

NAAC
GRADE

A++

INSTRUCTIONS FOR REMOTELY PROCTORED EXAM



L O V E L Y
P R O F E S S I O N A L
U N I V E R S I T Y

Transforming Education Transforming India



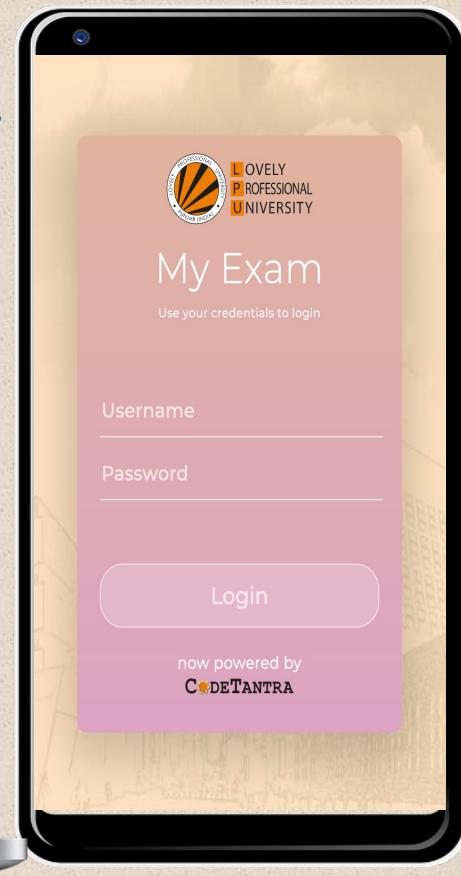
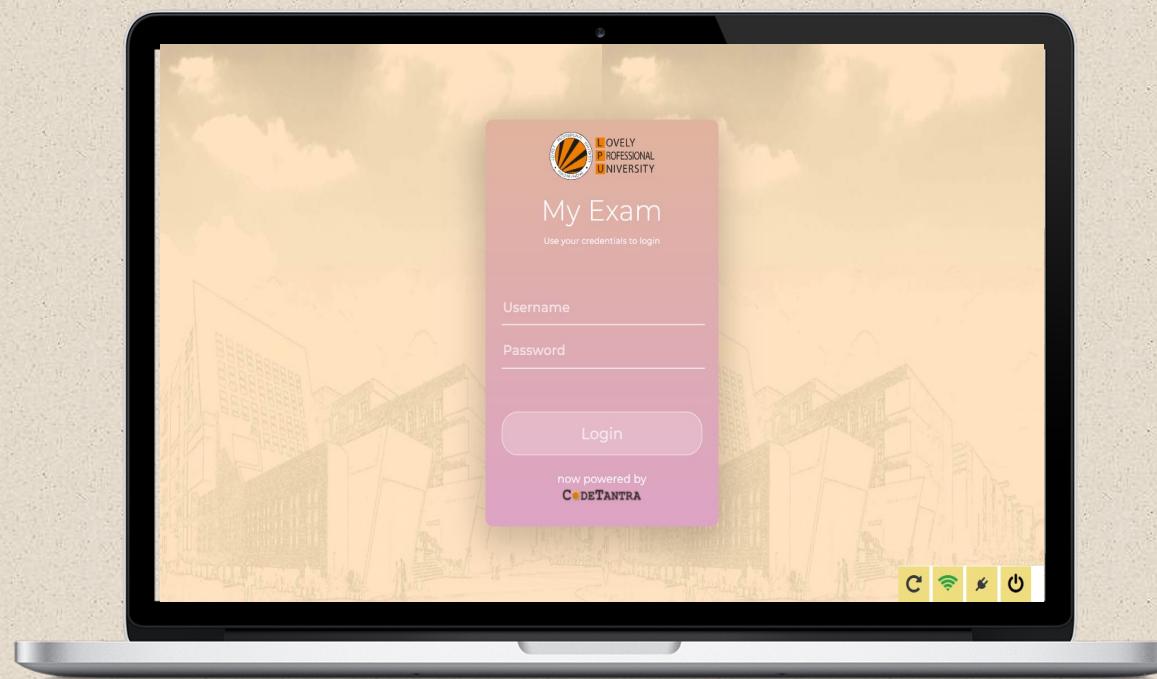
Lovely Professional University is giving an option of Online remotely Proctored LPUNEST exam from home. Candidates must make sure that before opting Online Proctored Exam, they require two devices and both are mandatory.

The two devices are:

- Primary Device i.e Laptop/Desktop(Windows/Linux/Mac-iOS) and
- Secondary Device i.e. a mobile phone(iOS/android).

Note:

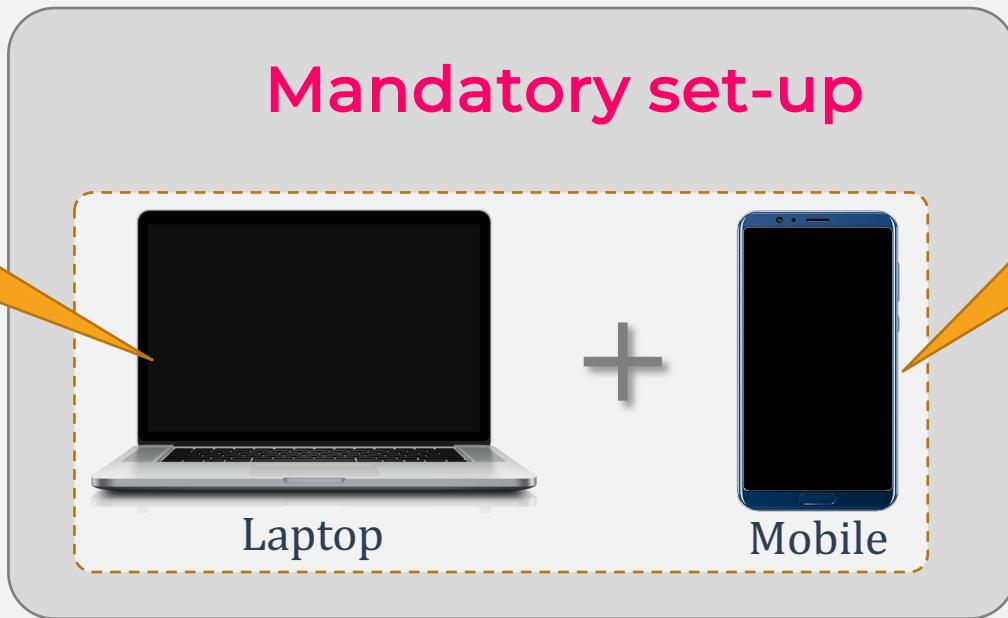
- ❖ The good internet facility with minimum internet speed of **1MBPS** is required for better audio-video connectivity from primary and secondary devices.
- ❖ Screen Sharing is must from primary device i.e laptop.
- ❖ Candidate must have desk and chair preferably with plain backdrop with adequate lighting.
- ❖ Examination will not be conducted if the examination area is a Public place or a noisy environment.
- ❖ The examination cannot be taken sitting on a couch, bed or on the floor.



How many devices are required?

Student must have 2 devices to attempt the test

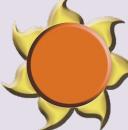
A laptop will be required to appear in Exam.



A mobile will be acting as a 3rd eye

Note: Make sure the camera and microphone of Laptop are also in working condition. You will be invigilated through laptop along with mobile(acting as a 3rd eye).

Which Operating System and browser are supported for LAPTOP/MOBILE?

	For Laptop/Desktop			For 3 rd Eye (Mobile)	
Operating System	 Windows	 Mac	 Linux	 Android	 iOS
Supported Browser	 CodeTantra Secure Exam Application (SEA)	 CodeTantra Secure Exam Application (SEA)	 CodeTantra Secure Exam Application (SEA)	 Chrome  Edge	 Safari

Note:: Apple 64-bit, minimum supporting macOS 12 version required. Microsoft 64-bit Windows supporting OS versions Windows 10 or above are required. For Linux: Only Ubuntu and Min 20.04

Android mobile device with minimum OS version of Android 11 or above, and iOS mobile device with minimum OS version iOS 14 or above is required.

Which version of browser is required?

Browser should be updated to the latest version at the time of attempting the test.

Updating Chrome & Edge Mobile version

Visit **Play store**, search Chrome/Edge and Update

For Android based mobiles

Updating Safari Mobile version

Visit **App store**, search Safari and Update

For iPhone

Let's login through Laptop/Desktop first

Let's Start



Step 01 : Procedure to Download Secure Exam App (codetantra SEA)

- ❖ Open URL **myexam.ipu.in** in **Google Chrome** on your **laptop**.
- ❖ (Login Credentials have been shared on registered email ID)

The diagram illustrates the four steps required to download the Codetantra Secure Exam App:

1. Type **myexam.ipu.in**
2. Enter your credentials and click at **Login** button
3. Click at **Open Test** button, a new page will open
4. Click at **Download** to download codetantra Secure Exam App and then **Install** it.

Step 3 (Screenshot): A screenshot of a web browser showing a table of tests. One row is highlighted, and the "Open Test" button is circled in red. A large green callout box points to this button with the instruction: "Click at **Open Test** button, a new page will open".

#	Test Name	Time	Status	Result
1	MOCK 1 - LPUNEST	Start Time 14 Apr 2023 00:00:00 (India Standard Time) Duration 60 minutes	Open Test	Third Eye

Step 4 (Screenshot): A screenshot of a login page for "My Exam" on "LOVELY PROFESSIONAL UNIVERSITY". It shows fields for "Username" and "Password". A large blue callout box points to a "Download Now" button with the instruction: "Click on Download Now to get the latest version of **CodeTantra Secure Exam App**".

Callout Boxes:

- Step 1: "1. Type myexam.ipu.in"
- Step 2: "2. Enter your credentials and click at **Login** button"
- Step 3: "Click at **Open Test** button, a new page will open"
- Step 4: "Click on Download Now to get the latest version of **CodeTantra Secure Exam App**"
- Step 4 (Alternative): "4. Click at **Download** to download codetantra Secure Exam App and then **Install** it."

