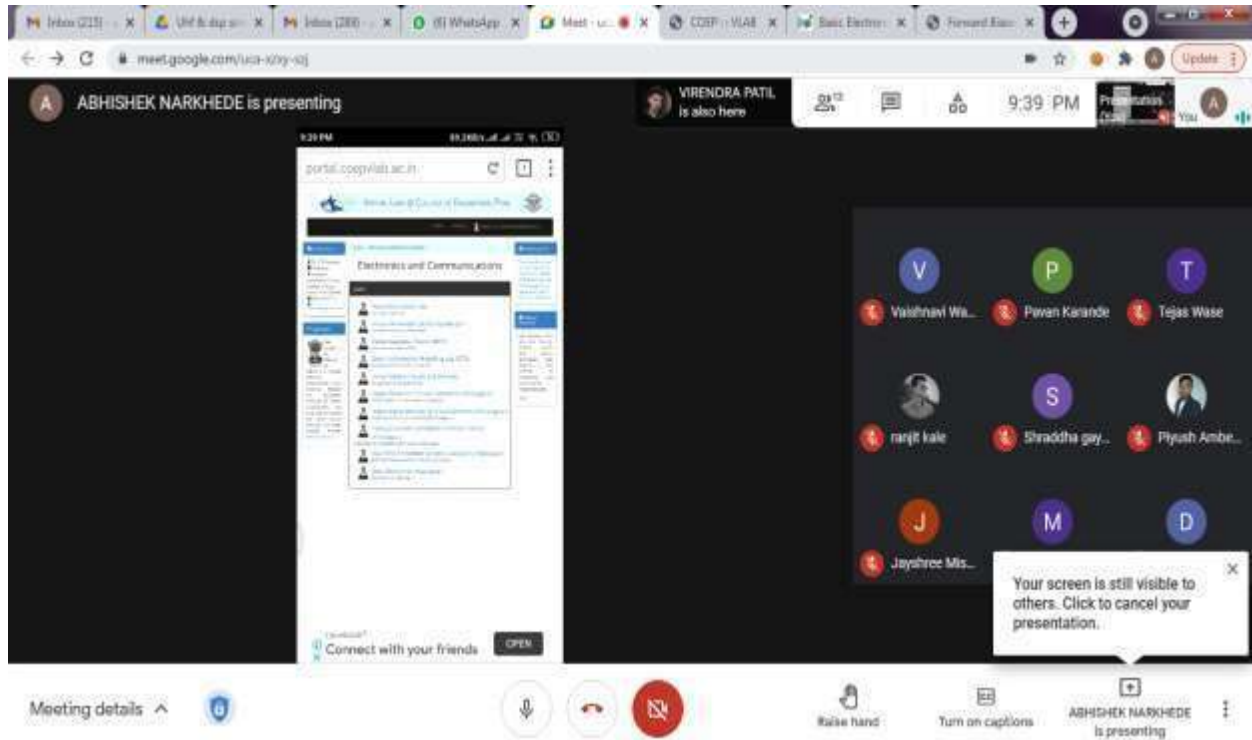
Year: -Third/Final Year

Branch:-Computer Science & Engg

Subject: Virtual Lab

Sr. No.	Name of Practical
1.	Recursion
2.	Sorting using Arrays
3.	Search Trees
4.	Advanced Control Flow
5.	Shortest Path sin Graphs
6.	Data Clustering: K-Means, MST-based
7.	Feature Representation
8.	Graph Traversals
9.	Ripple Carry Adder
10.	Carry-Look-Ahead Adder
11.	Karnaugh Map
12.	Combinational Multipliers
13.	Memory Design
14.	Representation of Floating Point Numbers and their Arithmetic
15.	Representation of Integers and their Arithmetic
16.	Virtual Memory

VLAB Photos / Proof:-



Full Wave Rectifier

INTRODUCTION

OSCILLOSCOPE

CALCULATION

$V_{rms} = \frac{V_m}{\sqrt{2}}$, V_m is the peak voltage
 $V_{avg} = \frac{2V_m}{\pi}$
 Ripple Factor = $\frac{V_{rms}}{V_{avg}}$ since, $V_{rms} = \sqrt{V_{dc}^2 - V_{avg}^2}$

CIRCUIT

CONTROLS

Channel 1: 1.0 Volt/Div
Channel 2: 1.0 Volt/Div
Timebase: 0.1 Time/Div

RC Integrator

OSCILLOSCOPE

CIRCUIT

CONTROLS

Channel 1: 10.0 Volt/Div
Channel 2: 1.0 Volt/Div
Timebase: 0.1 Time/Div

EXPERIMENTAL TABLE

Serial No.	Reverse Voltage(Volts)	Reverse Current(uAmp)
1	0.200	0
2	4.45	0
3	5.50	0
4	13.8	0
5	20.4	0
6	25.9	0
7	36.2	10199.8999999999

V-I Plot

Current (uAmp)

Voltage (V)

VIRTUAL LABS @ COLLEGE OF ENGINEERING PUNE

User ID:

Password:

User ID	Department	Lab	Equipment	Title/Time
ajay@ceepvlab.ac.in	Electronics and Communication	Diode logic processing using diodes (OR/AND)	Diode of varying forward and reverse bias	2 - 15
ajay@ceepvlab.ac.in	Electronics and Communication	Diode logic processing using diodes (OR/AND)	Diode of varying forward and reverse bias	2 - 15
ajay@ceepvlab.ac.in	Physics (Electronics)	Diode logic processing using diodes (OR/AND)	Diode of varying forward and reverse bias	2 - 15
ajay@ceepvlab.ac.in	Electronics and Communication	Diode logic processing using diodes (OR/AND)	Diode of varying forward and reverse bias	2 - 15