Criterion 2: Teaching Learning and Evaluation

2.3 Teaching- Learning Process

2.3.1 Student centric methods, such as experiential learning, participative learning and problem solving methodologies are used for enhancing learning experiences and teachers use ICT- enabled tools including online resources for effective teaching and learning process

Innovative Teaching Methods

	Activity	Name of Faculty	Subject	No. of students Attended / benefitted
1	Google classroom	Prof. D. S. Patil	Switchgear & Protection	340
2	YouTube Channel	Prof. K. R. Jadhav	Basic Electrical and Measurements	14867
		Prof. D. D. Ved	Electronics and Embedded System	500
3	Socrative App	Prof. A. V. Kumbhar	Basic Electrical Engg.	108
4	Animations	Prof. V. K. Thombare	Power Sytems	70
5	Virtual Lab	Prof. A. V. Kumbhar	Measurements	221
		Prof. S. A. Gaikwad	High Voltage Engg.	130
		Prof. S. H. Shete	Electrical Machines - I	75
6	Flipped Classroom	Prof. S. A. Shankardas	Power Electronics	120
		Prof. D. S. Patil	Electrical Machine Design	130
		Prof. A. V. Kumbhar	Measurements	75
		Prof. K. R. Jadhav	HVDC	105
7	Group Discussions	Prof. D. D. Ved	Analog Electronics	130

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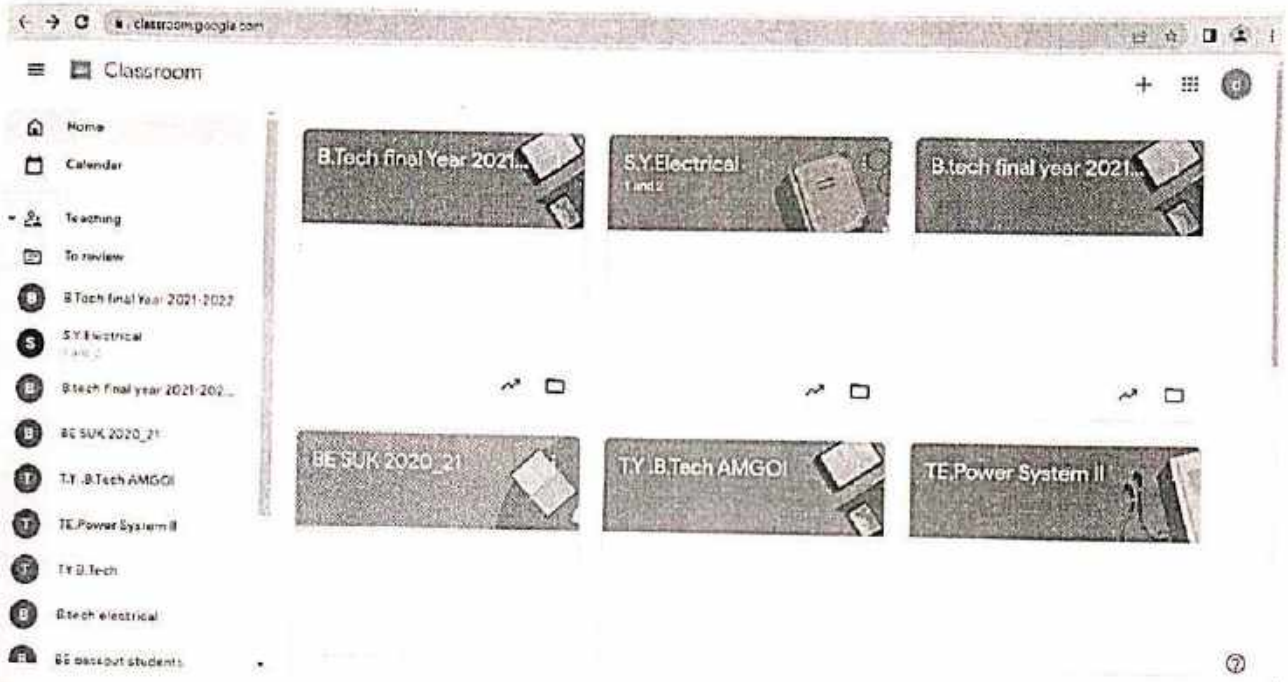
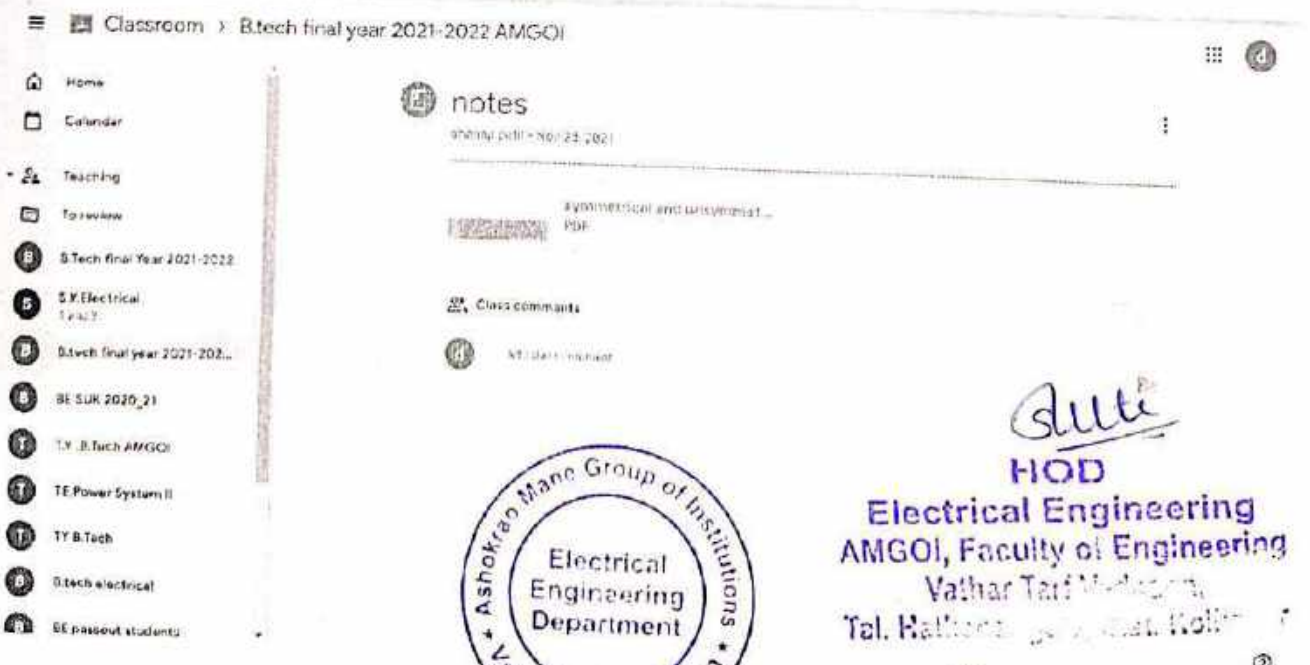
NH – 4, Vathar Tarf Vadgaon, Tal: - Hatkanangale, Dist: - Kolhapur - 416112.
Phone: (0230) 2407740, 2407750, 2407760 Fax: (0230) 2407750
NBA accredited Programs* | Accredited by NAAC with 'A' Grade CGPA 3.08
DEPARTMENT OF ELECTRICAL ENGINEERING

USE of GOOGLE CLASSROOM





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Electrical Engineering Department
Vathar Tarf Vadgaon

HOD
Electrical Engineering
AMGOI, Faculty of Engineering
Vathar Tarf
Tal. Hatkanangale, Kolhapur

SR. NO.	NAME OF STAFF	TOPIC	LINK	QR
1	Prof.K.R.Jadhav	Ohm's Law	https://youtu.be/kt43eHgtgQA?si=e8H7C_FbV43v4Uuv	
2	Prof.K.R.Jadhav	Resistors in series	https://youtu.be/rCszD8YiU7A?si=pQN_EsIjuylbWKdy	
3	Prof.K.R.Jadhav	Resistors in Parallel	https://youtu.be/5T-Zvv6aXeY?si=4ANe-nm4lFV5FrSw	
4	Prof.K.R.Jadhav	Problems on Equivalent Resistance	https://youtu.be/TQ_Ewl3pGTU?si=ljcliqecBt4626xo	
5	Prof.K.R.Jadhav	Problems on Parallel circuit	https://youtu.be/TLGQ5isSjT8?si=zyJaAnEYolMjwXjT	

11	Prof.K.R.Jadhav	Induction Directional relay	https://youtu.be/0aLK2S-Xboc?si=Ur1Z8ogPKseUlTLY	
12	Prof.K.R.Jadhav	Thermal relay	https://youtu.be/Q-Mr_FTKoaw?si=gp8O4JRnUP-yl17e	
13	Prof.K.R.Jadhav	Static relay	https://youtu.be/uo_8lRzrmdc?si=RsGEpRwiFi2sKBDa	
14	Prof.K.R.Jadhav	Microprocessor Relay	https://youtu.be/5gr31QB-m2E?si=9DAF71Xa9fl1kDNY	
15	Prof.K.R.Jadhav	Distance and Impedance relay	https://youtu.be/zBTCNTDS6JA?si=vAYRcKJ72H6MIs97	

21	Prof.K.R.Jadhav	Single Phase Power Measurement	https://youtu.be/7laUpFn79IE?si=aKeWVc8gjOtIhZEg	
22	Prof.K.R.Jadhav	Measurement of AC and DC Quantities	https://youtu.be/pCUomptvk3A?si=LRXlr0rECBKR09L_	

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Vathar Tarf Vadgaon

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Electrical Engineering
AMGOI, Faculty of Engineering
Vathar Tarf Vadgaon,
Tal. Hatkanangale, Dist. Kolhapur

SR. No.	NAME of Staff	Topic	Link	QR
1	Prof. D. D. Ved	Embedded C program for LED Blinking	https://www.youtube.com/watch?v=eTVctkHFZks&list=PLr9oy0_1y2w1eciiHgR0lLB9a2CbKNXCI&index=1	
2	Prof. D. D. Ved	Programs on Timers of 8051	https://www.youtube.com/watch?v=gJRtHhmcaHA&list=PLr9oy0_1y2w1eciiHgR0lLB9a2CbKNXCI&index=2	
3	Prof. D. D. Ved	Programs on 8051	https://www.youtube.com/watch?v=MxENp61axig&list=PLr9oy0_1y2w1eciiHgR0lLB9a2CbKNXCI&index=3	
4	Prof. D. D. Ved	Timers & counters of 8051	https://www.youtube.com/watch?v=K6NNZKYLCTc&list=PLr9oy0_1y2w1eciiHgR0lLB9a2CbKNXCI&index=4	
5	Prof. D. D. Ved	Max 232	https://www.youtube.com/watch?v=YSdc5knSKfE&list=PLr9oy0_1y2w1eciiHgR0lLB9a2CbKNXCI&index=9	
6	Prof. D. D. Ved	I2C Communication	https://www.youtube.com/watch?v=FN8qFtItYpo&list=PLr9oy0_1y2w1eciiHgR0lLB9a2CbKNXCI&index=10	

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7	Prof. D. D. Ved	PCI	https://www.youtube.com/watch?v=87tE1S95upU&list=PLr9oy0_1y2w1eciiHgR0lLB9a2CbKNXCI&index=11	
8	Prof. D. D. Ved	Interfacin Input and Output devices	https://www.youtube.com/watch?v=VdVfpDJELmk&list=PLr9oy0_1y2w1eciiHgR0lLB9a2CbKNXCI&index=12	
9	Prof. D. D. Ved	DAC interfacing	https://www.youtube.com/watch?v=sf-gS0ndLHo&list=PLr9oy0_1y2w1eciiHgR0lLB9a2CbKNXCI&index=14	
10	Prof. D. D. Ved	Class A Power Amplifier	https://www.youtube.com/watch?v=APKGlRj-CBM&list=PLr9oy0_1y2w3hbKfTp1rgWOn27jeC52Gj&index=3	
11	Prof. D. D. Ved	Feedback Amplifiers	https://www.youtube.com/watch?v=2uVm8uITg44&list=PLr9oy0_1y2w3hbKfTp1rgWOn27jeC52Gj&index=4	

socrative
A showbie PRODUCT

Name _____
Date _____

Score _____

electrical

1. In a current-voltage relationship graph of a linear resistor, the slope of the graph will indicate

(A) conductance
(B) resistance
(C) resistivity
(D) a constant

2. Ohm's law is not applicable to

(A) dc circuits
(B) high currents
(C) small resistors
(D) semi-conductors

3. In case of ideal current sources, they have

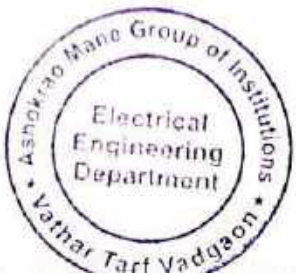
(A) zero internal resistance
(B) low value of voltage
(C) large value of currrent
(D) infinite internal resistance

4. A practical current source can also be represented as

(A) a resistance in parallel with an ideal voltage source
(B) a resistance in parallel with an ideal current source
(C) a resistance in series with an ideal current source
(D) none of the mentioned

5. If the resistances 3Ω, 5Ω, 7Ω, 9Ω are in series, then their equivalent resistance(Ω) is

(A) 24
(B) 9
(C) 20
(D) 32



6. If the resistances 1Ω, 2Ω, 3Ω, 4Ω are parallel, then the equivalent resistance is?

(A) 0.46

(B) 0.48

(C) 0.5

(D) 0.52

7. Which of the followings is/are active element?

(A) Current source

(B) voltage source

(C) resistance

(D) both A and B

8. Capacitor does not allow the sudden change of

(A) Current

(B) voltage

(C) resistance

(D) Both A and B

9. KCL works on the principle of which of the following

(A) law of conservation of charge.