ONE VERY IMPORTANT INFORMATION

Tests			
#	Test Name	Time	Status
1	MOCK 1 - LPUNEST	Start Time 14 Apr 2023 00:00:00 (India Standard Time) Duration 60 minutes	Open Test  Third Eye 

This screen, the candidate will see when appearing for **MOCK TEST**

Your Test

April 12, 19:00
12 Apr 07:00 PM
90 minutes

[Take Test](#)

Download & Install


[Windows](#)
64-bit 7, 8, 8.1, 10


[Ubuntu](#)
64-bit 18.04, 20.04


[Mac](#)
macOS 10.11+

Download

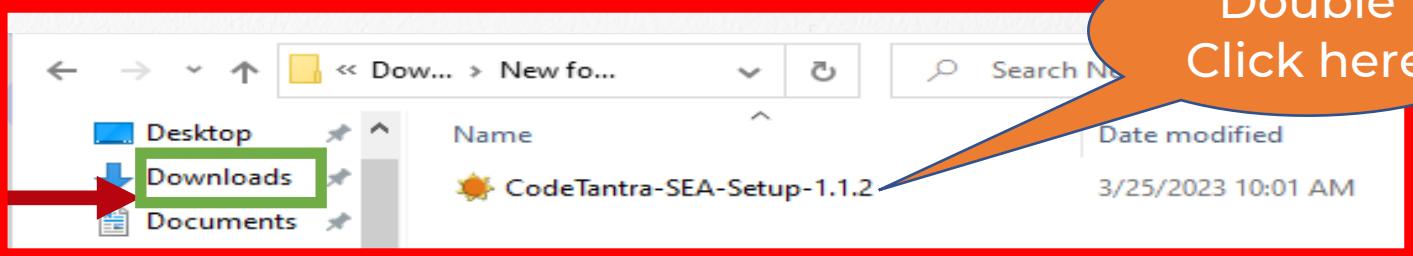
BUT on the day of **ACTUAL EXAM**, this is how the screen will look.

Let us move to next slide to see **HOW** the secure browser can be installed?

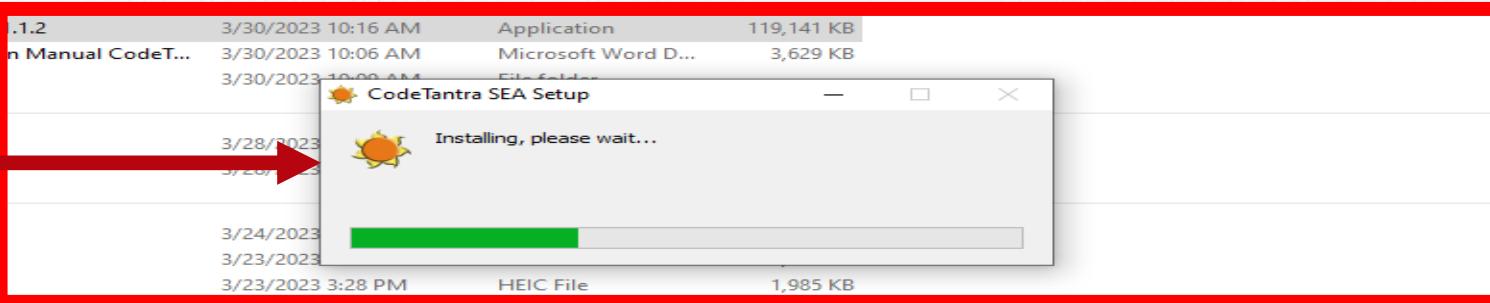


Step 02 : Installing and Opening the Codetantra SEA Browser

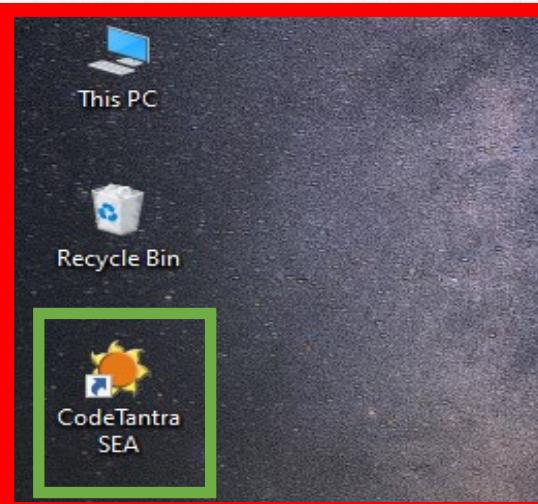
- i. Open **Downloads** folder in your Desktop/Laptop where **Codetantra-SEA-Setup** has been downloaded.



- ii. Find and click on **CodeTantra-SEA-SetUp** file. The installation process will start as shown.



- iii. The installation process has started

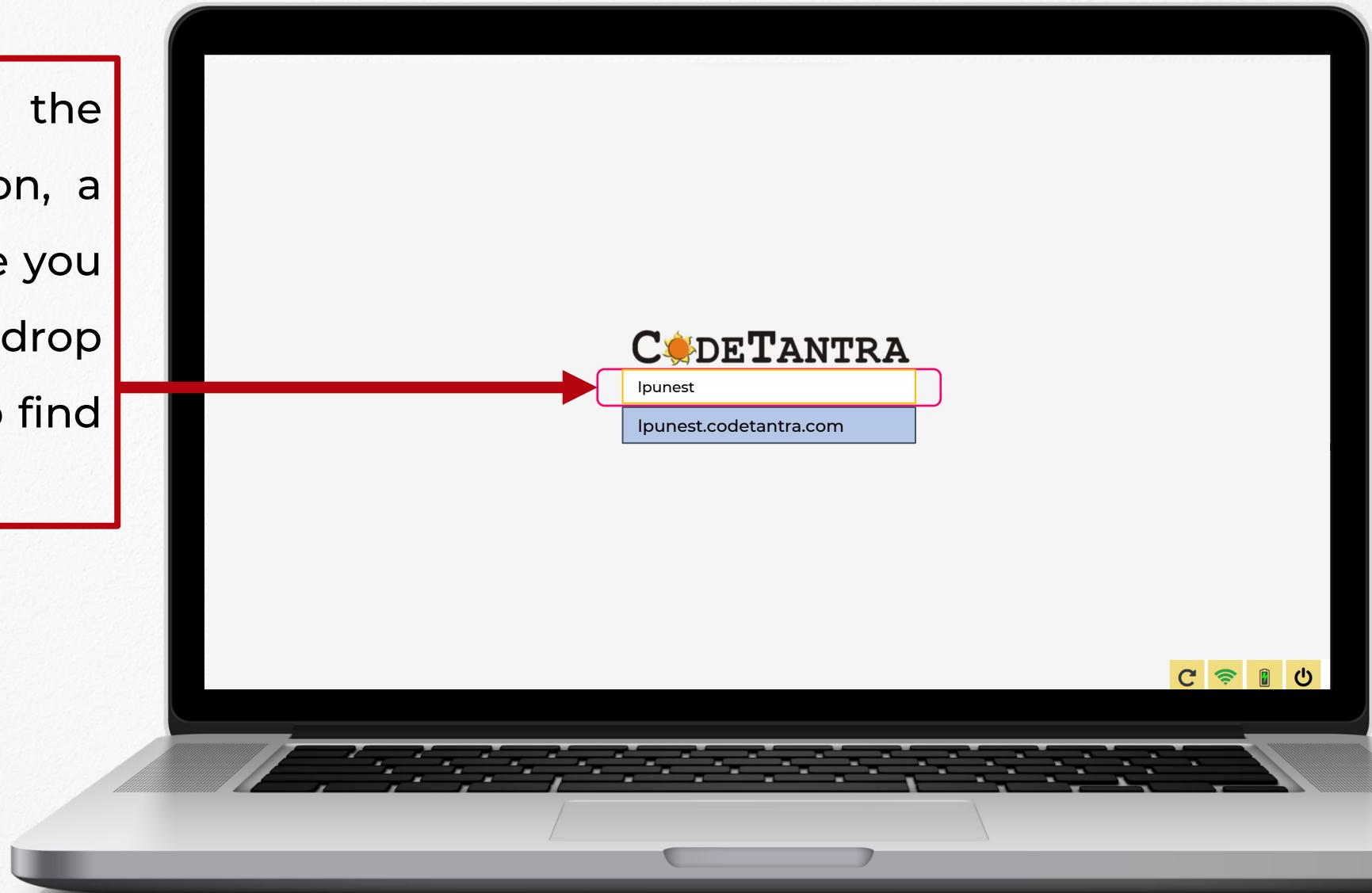


- iv. Once Installed, then the **Codetantra SEA** icon will be created on your desktop. Click that icon to open the secure browser

NOTE: You can also search this browser by typing **codetantra SEA** in START MENU search bar.

Step 03 : How to start exam after opening secure browser

Once you have opened the secure browser application, a new page will open where you need to Click on the drop down and type **Ipunest** to find Ipunest.codetantra.com



Step 04 : How to proceed to the LPUNEST exam Login Page

After selecting
lpunest.codetantra.com
, Click at Go button, You
will proceed to Login
Page

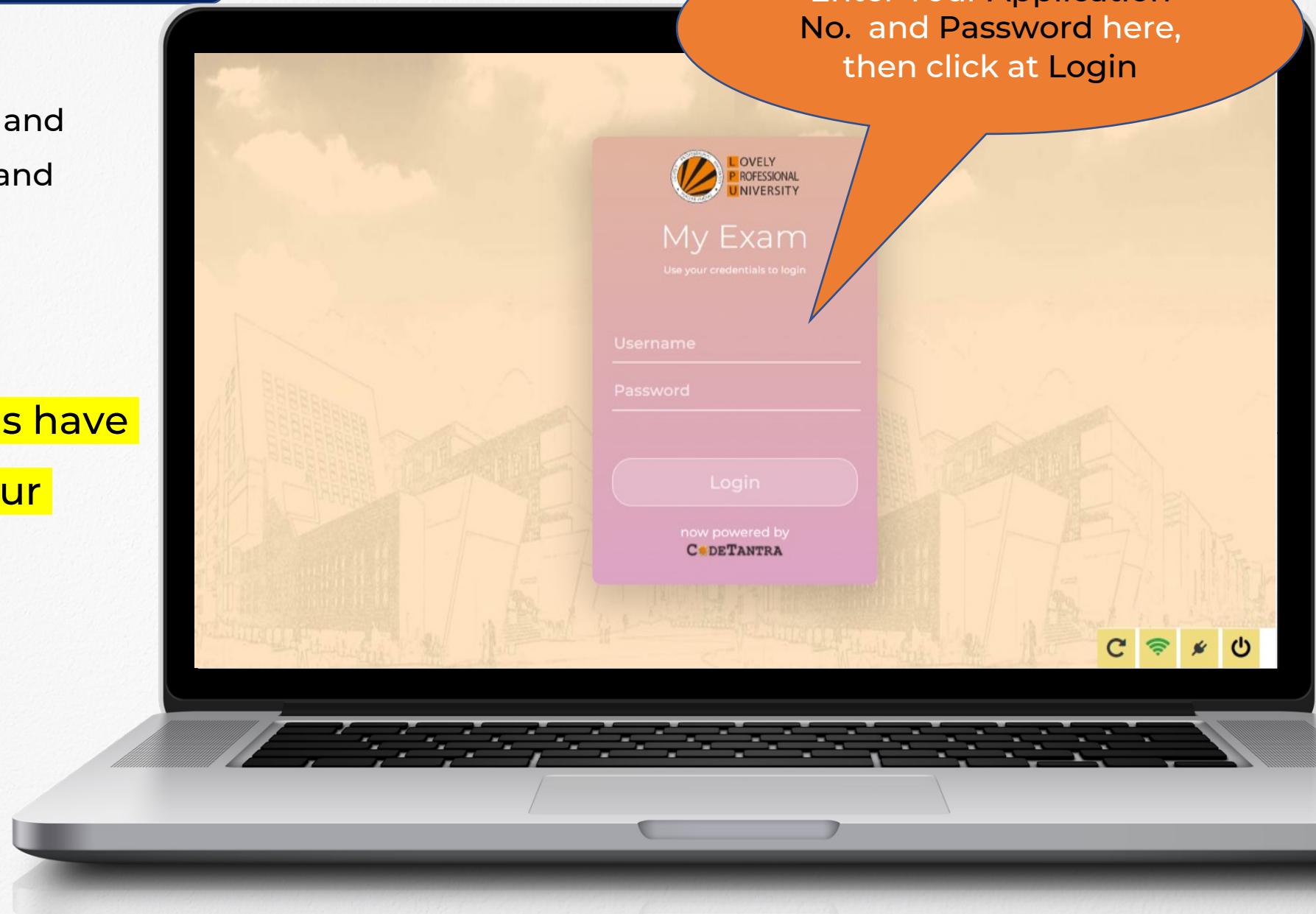


Step 05 : How to Login here?

Enter Your Application Number and Password in the respective field and then click at Login button.

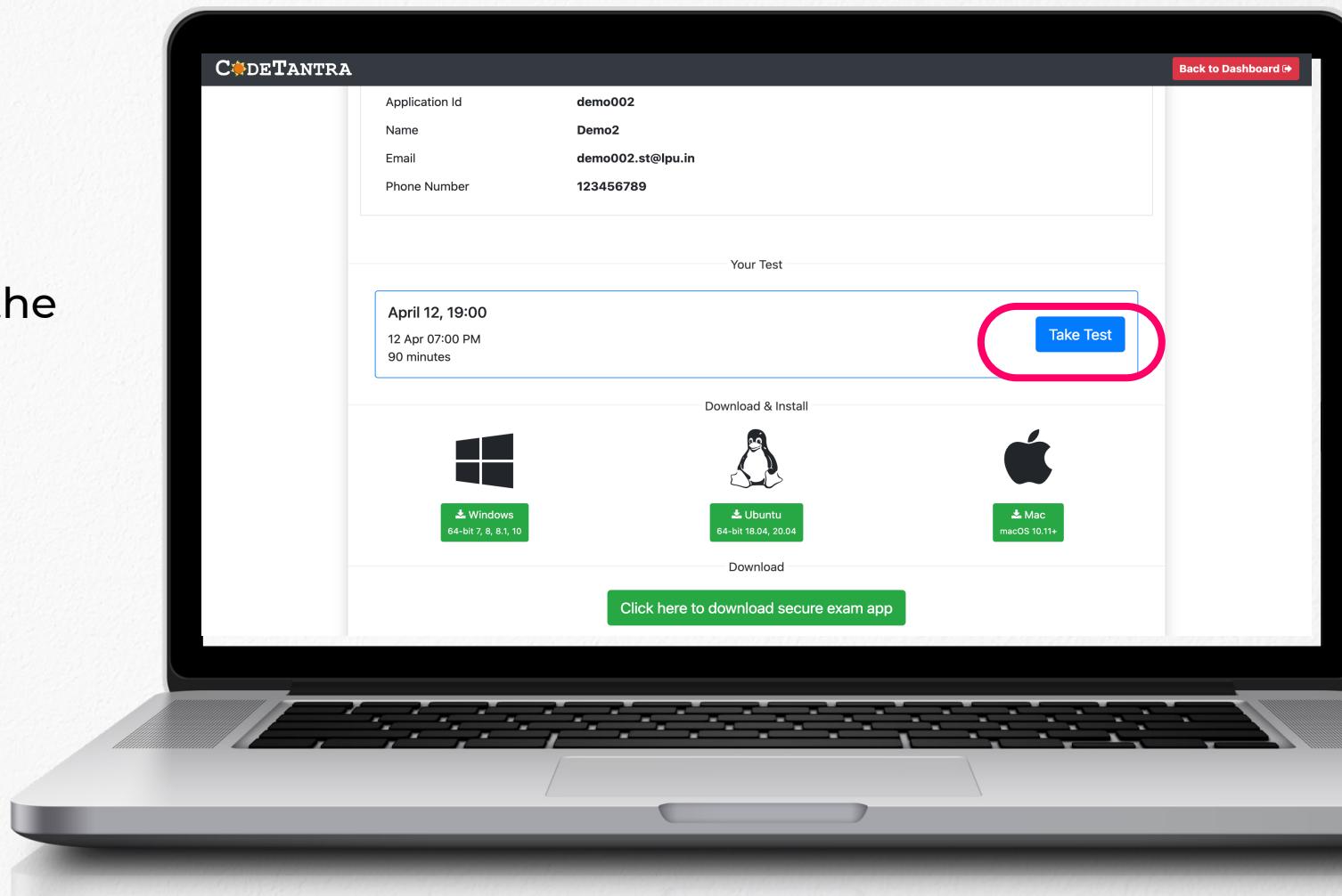
Note: The Login credentials have already been shared on your registered email ID.

Enter Your Application No. and Password here, then click at Login



Step 06 : Let us Start the LPUNEST Exam.

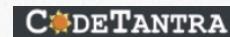
1. Once you login, a new page will open showing the candidate's exam information.
2. Click on the **Take Test** button to start the exam



Step 7: Subject Selection Page

On this page, select the subjects for LPUNEST exam. Then click at **Proceed** button.

Note: In case, all the subjects are mandatory, the candidate can click at **Proceed** button.



[Back to Dashboard ↗](#)

Welcome to your **ONLINE LPUNEST**-exam. Your exam will have the following sections:

Compulsory sections *

English

Select any 1 of the following choices *

- Computer Applications
- Multimedia & Animation
- Fashion Design
- Interior and Product Design
- General Aptitude & General Awareness

Proceed

Step 08 : Clear Environment Check

At this page, the application will check whether **Speaker**, **Microphone** and **Webcam** is working or not.

Important Notes:

1. To clear audio test, click on **Click here to check the audio** and then click on **play** button, and then click on **Yes**, if you can hear the audio.
2. To clear webcam test, make sure, your face is visible in the camera frame.
3. To clear Microphone test, speak few words.
4. In case of trouble, watch the video appearing in the concerned section and troubleshoot the issues.

The image shows a laptop screen with the CodeTantra logo at the top left. The main content area is titled "ENVIRONMENT CHECK". Under "3rd Eye Based Test", it shows proctor details: Sonu Kumar Singh CT12345 and Proctor Details: Tomesh Jain 1234567890. Below this, there is a table with the following data:

Category	Status	Action
OS	✓	Windows 10 64-bit
BROWSER	✓	CodeTantra Secure Exam App
AUDIO	○ Pending	Click here to check audio
WEBCAM	○ Pending	
MICROPHONE	○ Pending	

On the right side of the laptop screen, there is a small circular icon with a hand symbol. At the bottom right of the laptop, there is a small graphic of the CodeTantra logo with a battery icon.

Step 09: Proceed to Test

Once the environment Check is complete, you will get a button **Proceed to test**, Click on that button to go to next step.

The image shows a laptop displaying the CodeTantra environment check interface. The screen is divided into several sections:

- Top Left:** The CodeTantra logo and navigation links: Home, Learn Anywhere, mr.sonusingh@outlook.com, Support, and Logout.
- Top Center:** A video feed of a person's face, enclosed in a green rectangular frame.
- Middle Center:** A blue button labeled "Proceed to test". This button is highlighted with a red rectangular border.
- Right Side:** The "ENVIRONMENT CHECK" section.
 - Section Header:** 3rd Eye Based Test
 - User Information:** Sonu Kumar Singh CT12345, Proctor Details: Tomesh Jain 1234567890
 - Checklist:** A table showing system requirements and their status:

Category	Status
OS	✓ Windows 10 64-bit
BROWSER	✓ CodeTantra Secure Exam App
AUDIO	✓ OK
WEBCAM	✓ OK
MICROPHONE	✓ OK
 - Progress Bar:** A horizontal bar at the bottom of the checklist section, consisting of several colored segments (green, grey, white) indicating progress.

Important Notes:

1. Please note, all 5 checks are completed.
2. Make sure **Antivirus** is not running, any screen recording software is not running in case you had trouble clearing the environment check.

CodeTantra logo is visible in the bottom right corner of the laptop screen.

Raising emergency help request (SOS)

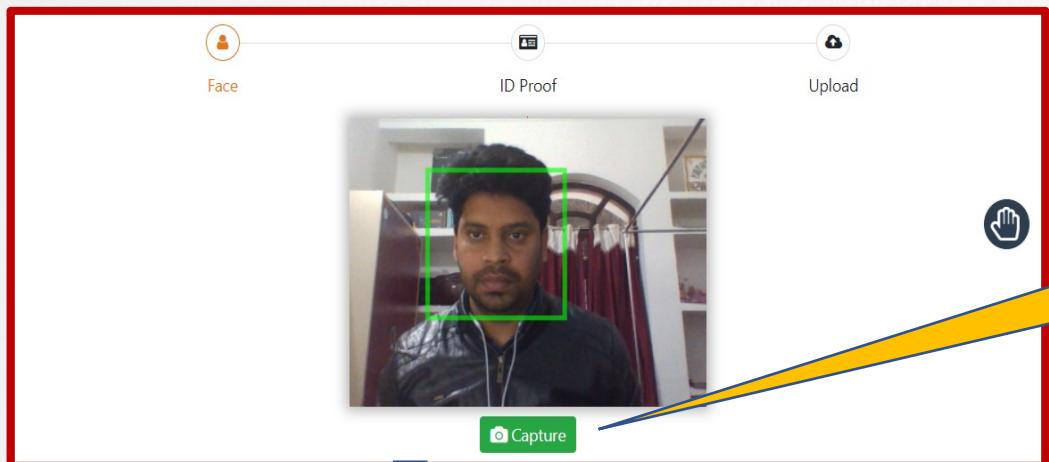
In case of trouble on this page during the actual exam, you can

- (A) click on hand icon,
- (B) enter your mobile number,
- (C) Describe your issue
- (D) Click on submit button.