(B) law of conservation of energy.

(C) both

(D) None of the above

10. KVL works on the principle of

(A) law of conservation of charge.

(B) law of conservation of energy.

(C) both

(D) None of the above

11. Rms value is defined based on which of the following?

(A) Heating effect

(B) Charge transfer

(C) Current

(D) Voltage

electrical

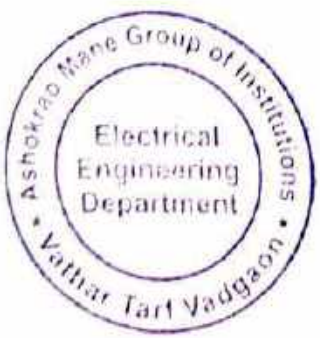
October 18, 2023 10:35 AM

STARDELTA

Student Name	Score (%)	Score (#)	
		11	
02 SANKET	90.91	10	
04 TAHIR DHAGE	54.55	6	
05, DNYANESHWAR	27.27	3	
06,SHUBHAM	45.45	5	
07 Swaranjali	81.82	9	
09 Pratiksha	45.45	5	
11 ATISH ANIL KHOT	90.91	10	
12 Vishwajit Korane	90.91	10	
15Anushka	81.82	9	
18 ATHARV NANGARE	72.73	8	
19-Chaitanya	72.73	8	
20MEGHARAJ	72.73	8	
20MEGHARAJ	9.09	1	
21- PRACHI	81.82	9	
24, Sakshi Patil	90.91	10	
25 Uvesh Tamboli	54.55	6	
25 soham patil	63.64	7	
28 tushar	81.82	9	
28-Tushar	18.18	2	
29 Abhishek	90.91	10	
30 ANIKET P SHINDE	81.82	9	
32 ADITYA	63.64	7	
37 KOMAL	72.73	8	
38 Omkar Dandavate	9.09	1	
41 , Sushant bajirao havaldar	54.55	6	
41 sushant	0	0	
43Nirjala	54.55	6	
44 NAGESH	81.82	9	
48-Nilam	81.82	9	
49 shraddha	90.91	10	
50 shreyas	81.82	9	
50 shreyas	36.36	4	
51 Tanmay	63.64	7	
52 Vaishnavi	63.64	7	
53PRANAV	72.73	8	
54 UVESH TAMBOLI	81.82	9	
54 Uvesh Tamboli	0	0	
56 Sopiya	36.36	4	
56 sopiya	72.73	8	
57 pradnya	72.73	8	
58 Gayatri	72.73	8	

59 Prachi	72.73	8	
61 Shubham	18.18	2	
63 Kiran	81.82	9	
64 Prathamesh	54.55	6	
65 Aditya kamble	27.27	3	
67 Farman.	72.73	8	
69 Sakshi	81.82	9	
70 Rasika	63.64	7	
71 Aditya	72.73	8	
72 Tejas	9.09	1	
72,Tejas	27.27	3	
73 Pruthviraj	54.55	6	
75 shivraj	27.27	3	
ANIS	63.64	7	
Akanksha -45	81.82	9	
Akanksha-45	0	0	
Akanksha-45	0	0	
ISHWARI 10	63.64	7	
Nihal	81.82	9	
Roll No 46 Aparna patil	81.82	9	
Roll No-40, Sonali	90.91	10	
Roll No. 26 Sushant	63.64	7	
Roll No.26 Sushant	0	0	
Roll no	0	0	
Roll no.-17 Pranav	81.82	9	
Roll-39, Sayali Bajirao Ekshing	90.91	10	
Saloni Uttam Patil	54.55	6	
Saloni Uttam Patil	0	0	
Sayali -03	81.82	9	
Class Scoring	**58.05**	**6.39**	

Report Generated: October 18, 2023 5:05 AM +00:00



electrical

January 2, 2023 2:26 PM

STARDELTA

Student Name	Score (%)	Score (#)
		11
AKSHAYPUJARI	72.73	8
ARMAN LANJEKAR	27.27	3
ATHARVPATIL	72.73	8
Arman	0	0
Digvijay Barage	63.64	7
Komal shaha	36.36	4
MAYURESH PATIL	54.55	6
MAYURESH PATIL	0	0
Mohsin patankar	0	0
Mohsin patankar	63.64	7
Mrunali Barge	54.55	6
Mrunali Barge	0	0
Neha shivaji kamme	18.18	2
Nisha Sanjay Khabade	63.64	7
Nitin Yadav	72.73	8
Omkar Pasare	81.82	9
Omkar Savare	27.27	3
PALLAVI PATIL	54.55	6
Prachi Sardar Patil	45.45	5
Prathmesh Magdum	63.64	7
Prathmesh jadhav	45.45	5
Prathmesh jadhav	0	0
Pratiksha Kadam	45.45	5
Pratiksha Kadam	0	0
Prerana Umesh Patil	9.09	1
ROHANSHEDBALE	18.18	2
ROHANSHEDBALE	63.64	7
ROHIT NAGARALE	63.64	7
Rutuja Savalekari	45.45	5
SANGRAMWAINGADE	63.64	7
SANKALP SOKASANE	54.55	6
SANKALP SOKASANE	63.64	7
SOHAM YASHWANT YADAV	9.09	1
Samruddhi Shivaji Patil	9.09	1
Sanika Sunil Patil	54.55	6
Sanket Sanjay Jalane	45.45	5
Sanket Sanjay Jalane	0	0
Shravani satyashil kibile	54.55	6
Trupti Avaghade	18.18	2
Trupti Avaghade	0	0
VEDANT INGLE	54.55	6
Yash	72.73	8
Class Scoring	**39.61**	**4.36**

Report Generated: January 2, 2023 8:56 AM +00:00

HOD

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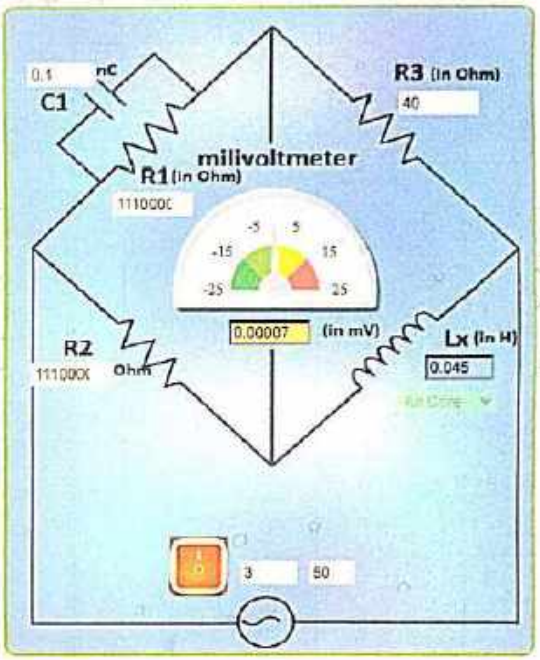
Electrical Engineering Department
Vathar Tad Wadgaon

Measurement of Self-inductance by Maxwell Bridge

Procedure:

1. Apply Supply voltage from with arbitrary frequency. (V =3v).
2. Set the value of Lx inductor from **Set inductor value tab**.
3. Choose the values of C1, R1, R2 and R3 from the Controls below.
4. Switch on the supply. Observe the millivoltmeter pointer.
5. If "NULL" is achieved, click "Simulate" from **measure inductor value tab**. Observe calculated values of unknown Inductance and unknown internal resistance of the inductor. If better "NULL" is desired, repeat from step 3.
6. Quality factor value of this coil should be less than 10. Q-Factor of unknown coil = (w*Ln)/Rn.



Set Inductor value | Measure Inductor value

The current voltmeter reading is: 0.0000 mv. Now simulate to get:

Inductor value (in H): 0.0444

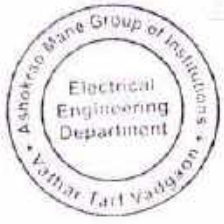
Resistance value (in Ohm): 40

Quality Factor: 0.34871678454E

Simulate

CONTROLS

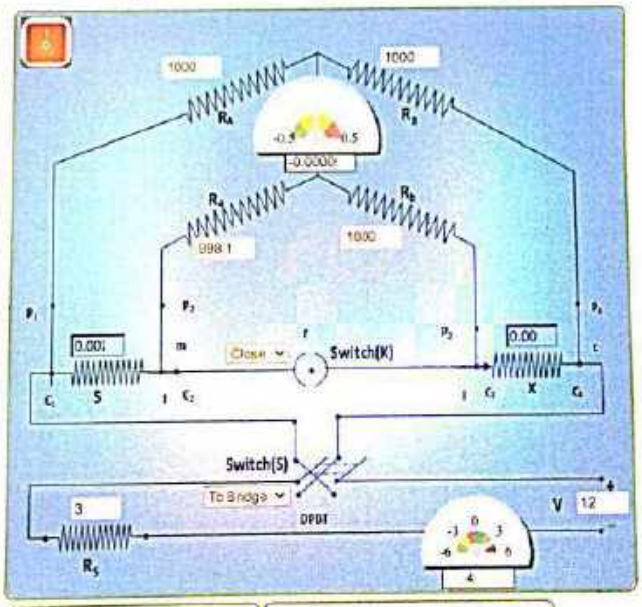
R1 : 1 Ohm		11.1 MOhm
R2 : 1 Ohm		11.1 MOhm
R3 : 1 Ohm		11.1 MOhm
C1 : 1 nC		111.1 nC

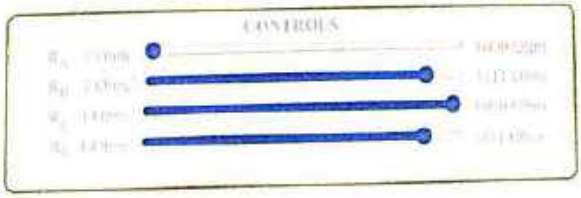


Measurement of Low Resistance by Kelvin Double Bridge

Procedure:

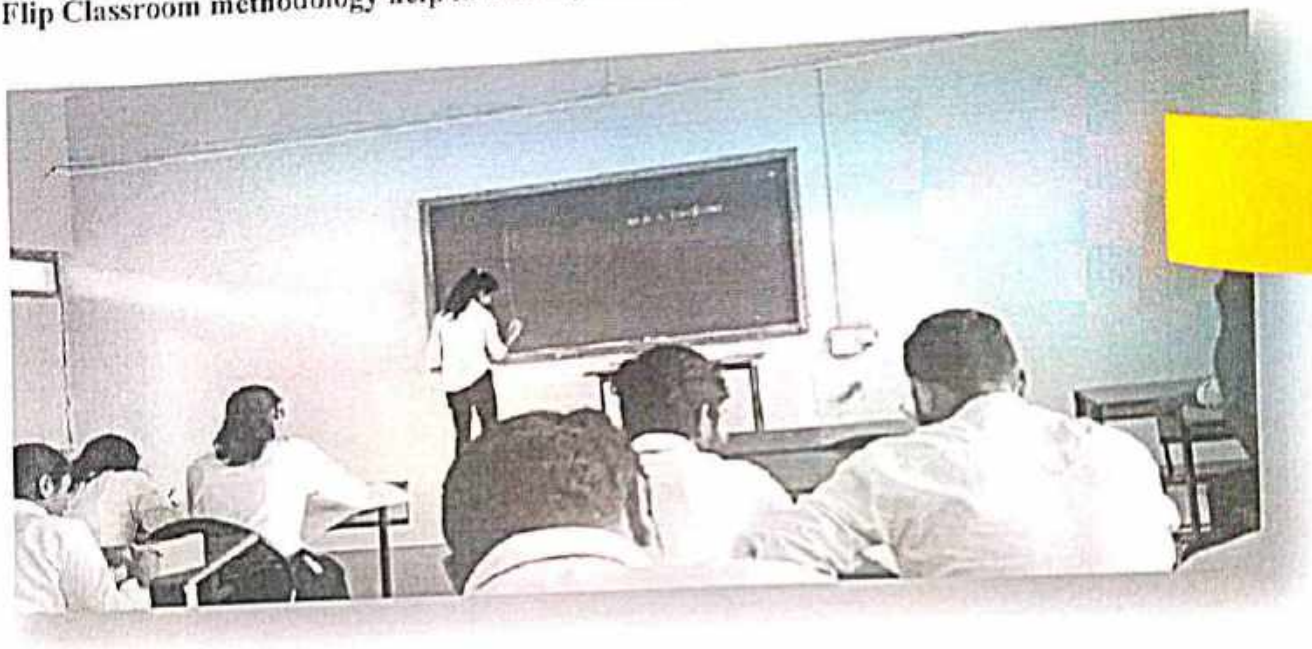
1. Set the voltage (V=12V) and switch on the board. Keep Switch(S) in 'Short' mode and adjust the rheostat(Rs) to maintain the current 2A, 3A, 4A or 5A in the circuit.
2. Then set Switch(S) to 'Open' mode and set Low resistance(S) value within 0.001 to 0.01 ohm from 'Set The Unknown Resistance 'S'' box.
3. Then set Switch(S) to 'Bridge' mode and Switch(K) to 'Open' mode.
4. Vary the values of R_A, R_B, R_a and R_b from the control box below or directly put the values in the boxes of respective elements to get a zero deflection on the millivoltmeter pointer.
5. Now, set Switch(K) to 'Close' mode and again vary the values of R_A, R_B, R_a and R_b to get a zero deflection on the millivoltmeter pointer.
6. If "NULL" is achieved, click on 'Calculate' on 'Calculated Unknown Resistance Value' box to observe calculated value of unknown resistance (S).





PARTICIPATIVE LEARNING

Flip Classroom methodology help in active participation of students in learning



Poster presentations encourages student's creative thinking

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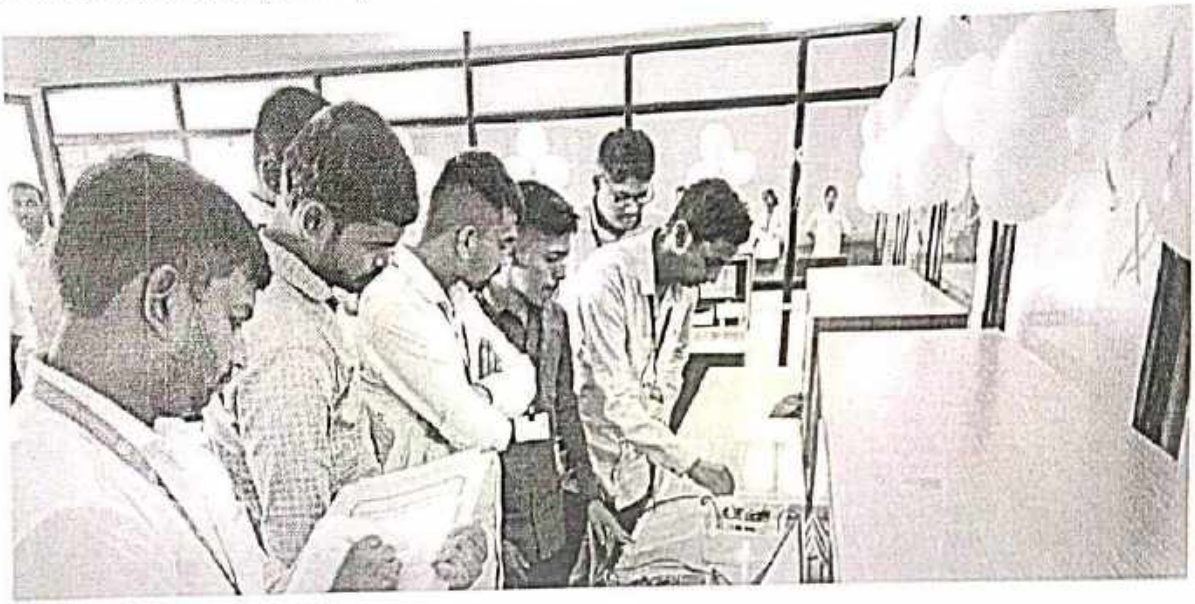
Project Competitions to enhance innovative ideas sharing, Hands-on skills, Presentation and communication , Entrepreneurial skills etc.



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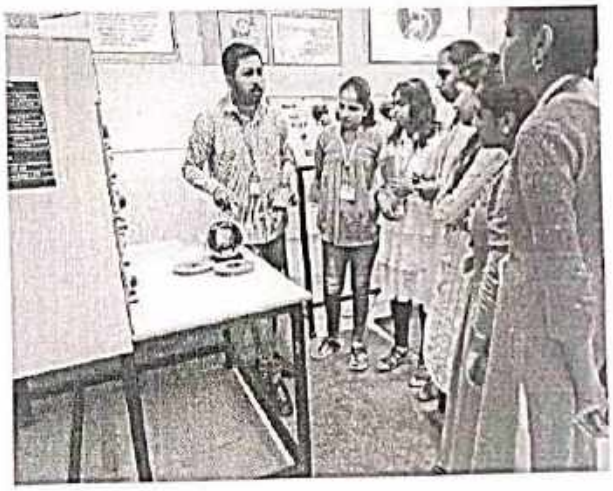
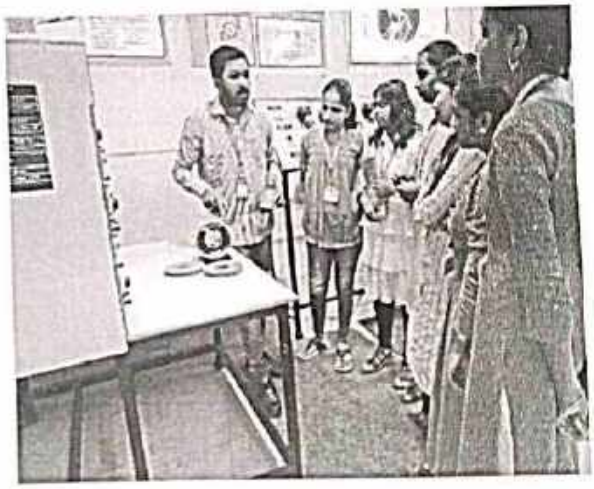
EXPERIENTIAL LEARNING

Electrical engineering experiments play a crucial role in enhancing the skills of students in this field. These experiments provide hands-on experience with electrical components, circuits, and systems, and they contribute to both technical and practical skill development.





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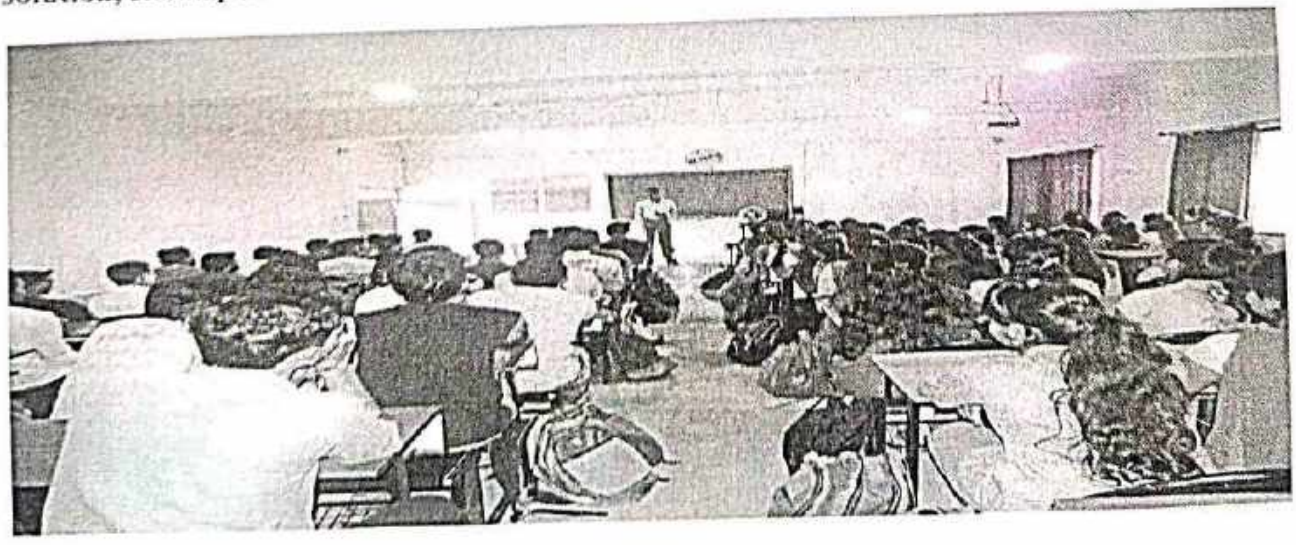
"A One Day Industrial visit to Suzlon Wind Plant, Chalkewadi"

"A Guest Lecture on Awareness about skill development program by chanakya logic solution, Kolhapur"



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Internships can indeed enhance students in Practical Experience, Skill Development, Resume Enhancement, Career Exploration, Confidence Building, Job Opportunities

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Tal. Hatkanangale, Dist. Kolhapur

2.3. Teaching- Learning Process

2.3.1 Student centric methods, such as experiential learning, participative learning and problem solving methodologies are used for enhancing learning experiences and teachers use ICT- enabled tools including online resources for effective teaching and learning process.

Sr. No	Activity	Name of Faculty	Subject	No. of Students attended/ Benefited
1	Google Meet	Prof. S. R. Patil	"R" Programming	74
2	Animation Video	Prof. S. J. Vibhute	Cloud Computing	74
		Prof. A. B. Desai	Software Engineering	75
		Prof. S. S. Kibile	Computer Architecture and Organization	78
3	Flipped Classroom	Prof. S. S. Redekar	Data Structure	78
4	NPTEL	Prof. R. P. Jadhav	Cloud Computing	78
5	Virtual Lab	Prof. P. S. Powar	Machine Learning	210
6	Algo Expert Competition	Prof. S. J. Vibhute	C and C++ Programming	100
7	Power Point Presentation	Prof. P. S. Powar	Machine Learning	210
		Prof. S. J. Vibhute	Consumer Behaviour	75
		Prof. P. P. Nagrale	Block Chain Technology	74
		Prof. D. A. Jadhav	Human Computer Interaction	76
8	Moodle Cloud system	Prof. S. J. Vibhute	Cloud Computing	78

Prepared By
Prof. S. J. Vibhute

Verified By
Prof. S. S. Redekar

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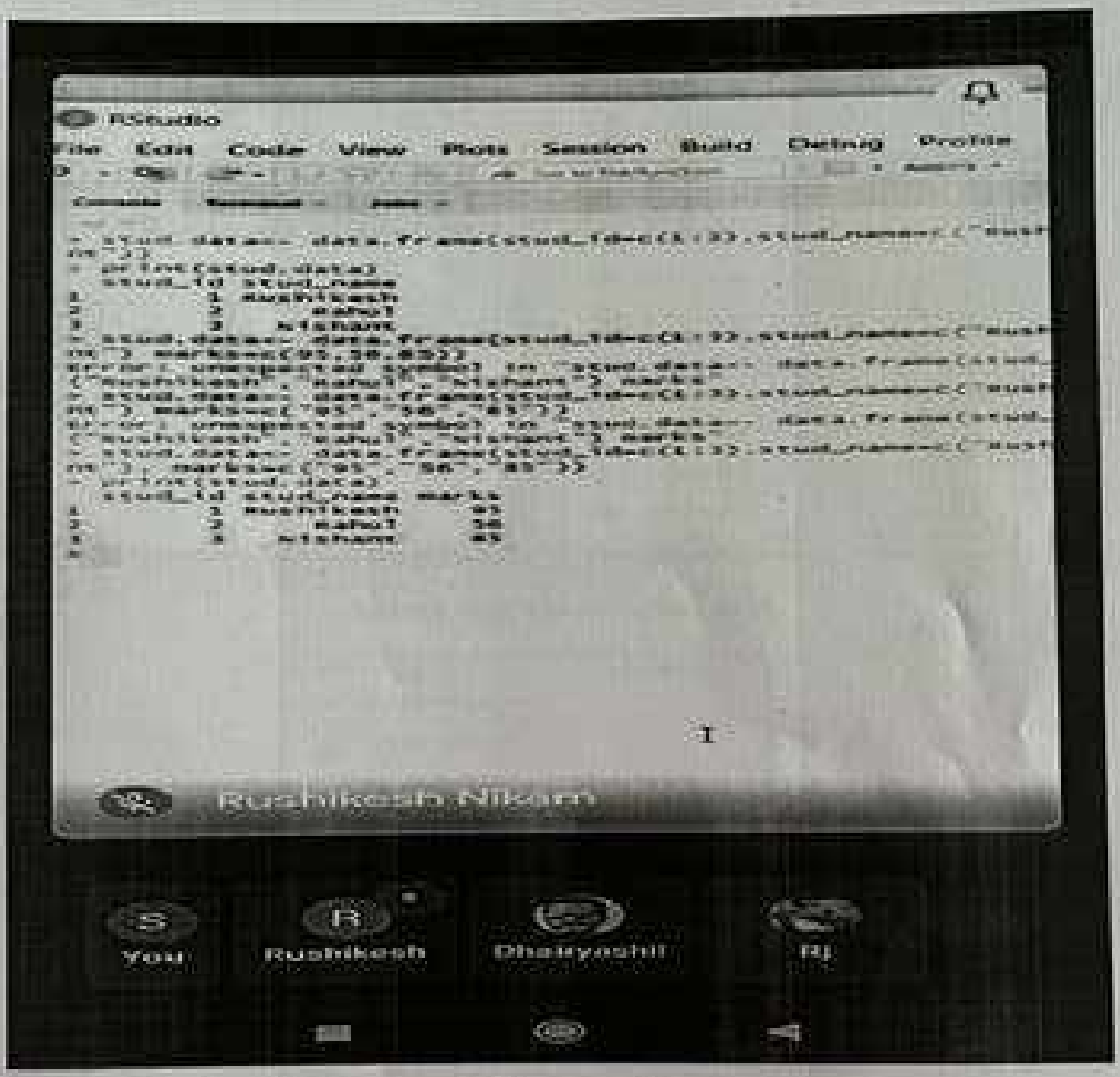
ASHOKRAO MANE GROUP OF INSTITUTIONS, VATHAR.
NH – 4, Vathar Tarf Vadgaon, Tal: -Hatkanangale, Dist: - Kolhapur-416112
Department of Computer Science and Engineering

1. Google Meet:

Prof. S. R. Patil "R" Programming

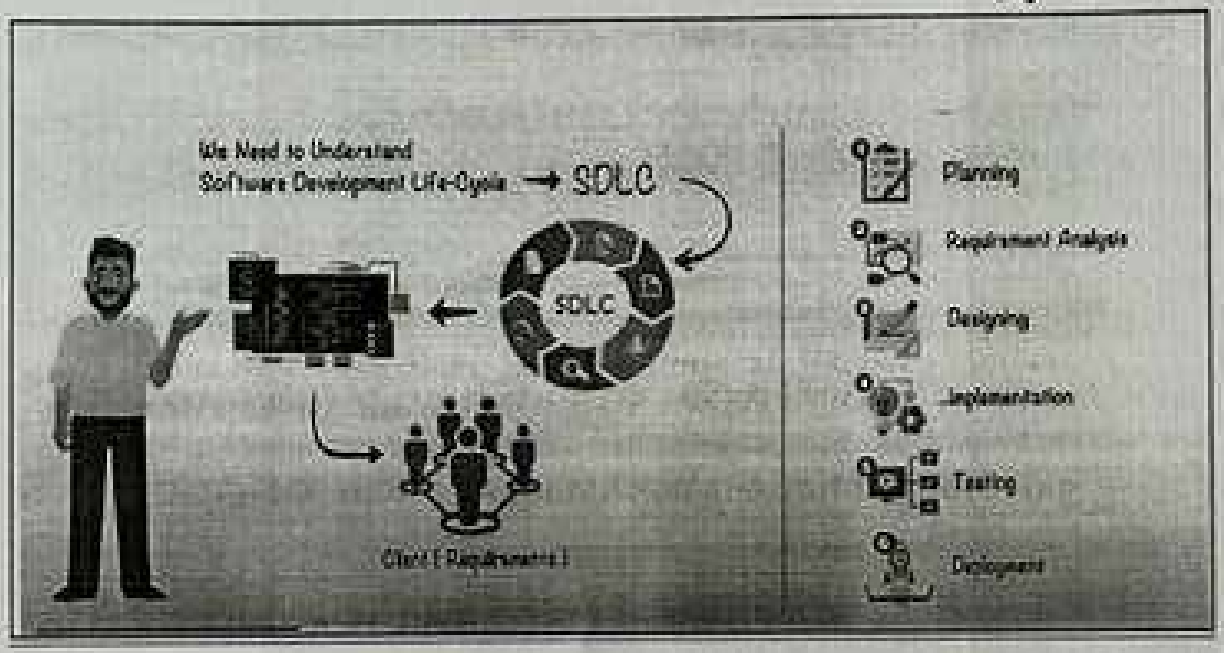


Google Meet Conducted by Prof. S. R. Patil Madam on "R" Language

Prepared By
Prof. S. J. Vibhute

Verified By
Prof. S. S. Redekar

2. Prof. A. B. Desai Software Engineering



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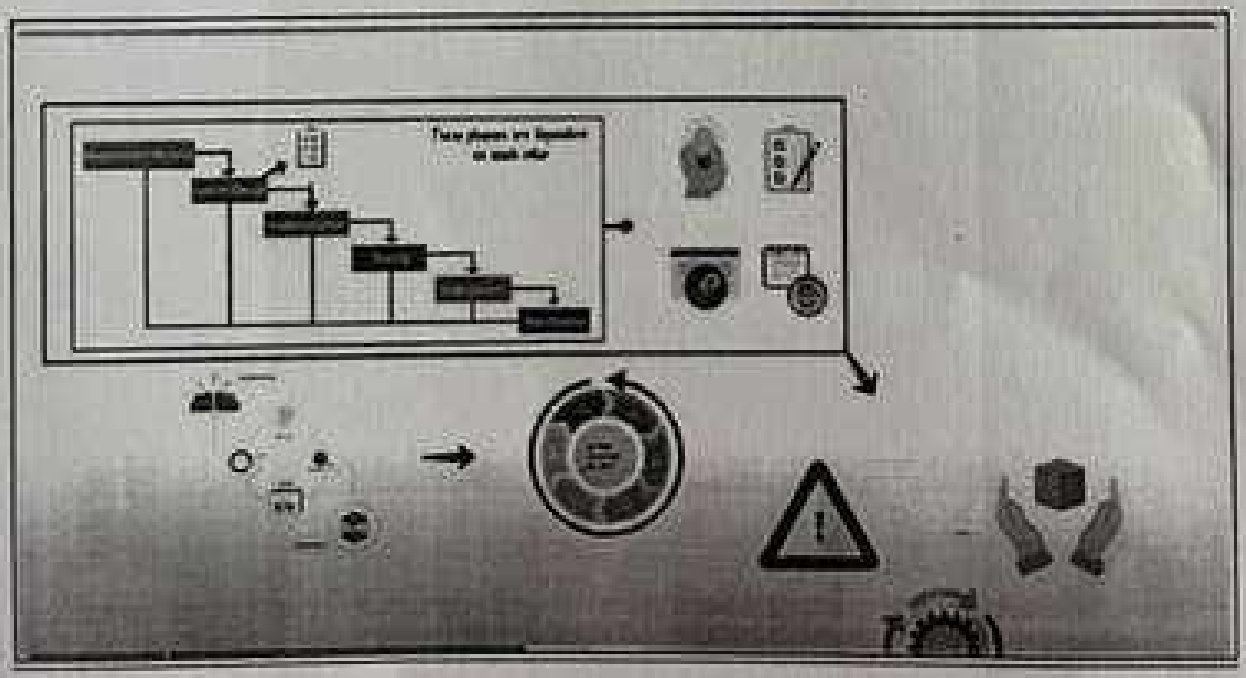

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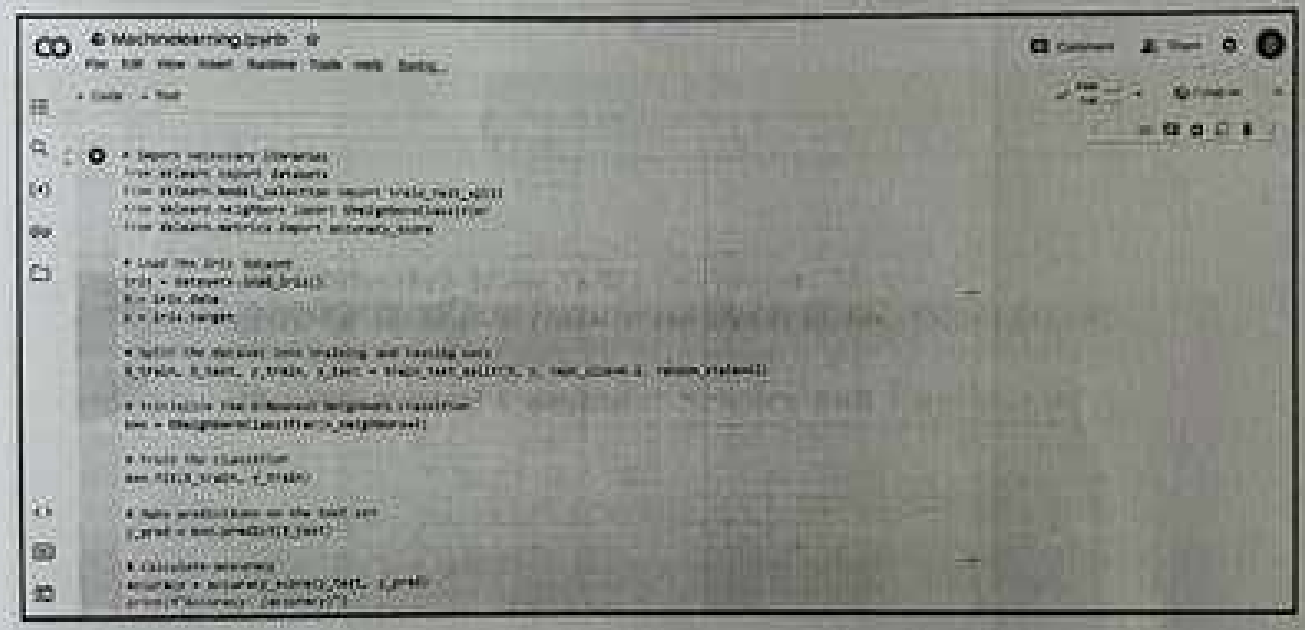
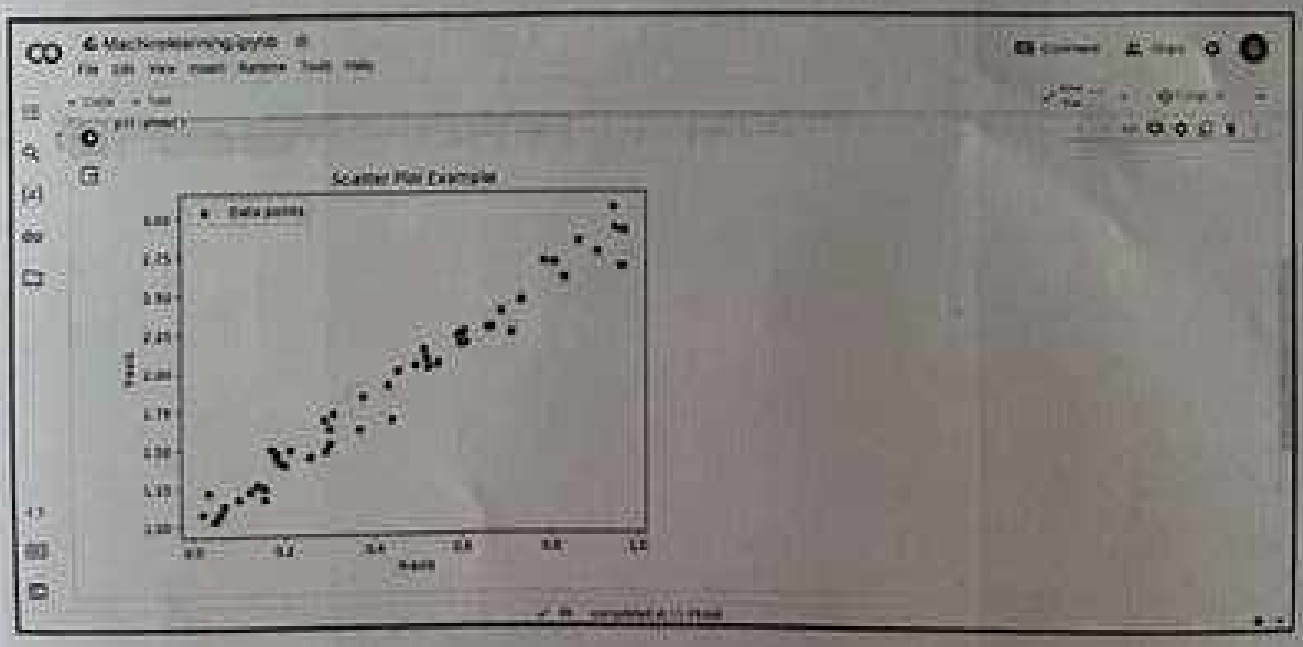
5 Virtual Lab