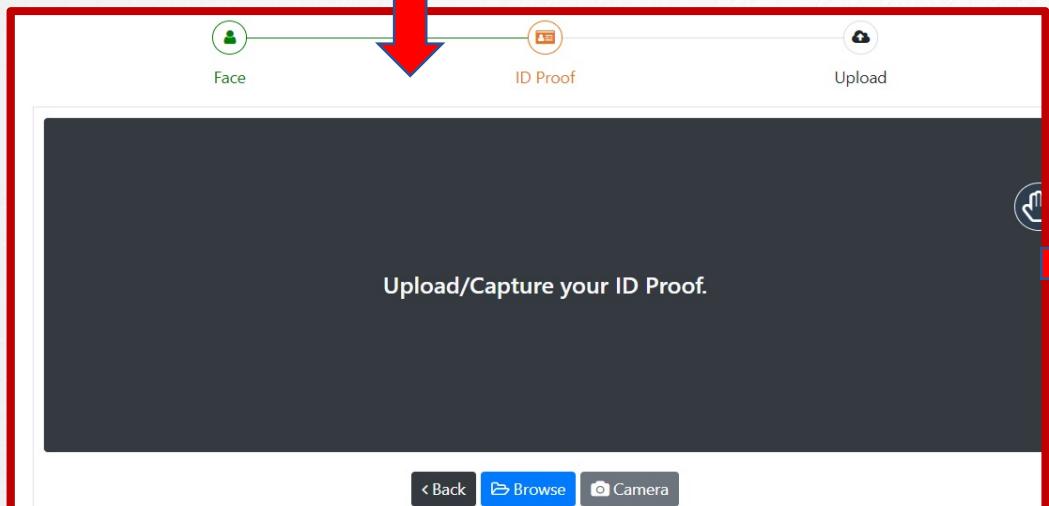
Your request will be sent to the proctor.

The screenshot shows a laptop screen with the CodeTantra interface. At the top, there's a navigation bar with 'CODETANTRA' logo, 'Home', 'Learn Anywhere', and user info 'mr.sonusingh@outlook.com', 'Support', and 'Logout'. Below the navigation is a video feed of a person's face with a green border around it, and a blue 'Proceed to test' button below it. To the right is the 'ENVIRONMENT CHECK' section for a '3rd Eye Based Test' by 'Sonu Kumar Singh CT12345' with 'Proctor Details: Tomesh Jain 1234567890'. It lists system requirements: OS (Windows 10 64-bit), BROWSER (CodeTantra Secure Exam App), AUDIO (OK), WEBCAM (OK), and MICROPHONE (OK). A pink circle labeled 'A' highlights a hand icon in the top right corner of the environment check area. Below this is a 'Request Help' modal window. It has two text input fields: one for 'Please provide your contact number' containing '123456789' (pinked out), and another for 'Please describe the issue you are facing' containing 'dasdasdasdas'. At the bottom of the modal are 'Submit' and 'Cancel' buttons, with 'Submit' highlighted with a pink circle labeled 'D'. A pink circle labeled 'B' points to the contact number field, and a pink circle labeled 'C' points to the issue description field. In the bottom right corner of the laptop screen, there's a small 'CODETANTRA' logo with a battery icon.

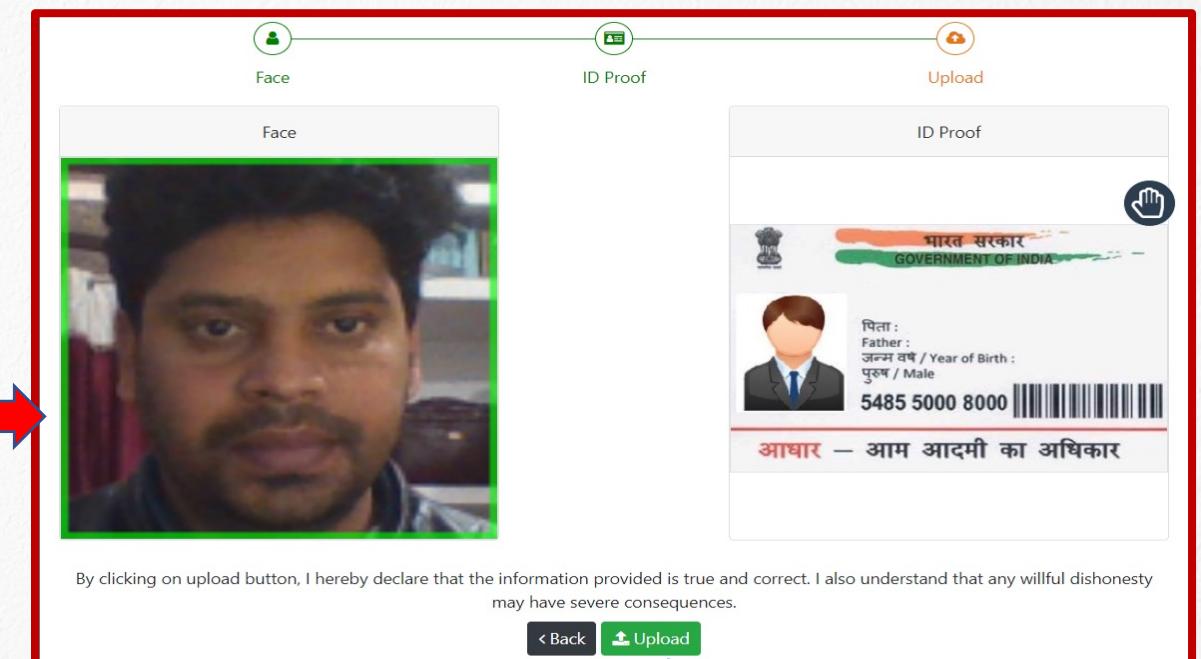
When candidate clicks at **Proceed to Test** button, the candidate will be asked to take **Front Face photo** and will also be asked to upload valid **ID Proof**.



1. Click on Capture button to capture the face and then Proceed to next page.



2. Click on **Browse** Button to upload the ID card from PC or click on the **Camera** button to capture the photograph of ID card through Web Cam.

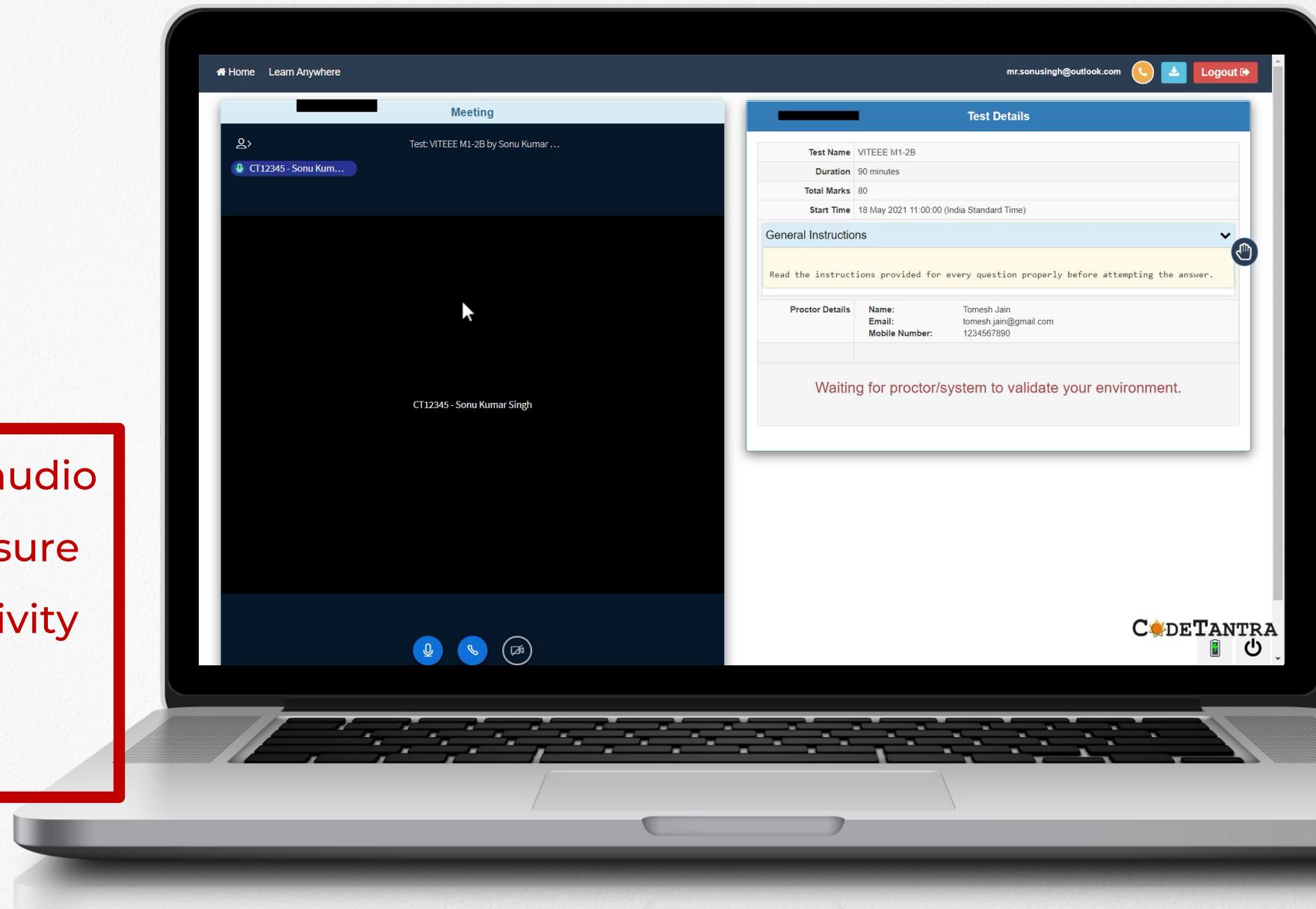


3. Click at **Upload** Button to upload the face and ID capture.

Meeting Page

On this page, exam session is being created and you are expected to join this session with proper video, audio and screen sharing for smooth conduct of exam.

To join with proper video, audio and screen sharing, make sure that your internet connectivity is stable on primary and secondary devices.