Prof. P. S. Powar Machine Learning



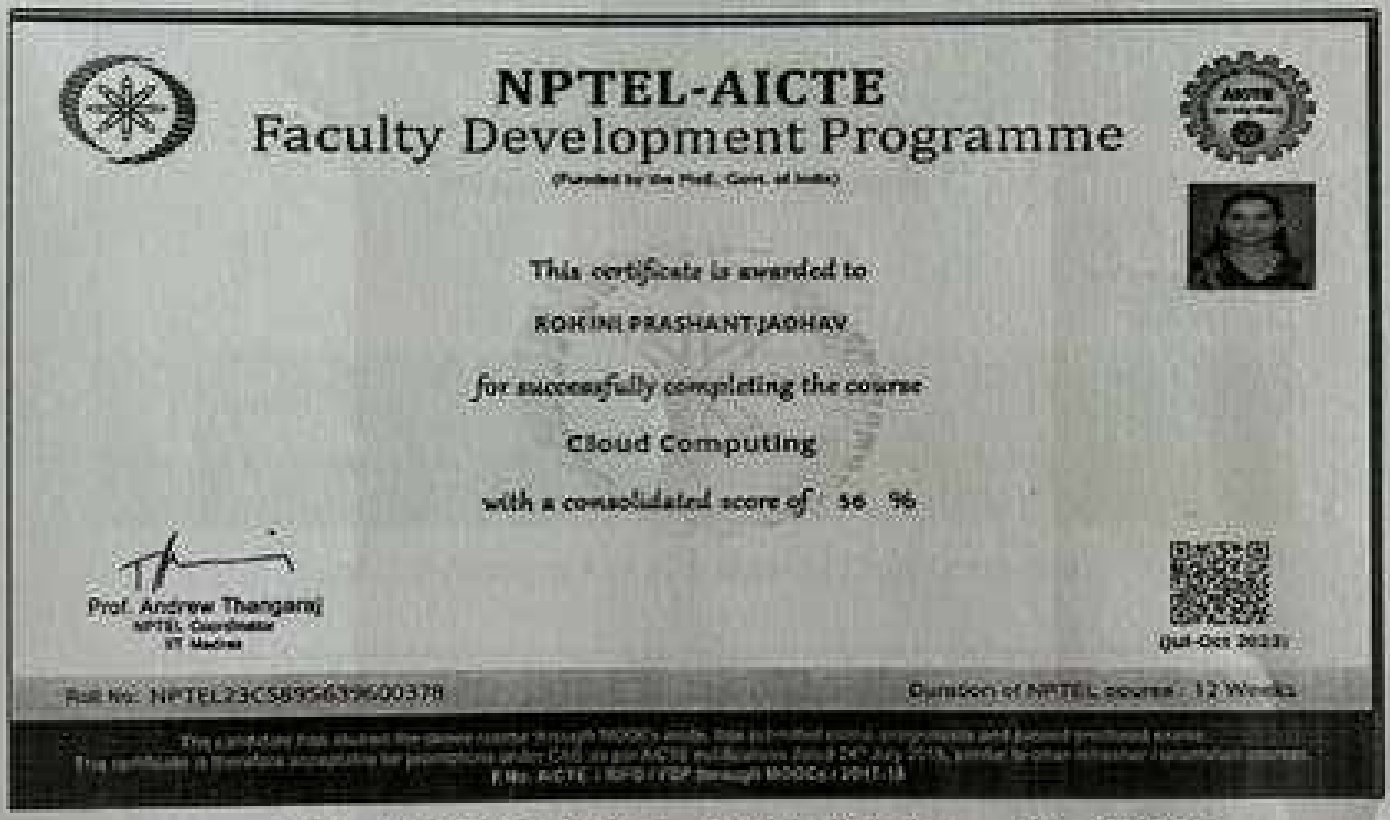
Machine learning practical's done on Google Colab



4 NPTEL

Prof. R. P. Jadhav Cloud Computing

Prof. R. P. Jadhav Madam has been registered for NPTEL FDP Program and students also registered for the same.



NPTEL-AICTE
Faculty Development Programme

This certificate is awarded to

ROHINI PRASHANT JADHAV

for successfully completing the course

Cloud Computing

with a consolidated score of 56 %

Prof. Andrew Thangaraj
NPTEL Coordinator
IIT Madras

Duration of NPTEL course : 12 Weeks

Attached is the FDP Certificate by Prof. R. P. Jadhav AY – 2023-24

3 **Flipped Classroom**

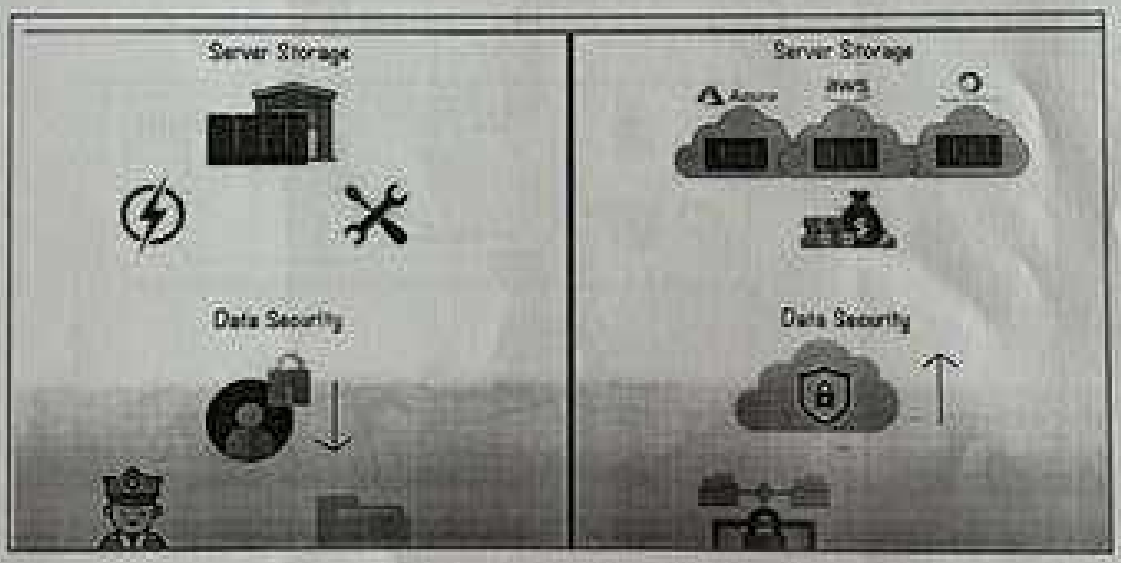
Prof. S. S. Redekar Data Structure

Students involved in Flipped Classroom Session (TY CSE 2021-22)

2. **Animated Video**

1. Prof. S. J. Vibhute Cloud Computing

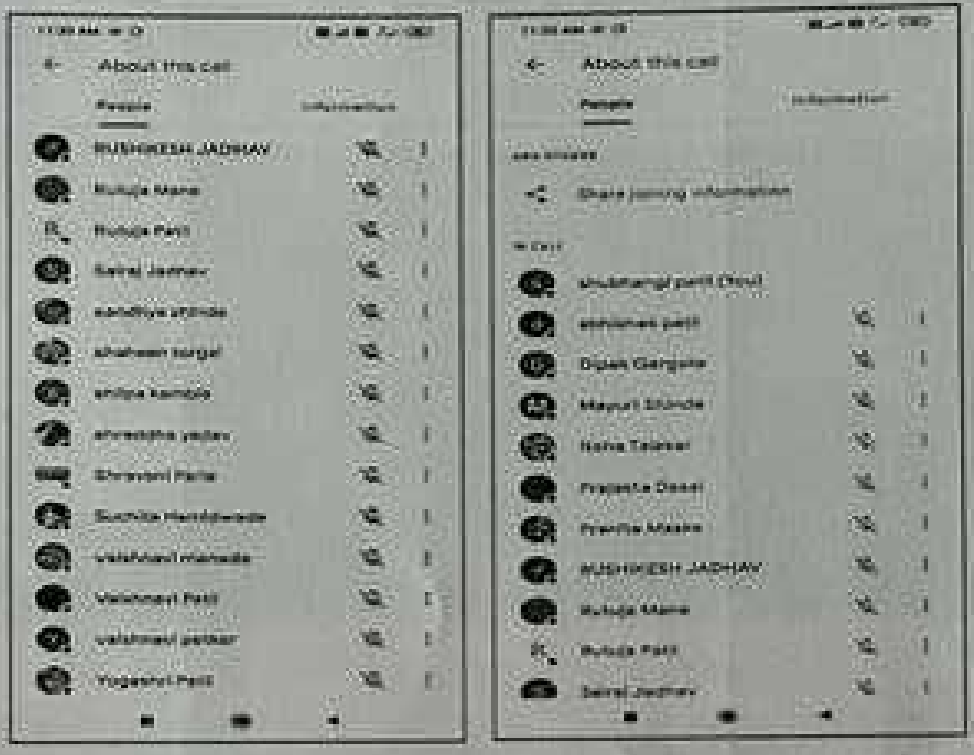
https://youtu.be/WFDjGYfwdY?si=02K-eiucK8rpQuQm



https://youtu.be/M9S8_fiOSWo?si=pMVIN0IF7HXkh1L9

Prepared By
Prof. S. J. Vibhute

Verified By
Prof. S. S. Redekar



Students Attendance for Online Lecture.

Prepared By
Prof. S. J. Vibhute

Verified By
Prof. S. S. Kodekar

You Tube Channel: Channel contains total 40 lectures which covers entire Engineering Graphics syllabus

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NH – 4, Vathar Tarf Vadgaon, Tal: - Hatkanangale, Dist: - Kolhapur-416112

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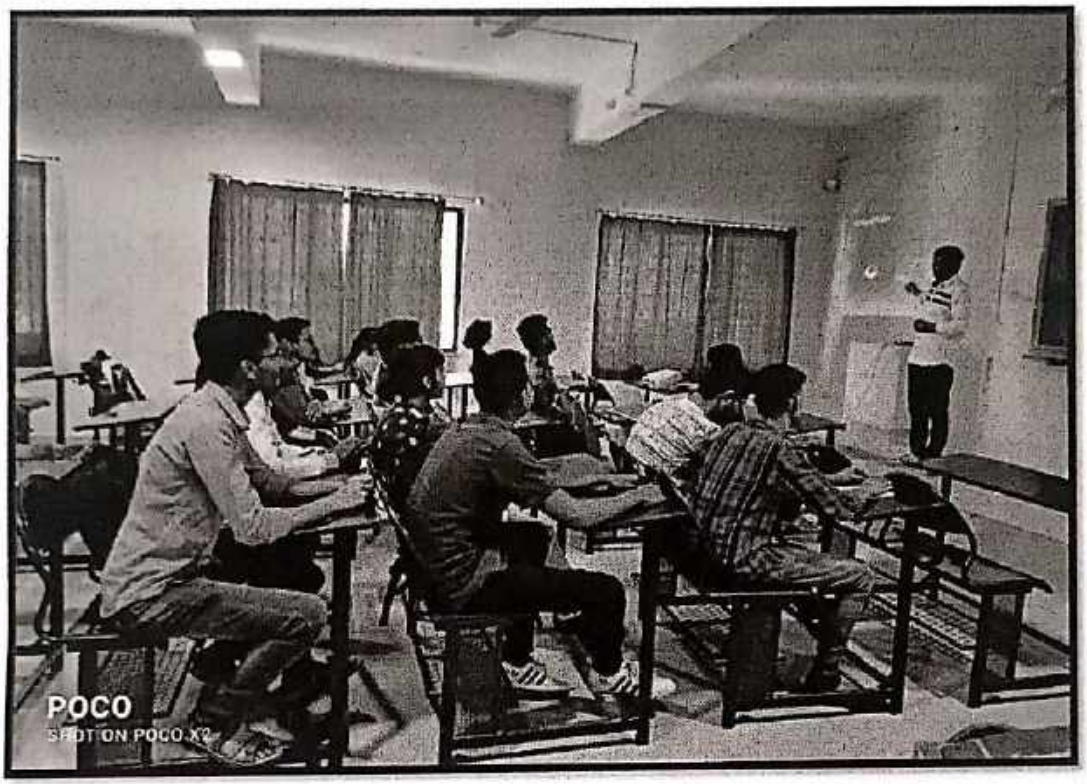


First Year student Seminar Activities Students Making PPT and explaining

Director Sir interacted with First Year student

ICT EVIDENCES

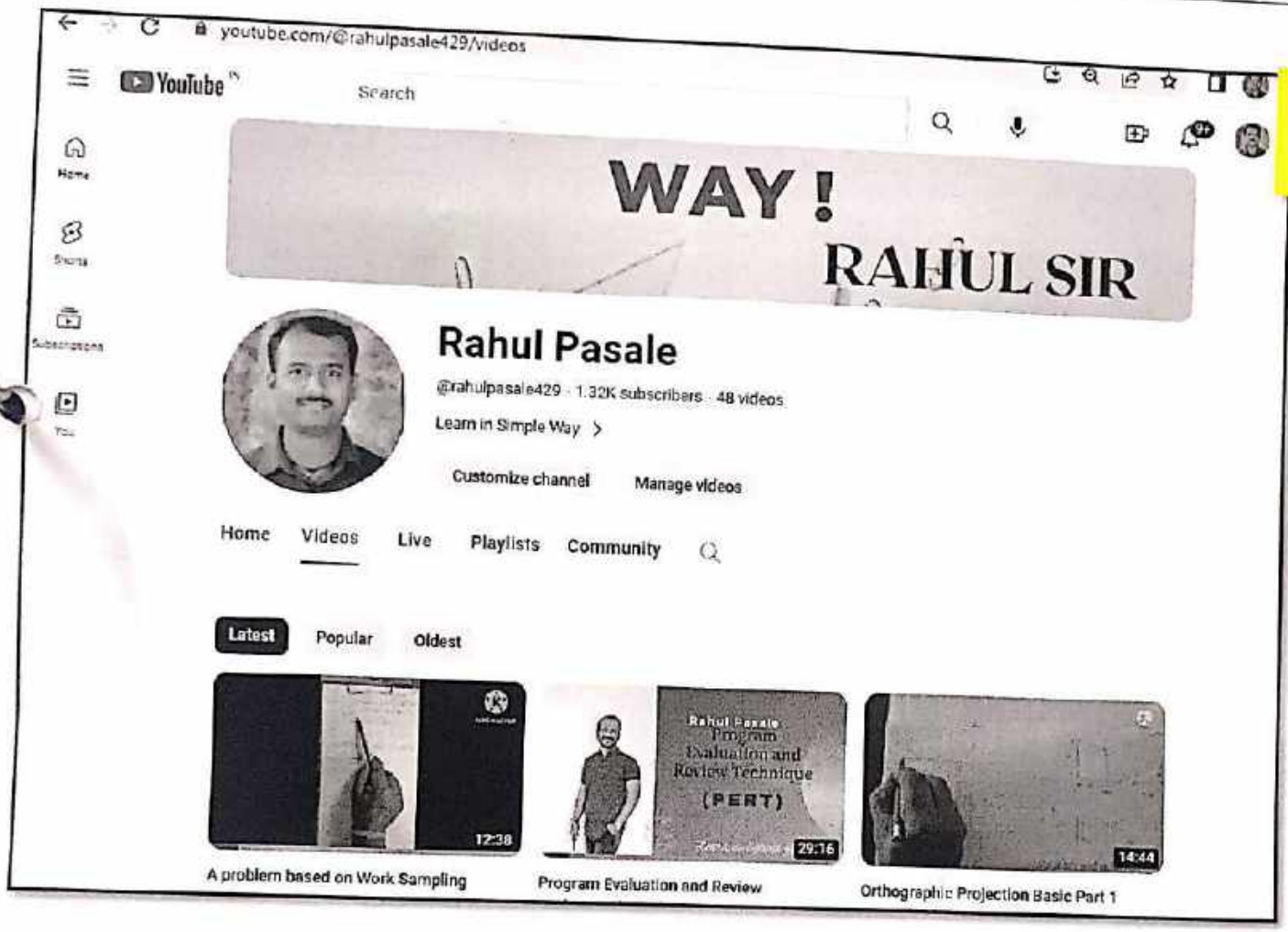
Sr. No.	Name of Staff	Subject	ICT used
1	Prof. R. A. Pasale	Engineering Graphics	YouTube channel (40 lectures covered in entire syllabus) Think pair share, Group discussion.
2	Prof. P. P. Hirave Prof. A. K. Kulkarni	Engineering Physics	PPT and animated videos
3	Prof. S. V. Hajare	Communication Skill	PPT and videos
4	Dr. S. G. Chonde Prof. S. L. Rathod	Engineering Chemistry	PPT and animated videos

Prepared by

ASHOKRAO MANE GROUP OF INSTITUTION Applied Science And Humanities Department VATHAR TARF VADGAON

Head,

Applied Science & Humanities



You Tube Channel: Channel contains total 40 lectures which covers entire Engineering Graphics syllabus

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Verbal Communication

- It refers to the form of communication in which message is transmitted verbally
- Communication is done by word of mouth and a piece of writing
- In verbal communication remember the acronym "KISS" (keep it short and simple).

Verbal Communication is divided into

- ☐ Oral Communication
- ☐ Written Communication

Oral Communication

- ☐ Advantages –
  In a face to face conversation, by reading facial expression and body language one can guess whether he/she should trust what's being said or not.
- ☐ Disadvantages –
  In face to face discussion, user is unable to deeply think about what he is delivering, so this can be counted as a fault.

Written Communication

Nonverbal Communication

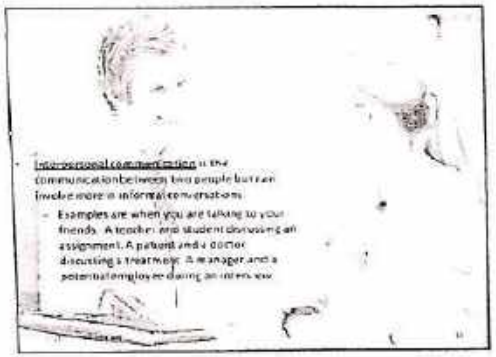
- Nonverbal communication is the sending or receiving of wordless messages. Such as gesture, body language, posture, tone of voice or facial expressions, is called Nonverbal communication.
- Nonverbal communication is all about the body language of person.

Nonverbal communication have the following three elements –

- Appearance
  Speaker –
  clothing, hairstyle, neatness, use of cosmetics
  Surrounding– room
  size, lighting, decorations, furnishing
- Body Language
  facial expressions, gestures, posture
- Sounds
  Voice Tone, Volume, Speech rate

Levels of Communication

- Intrapersonal Communication is communication that occurs in your own mind. It is the basis of your
  Feelings, biases, prejudices, and beliefs
  - Examples are when you make any kind of decision – what to eat or wear. When you talk about something – what you want to do on the weekend or when you think about another person.



- Interpersonal communication is the communication between two people but can involve more in informal conversations
  - Examples are when you are talking to your friends. A teacher and student discussing an assignment. A patient and a doctor discussing a treatment. A manager and a potential employee during an interview

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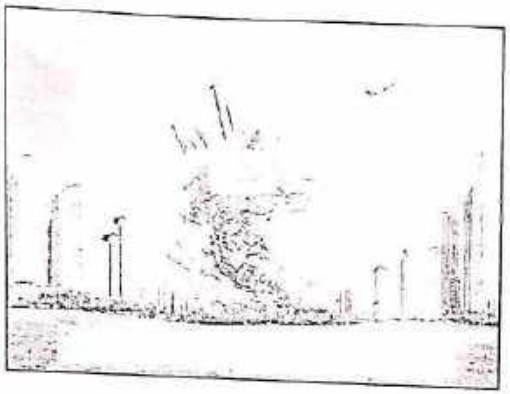
COMMUNICATION SKILL

PRESENTED BY MR. SATISH HAJARE (TRAINER)
ASHOKRAO MANE GROUP OF INSTITUTES, VATHAR



Contents

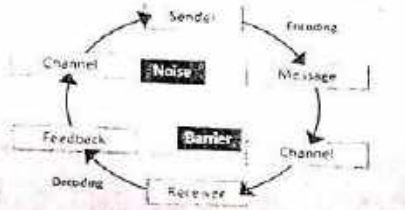
- What is Communication
- Importance of Communication
- Types of Communication
- Levels of Communication
- Communication Barriers
- Principals of Effective Communication

Communication is what ??

It is a process of exchanging –
- ☐ Information
- ☐ Ideas
- ☐ Thoughts
- ☐ Feelings
- ☐ Emotions

Through –
- ☐ Speech
- ☐ Signals
- ☐ Writing
- ☐ Behavior

Process of Communication



Types of Communication

People communicate with each other in a number of ways that depend upon the message and its context in which it is being sent.