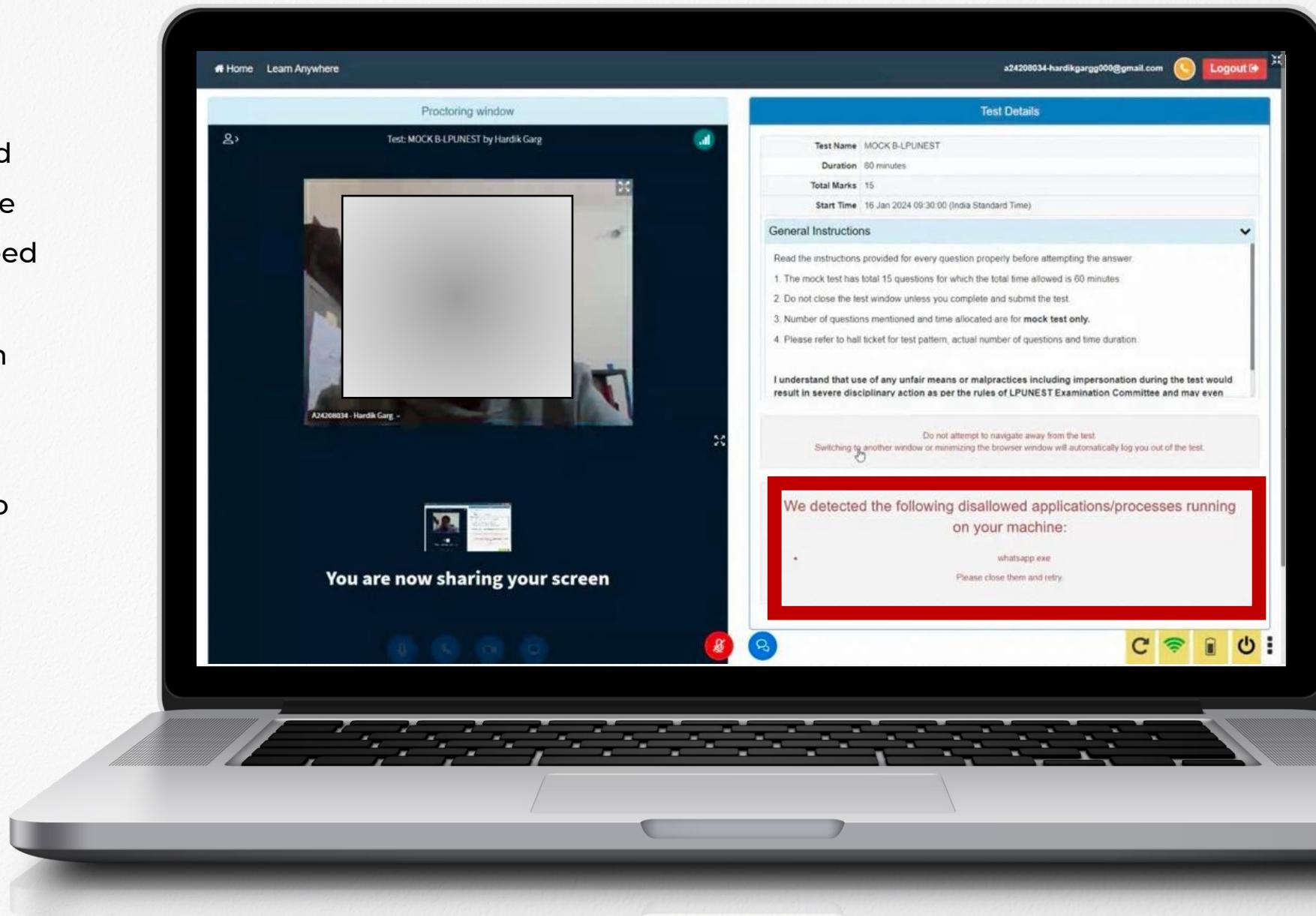


Important: Screen sharing is must from Primary Device

Important Note

In case, you see a warning of disallowed applications on this meeting page while creating the exam session, then you need to exit the SEA browser and close all those applications which were listed on this page and were running in the background.

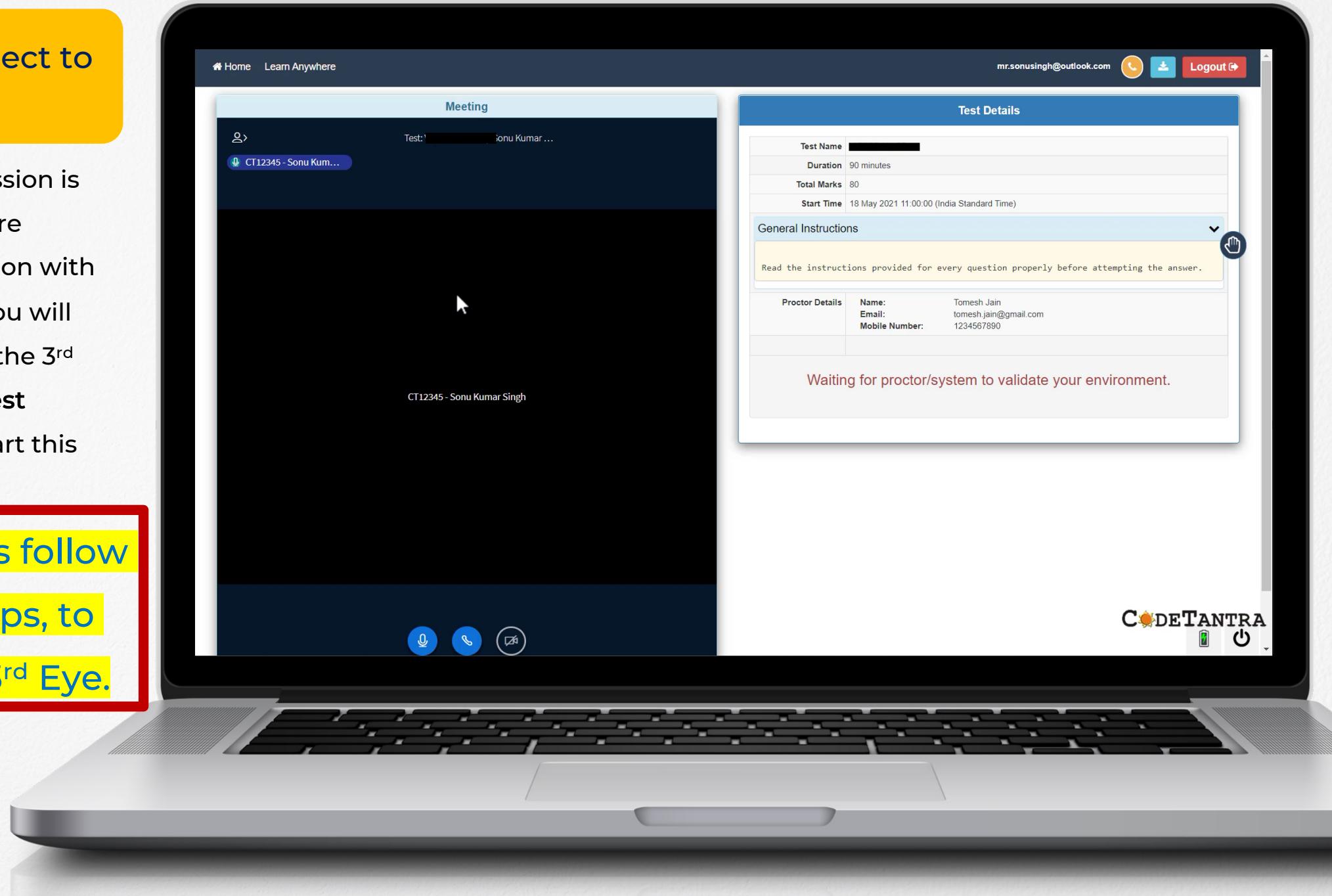
Once you rejoin then you will be able to proceed.



Get Ready to Connect to 3rd Eye now

On this page, as exam session is being created, now you are expected to join this session with mobile as 3rd eye. Once you will join this session through the 3rd eye, you will get a **start test** button on this page to start this test.

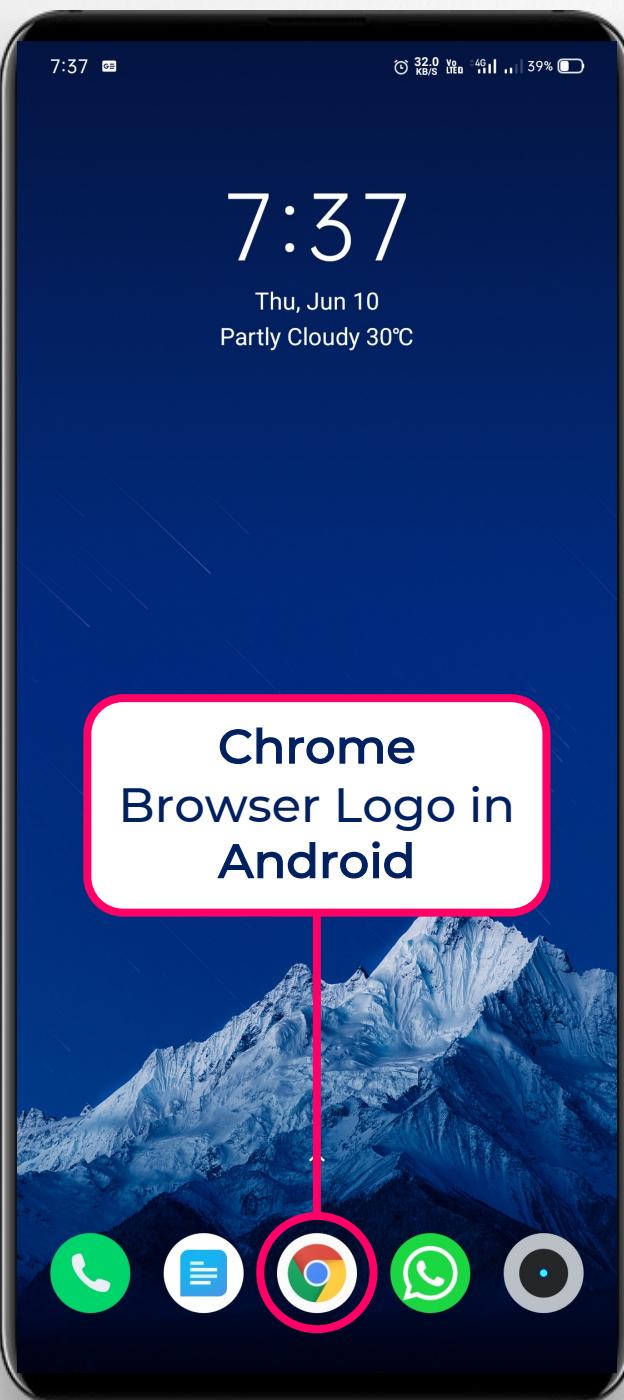
On the next pages follow the upcoming steps, to join through the 3rd Eye.