Types of communication based on the communication channels used are –
- ❖ Verbal Communication
- ❖ Nonverbal Communication

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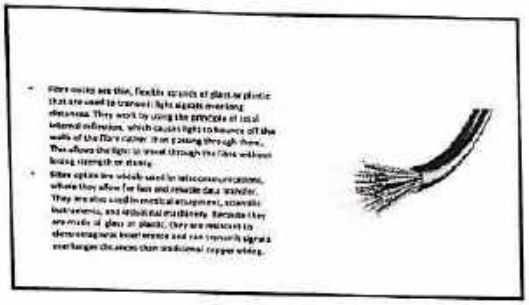

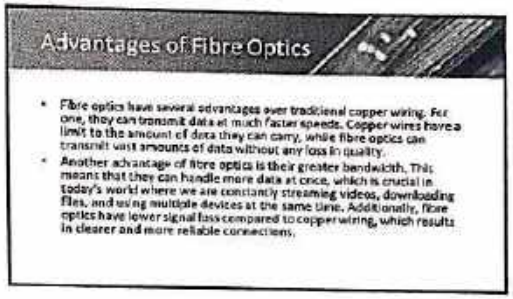

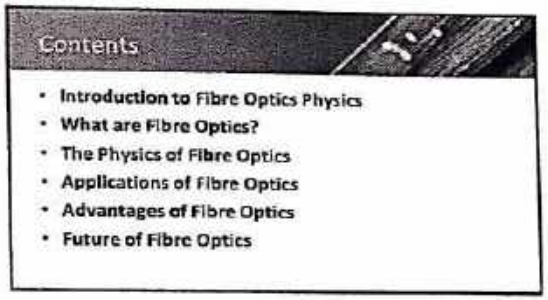

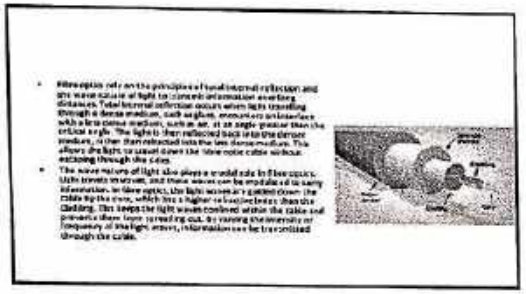

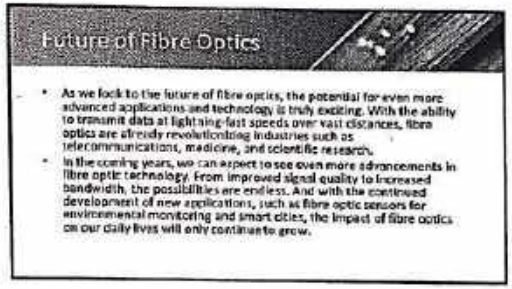

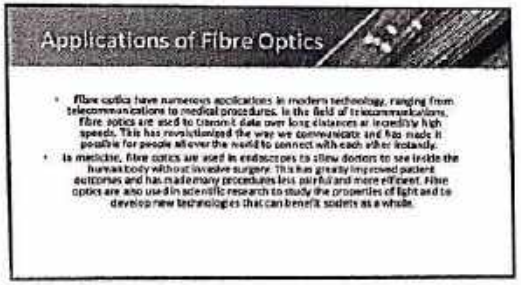

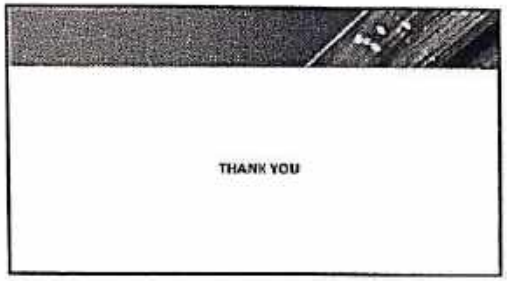

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DEPARTMENT APPLIED SCIENCE & HUMANITIES

Beyond the Limits:

Exploring the Wonders of Type I and Type II Superconductors

Prof. Ankita Kulkarni

What are Super Conductors?

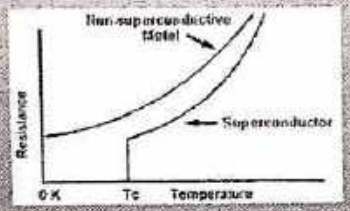
- Superconductors are materials that can conduct electricity with zero resistance when cooled below a certain temperature, known as the critical temperature. This means that electrons can flow through the material without any energy loss, making superconductors incredibly efficient for transmitting electrical power.
- Unlike regular conductors, which lose energy as heat due to resistance, superconductors can maintain a constant flow of electricity without generating any heat. This property has many practical applications, including in medical imaging, transportation, and energy transmission.

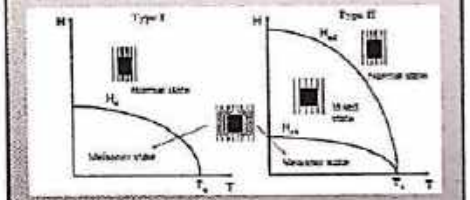
Type II Superconductors

Type II superconductors are materials that exhibit zero electrical resistance at very low temperatures, just like Type I superconductors. However, they differ from Type I superconductors in a few key ways.

One major difference is that Type II superconductors can exist in a mixed state, where some parts of the material are superconducting, while others are not. This is due to the fact that Type II superconductors have a higher critical magnetic field than Type I superconductors, which allows them to tolerate stronger magnetic fields before losing their superconductivity. Another difference is that Type II superconductors are typically made up of multiple layers or grains, which can cause them to exhibit different properties depending on the direction of the magnetic field. This makes Type II superconductors more complex and difficult to work with than Type I superconductors.

Contents





Introduction

Welcome to the fascinating world of superconductors, where electricity flows with zero resistance and magnetic fields are expelled. Today we will explore the properties, applications, challenges, and future developments of these remarkable materials.

Imagine a world where energy is transmitted with 100% efficiency, trains levitate above their tracks, and medical imaging is faster and more accurate than ever before. This is the world that superconductors can help create, and we are here to learn about how they work and what makes them so special.

Type I Superconductors

- Type I superconductors are a class of materials that exhibit zero electrical resistance when cooled below a certain critical temperature. They are also known as "soft" superconductors because they have a low critical magnetic field and are easily penetrated by magnetic fields.
- One example of a Type I superconductor is mercury, which becomes superconducting at a temperature of -269°C. Other examples include lead, tin, and aluminum. Type I superconductors have practical applications in a variety of areas, including in the construction of powerful electromagnets used in MRI machines and particle accelerators.

Applications of Superconductors

Superconductors have a wide range of practical applications, from medical imaging to energy transmission. One of the most exciting applications is in medical imaging, where superconducting magnets are used in MRI machines to produce detailed images of the body's internal structures.

In transportation, superconductors have the potential to revolutionize the way we travel. Levitating trains that use superconducting magnets to float above the tracks could reach speeds of up to 300 miles per hour, drastically reducing travel times and increasing efficiency. Additionally, superconducting power cables could be used to transmit electricity with virtually no resistance, making energy transmission more efficient and cost-effective.

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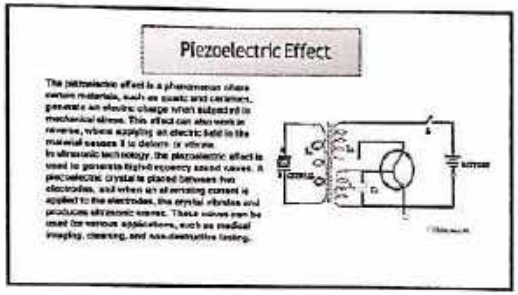

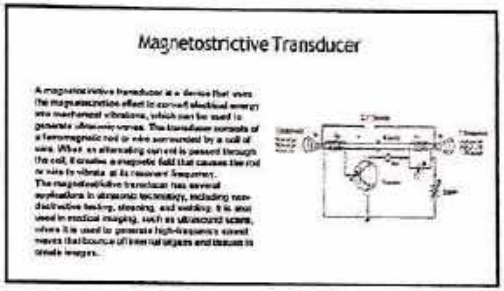

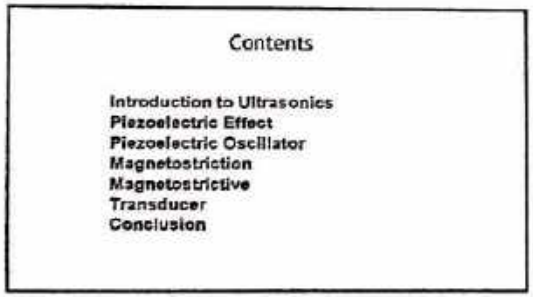

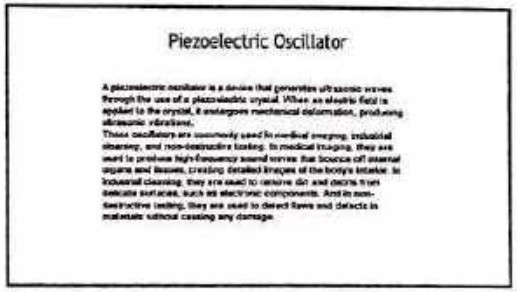

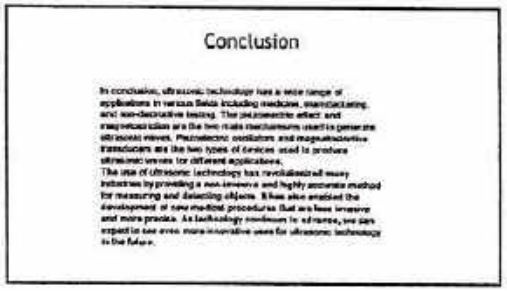

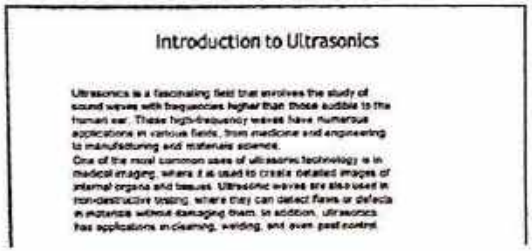

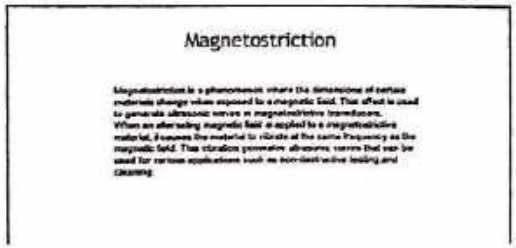

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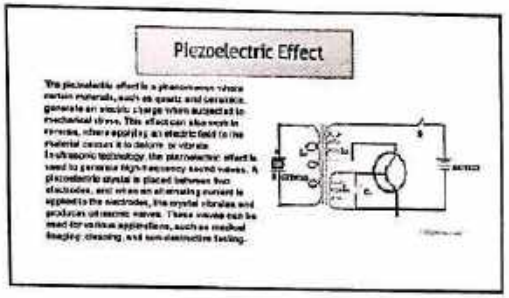

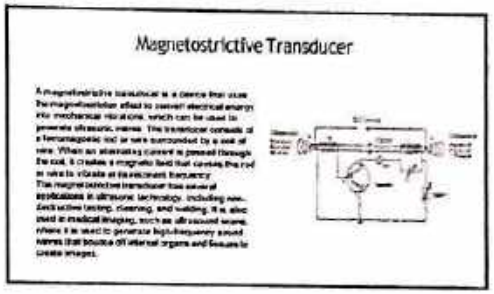

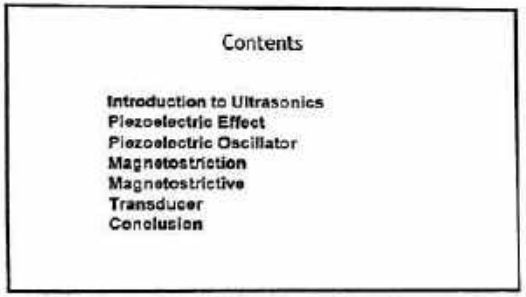

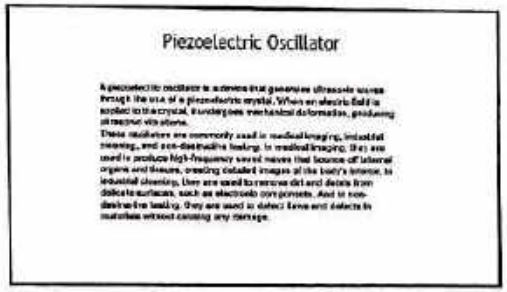

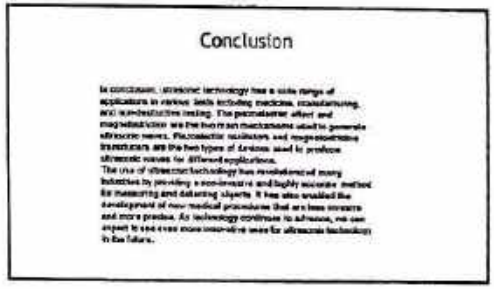

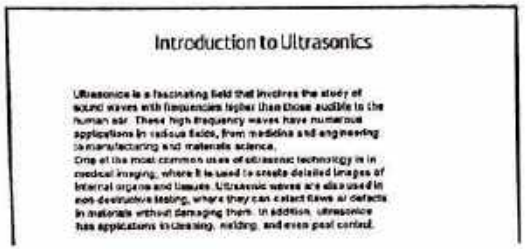

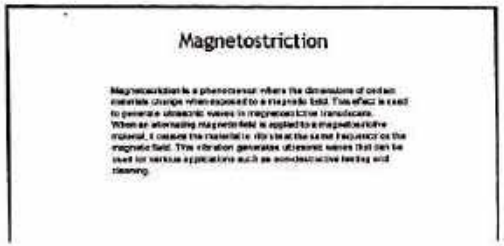

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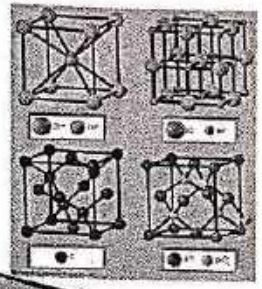
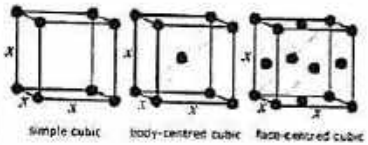
The Hidden Beauty of Crystal Structures

Prof. Ankita Kulkarni





What is Crystal Structure?