Let's join
through the
3rd Eye using
mobile phone



Step 01 : Open a browser in your Mobile Phone



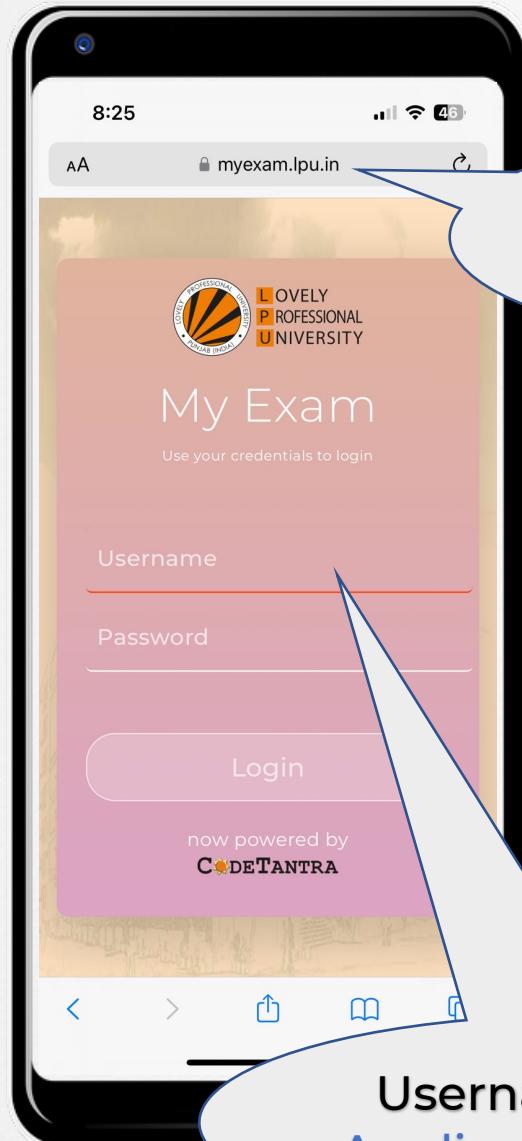
- i. Open a supported browser in your phone.
Either of the following 3 combination should work fine;
 - ✓ Chrome (Version 80+) on Android
 - ✓ Edge (Version 45+) on Android
 - ✓ Safari (Version 13+) on iOS
- ii. Visit the following link:

myexam.ipu.in

Important:

- ✓ Make sure the browser is up to date.
- ✓ You can visit Play Store to update Chrome or Edge in an Android device.
- ✓ You can visit App store to update Safari browser

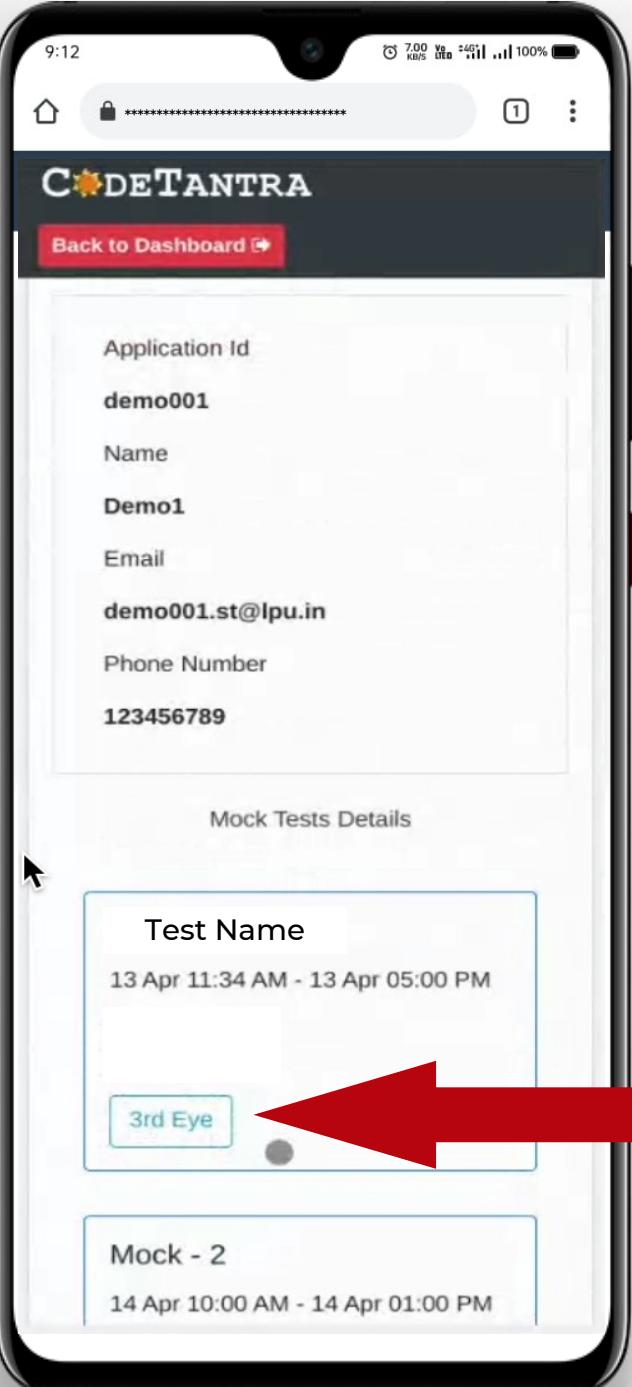
Step 02: Login to myexam.ipu.in



- i. Open URL <https://myexam.ipu.in>
- ii. Enter your **Application Number** and **Password**. (Use the same Application No. and Password you have used to login through Laptop/Desktop)
- iii. Click at **Login** button

Important Notes:

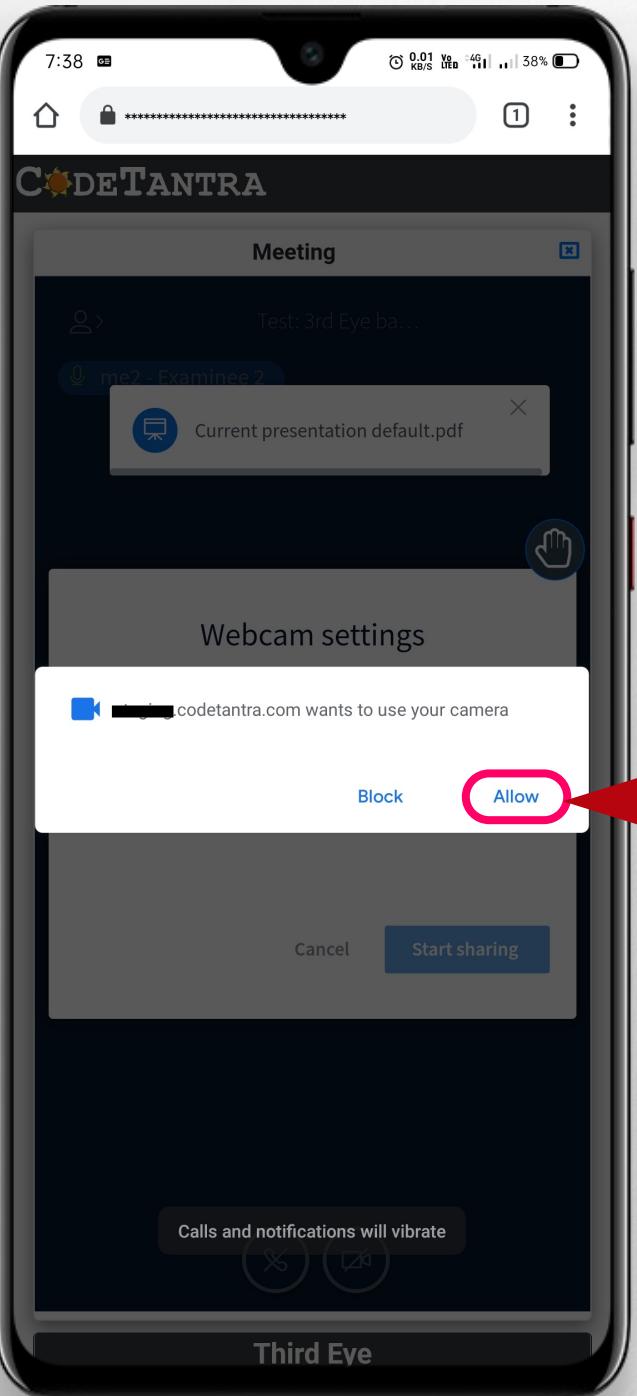
- Please note, the steps shown from this page onwards will remain same for Android as well as iOS.



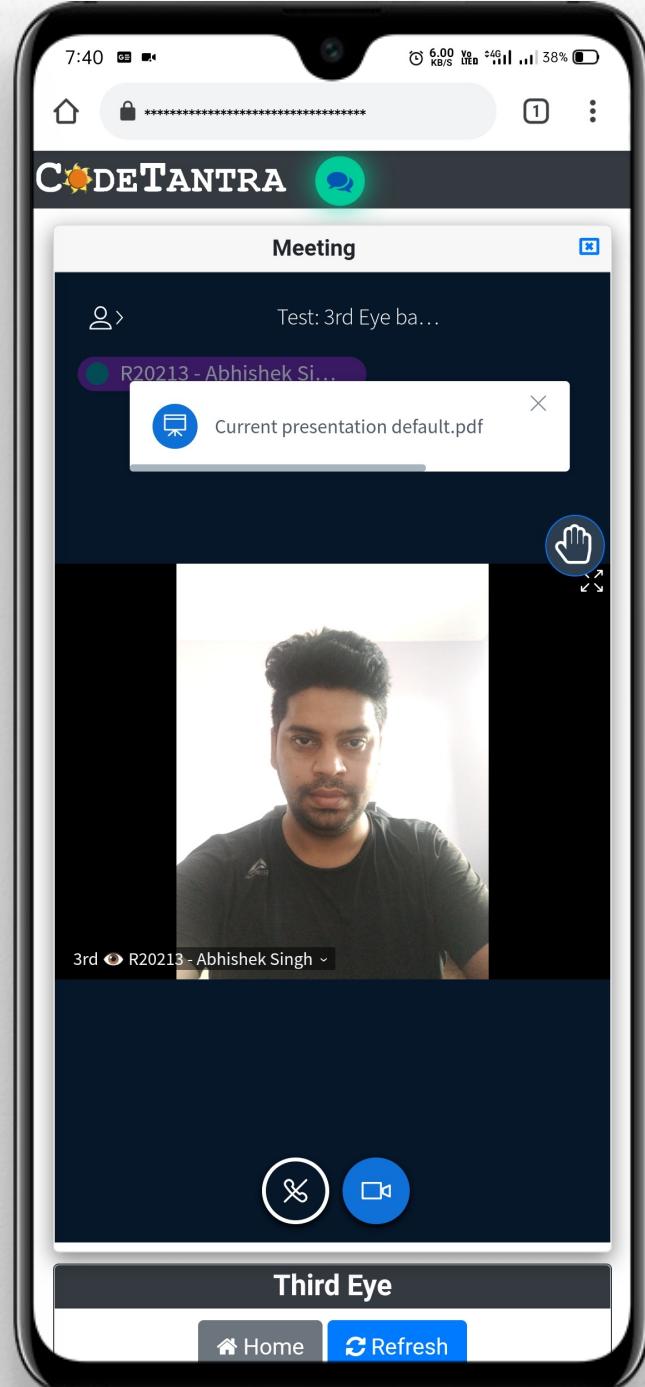
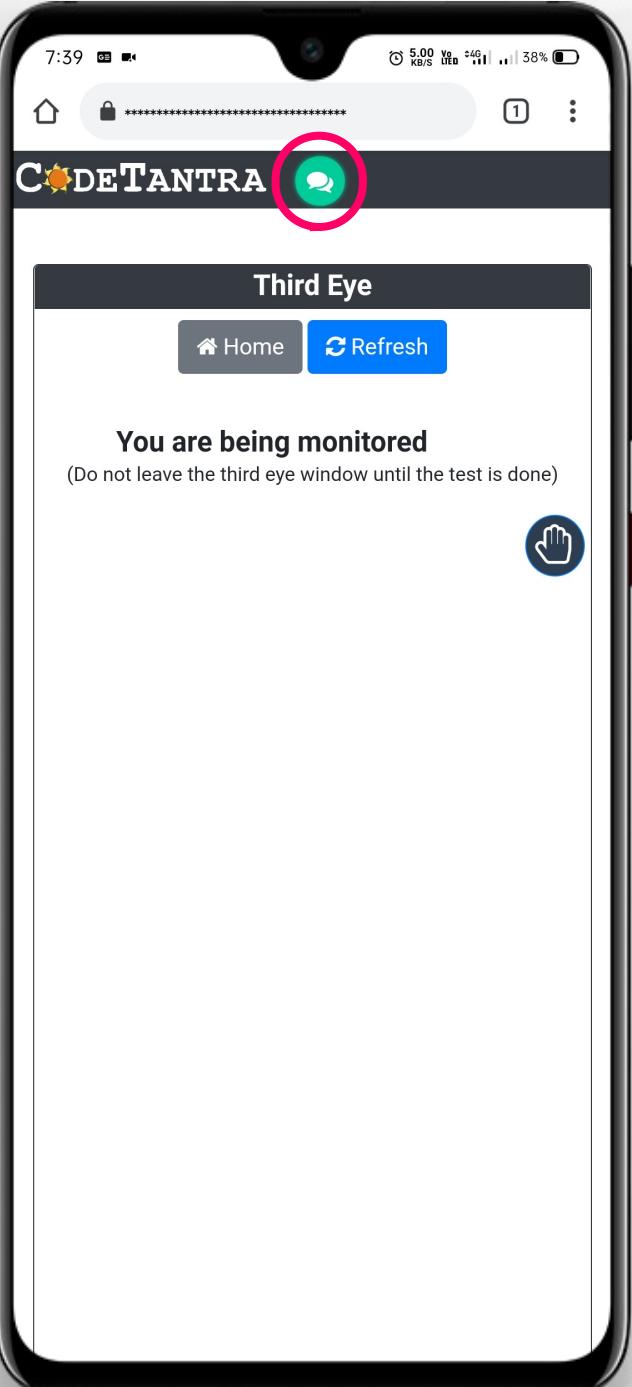
Step 03: After login, a new page will open as shown. On this page Join with 3rd Eye

Click on the **Third Eye** button against the test you want to attempt as per the availability of the test.

Step 04: Allowing Permission to Camera



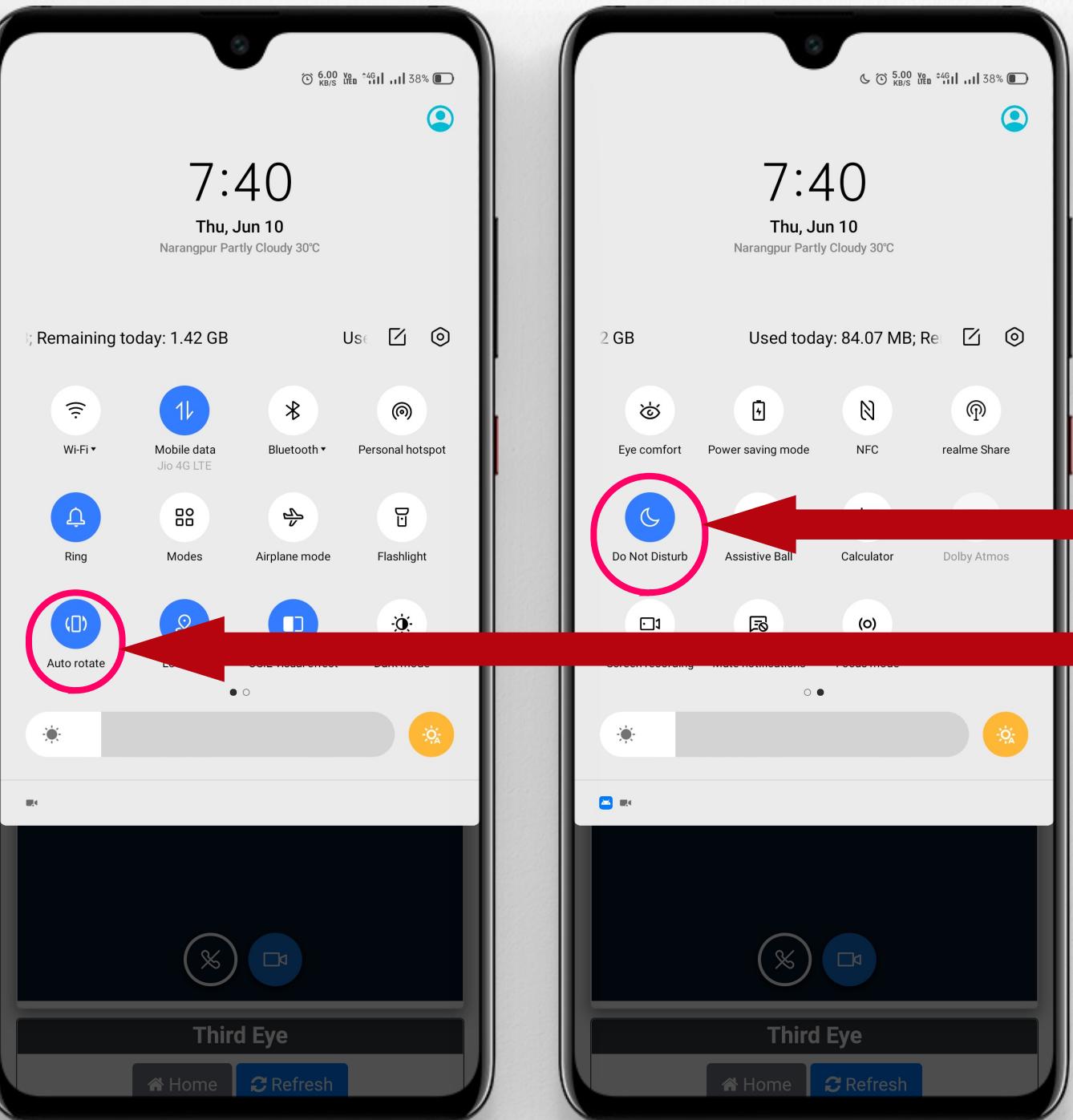
You will be asked to Allow the camera to be used by the browser (Chrome/Safari). Click on Allow.



Step 5: Position your Mobile for 3rd Eye

- i. Click on the green color **Chat** icon.
- ii. You will be able to see yourself through the front camera.
- iii. It is the time to place the mobile on the table which will be acting as 3rd Eye.

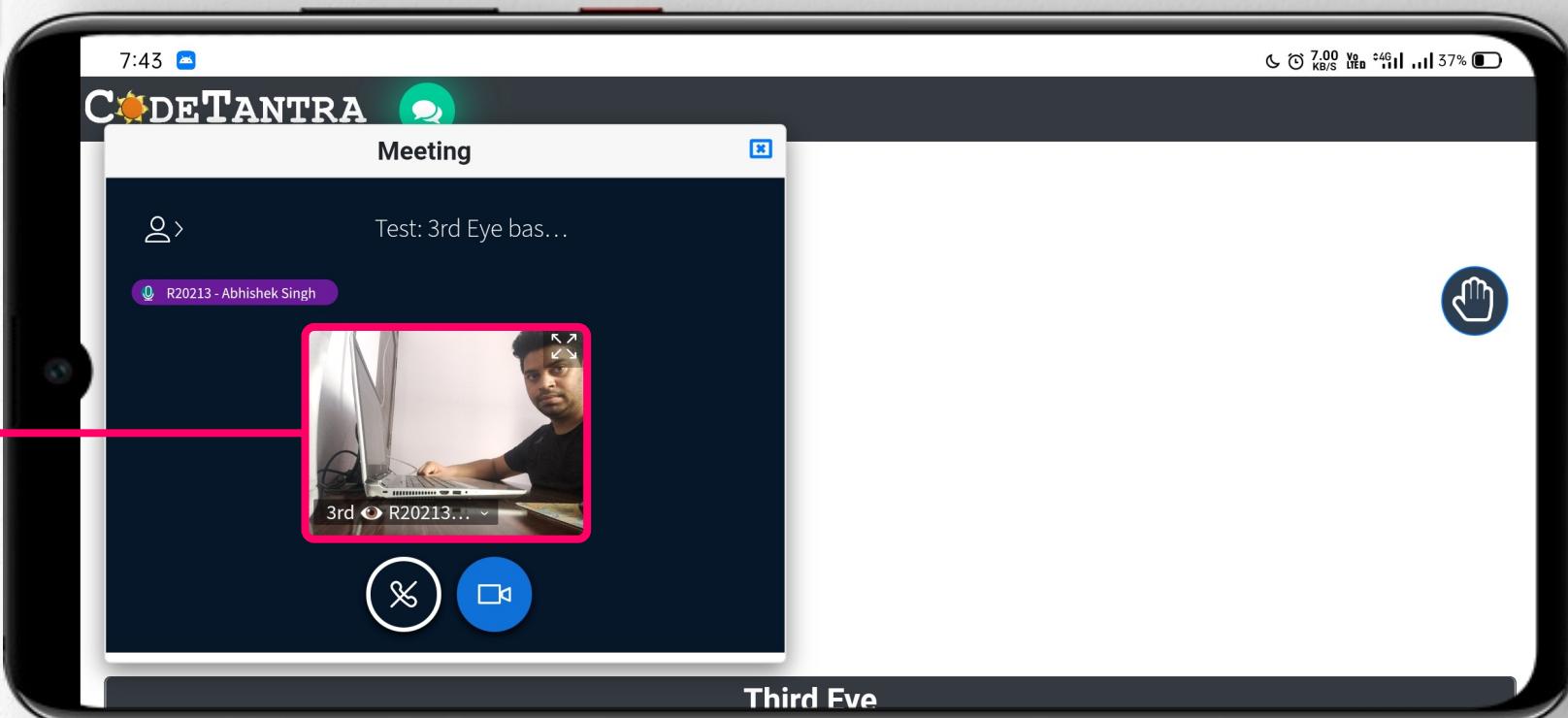
Step 6: Important Setting in Mobile



- i. Make sure to turn on **Do Not Disturb Mode**.
- ii. Make Sure to turn on **Auto-Rotate mode**.

Step 7: Placing the Mobile (3rd Eye) on a table

- i. Place your mobile (3rd Eye) on the table in such a way, where front camera can capture your hands, face, upper part of the body, and the laptop also.
- ii. Please observe, in the leftmost image, candidate, laptop, hands and upper body is completely visible.