- Atoms and Lattices
- Types of Crystal Structures
- Crystal Symmetry
- X-ray Diffraction
- Crystal Defects
- Crystal Growth
- Applications of Crystal Structure
- Future Developments
- Conclusion

Atoms and Lattices

- Atoms in a crystal lattice are arranged in a repeating pattern, forming a three-dimensional structure known as a crystal. The arrangement of atoms in the lattice affects the properties of the material, such as its strength and conductivity.
- The lattice structure can be described by its unit cell, which is the smallest repeating unit of the crystal lattice. Different types of unit cells can result in different lattice structures, such as cubic, tetragonal, and hexagonal. These structures have unique properties that make them useful for various applications.

Crystal Symmetry

- Crystal symmetry is an important concept in understanding crystal structure. It refers to the repeating patterns of the crystal lattice and how they are related to each other through various symmetry operations.
- There are seven types of crystal systems, each with their own unique symmetry operations. These include triclinic, monoclinic, orthorhombic, tetragonal, rhombohedral, hexagonal, and cubic. By understanding these systems and their corresponding symmetry operations, we can better understand the properties and behavior of different materials.

What is Crystal Structure?

- Crystal structure refers to the arrangement of atoms in a repeating pattern that extends in all three dimensions. This arrangement gives crystals their unique properties, such as their shape, hardness, and optical characteristics.
- Understanding crystal structure is essential in physics because it provides insights into the behavior of materials at the atomic level. By studying crystal structure, scientists can predict the physical and chemical properties of materials and design new materials with specific properties for various applications.

Types of Crystal Structures

- There are several types of crystal structures, each with their own unique properties and applications. The most common types include cubic, tetragonal, and hexagonal structures.
- Cubic structures have equal lengths on all sides and angles of 90 degrees. They are commonly found in metals such as copper and aluminum. Tetragonal structures have two sides that are longer than the other two, with angles of 90 degrees. They are often found in minerals such as zirconium silicate. Hexagonal structures have six sides and angles of 120 degrees. They are commonly found in minerals such as quartz and graphite.

X-ray Diffraction

- X-ray diffraction is a powerful technique used to determine the crystal structure of materials. It works by directing a beam of X-rays at a crystal and measuring how the X-rays scatter off the atoms in the crystal lattice.
- The scattered X-rays produce a pattern of spots on a detector, which can be analyzed to determine the positions of the atoms in the crystal. This information can then be used to build a model of the crystal structure. X-ray diffraction has been used to determine the structures of many important materials, including DNA and proteins.

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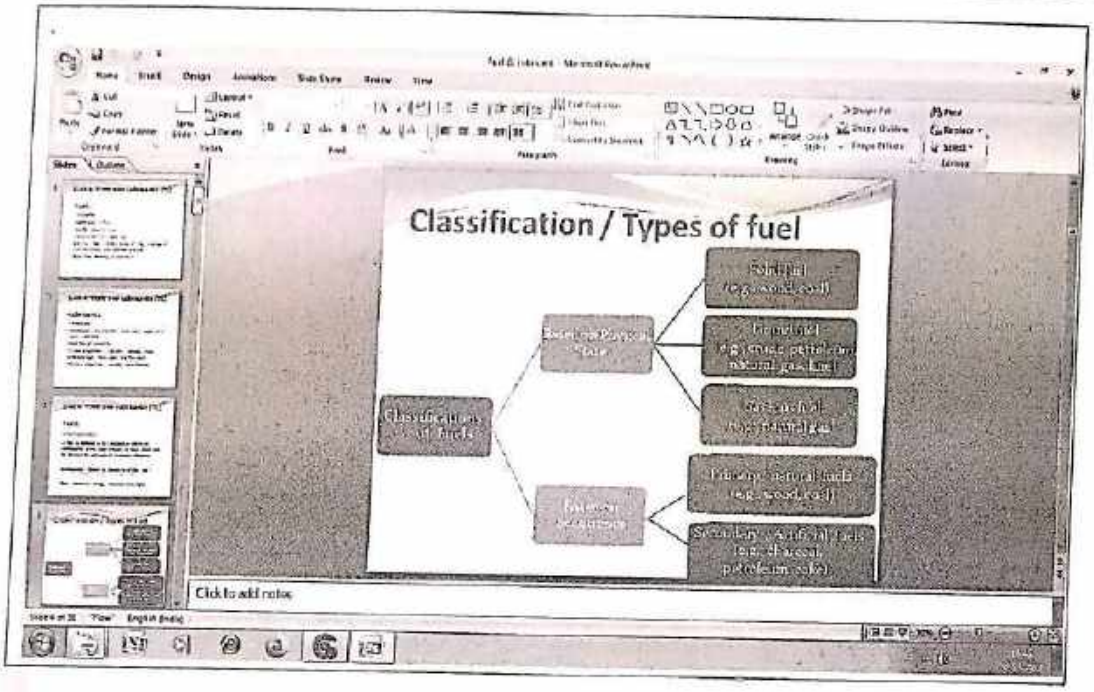
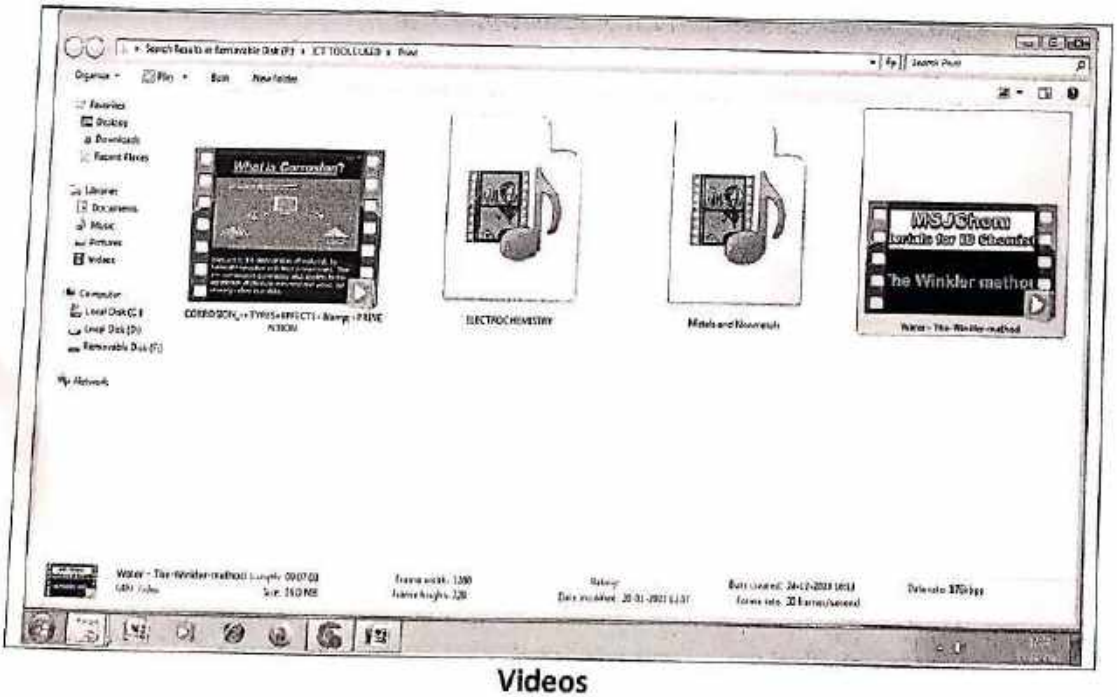
ICT Used : Engineering Chemistry



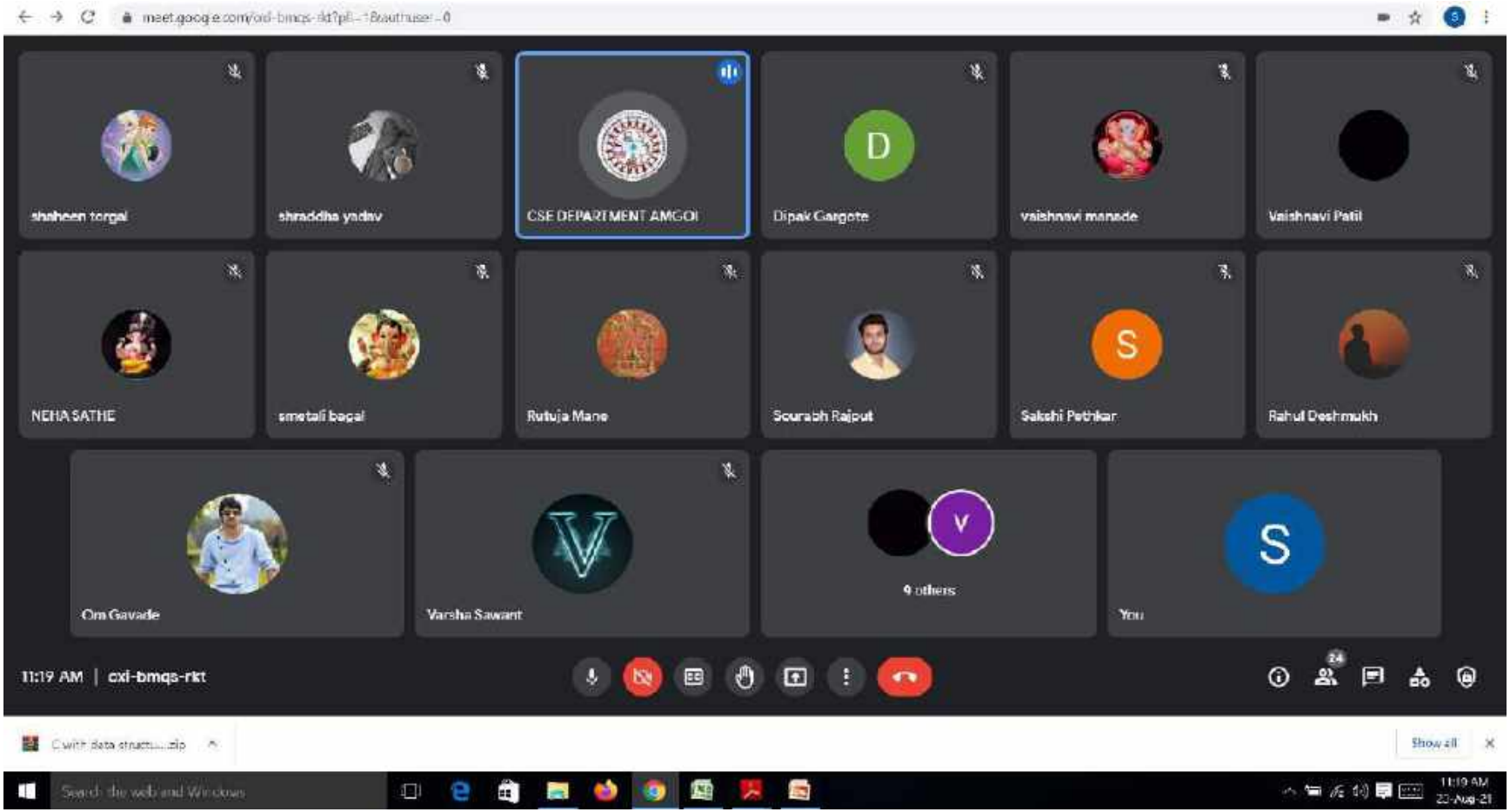
PPTs



Videos

Teaching through - PPT

Google Meet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