LPUNEST Exam Setup at student's end

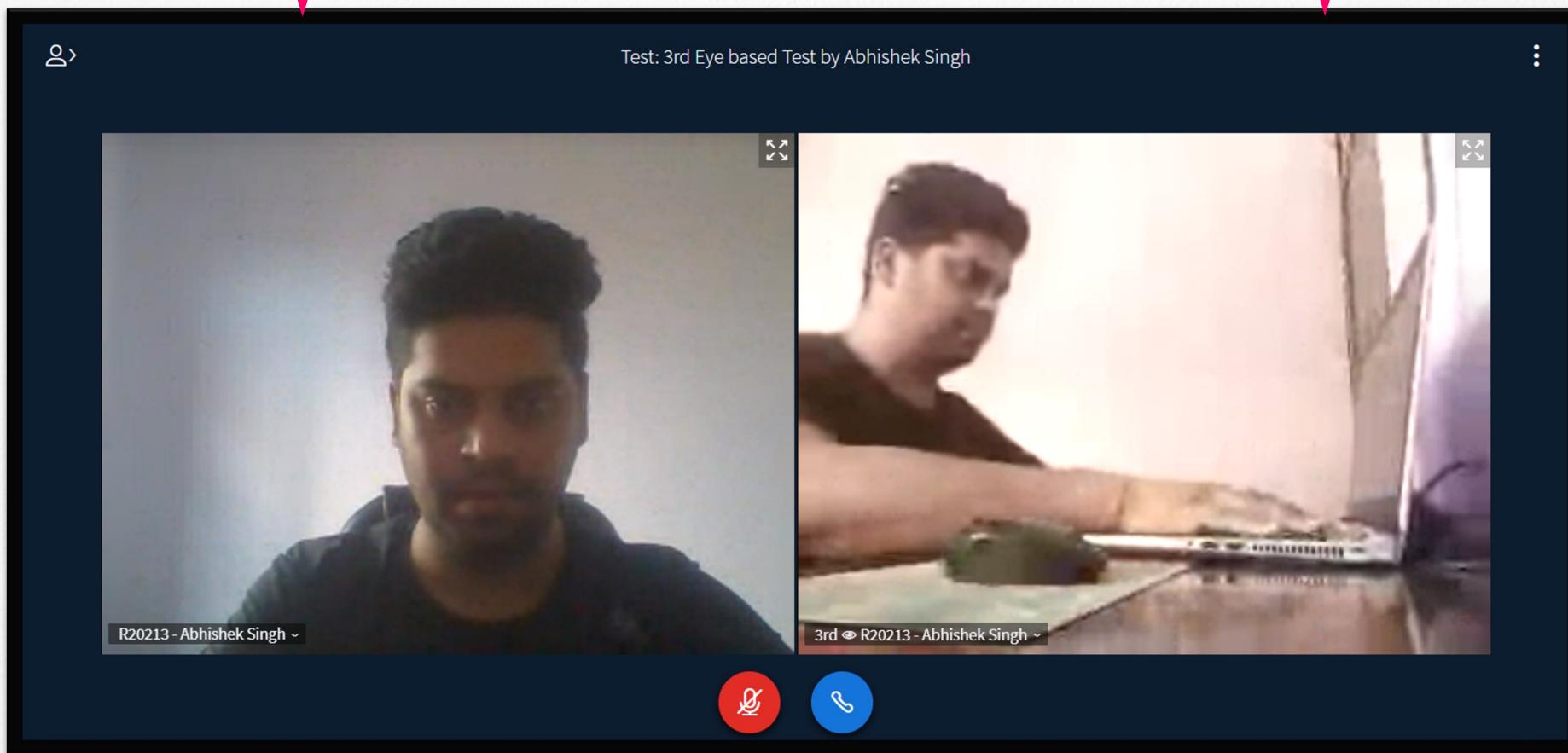
- You can observe that the mobile phone (3rd Eye) is kept at a distance from where it can capture the student's activity.
- A cup has been used as a support to the 3rd eye.

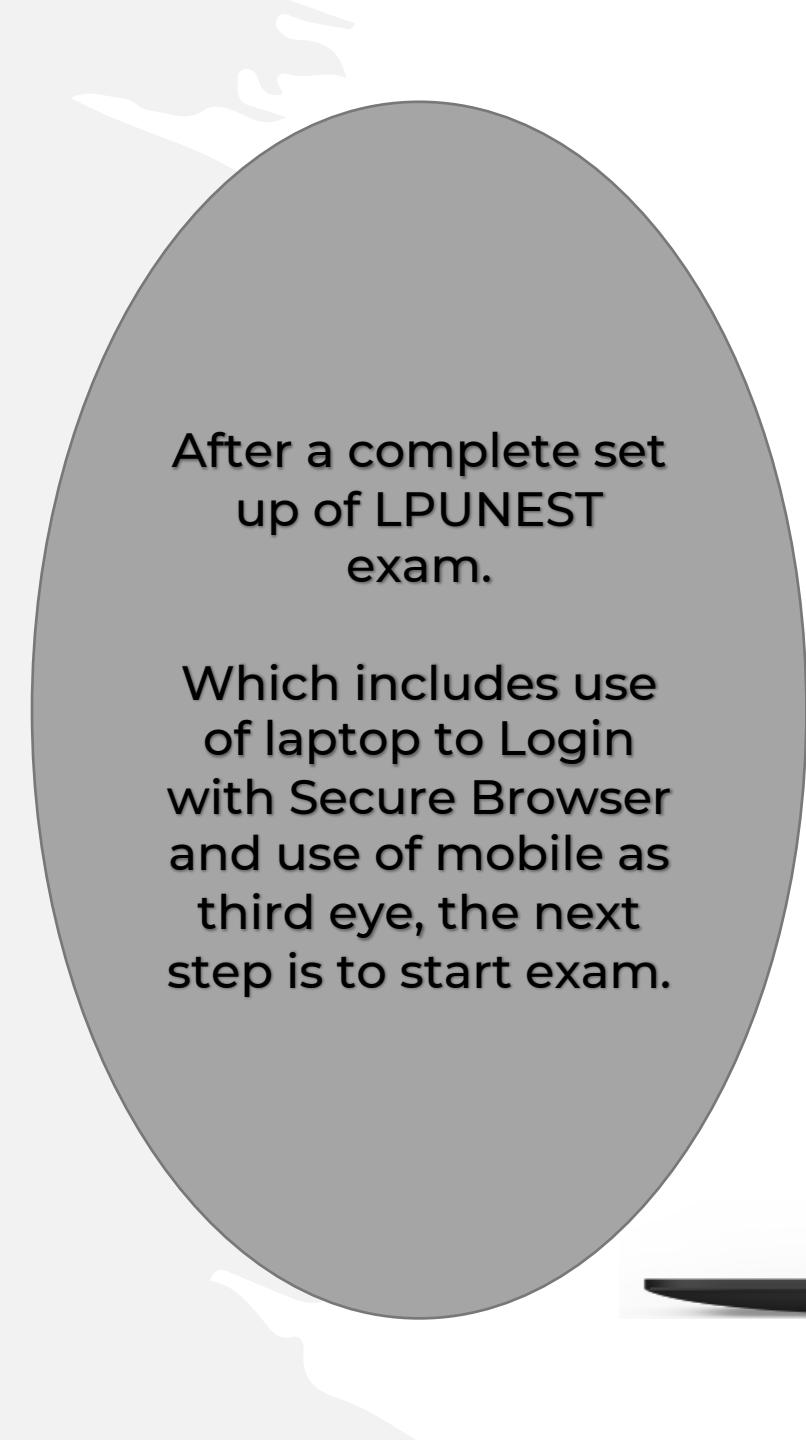


View at Proctor's End

Student's View from his
laptop/desktop

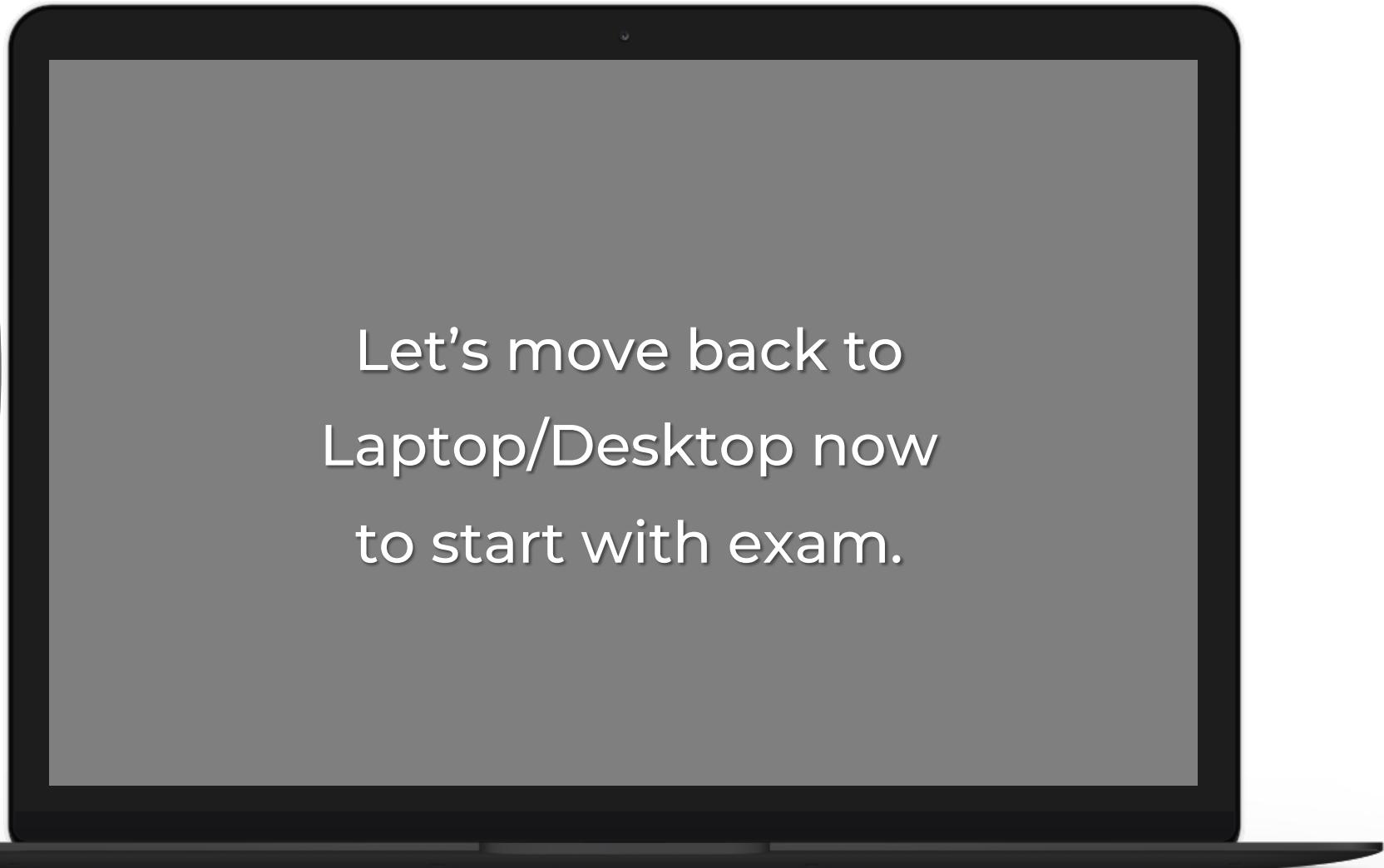
Student's View from
3rd Eye (Mobile)





After a complete set up of LPUNEST exam.

Which includes use of laptop to Login with Secure Browser and use of mobile as third eye, the next step is to start exam.



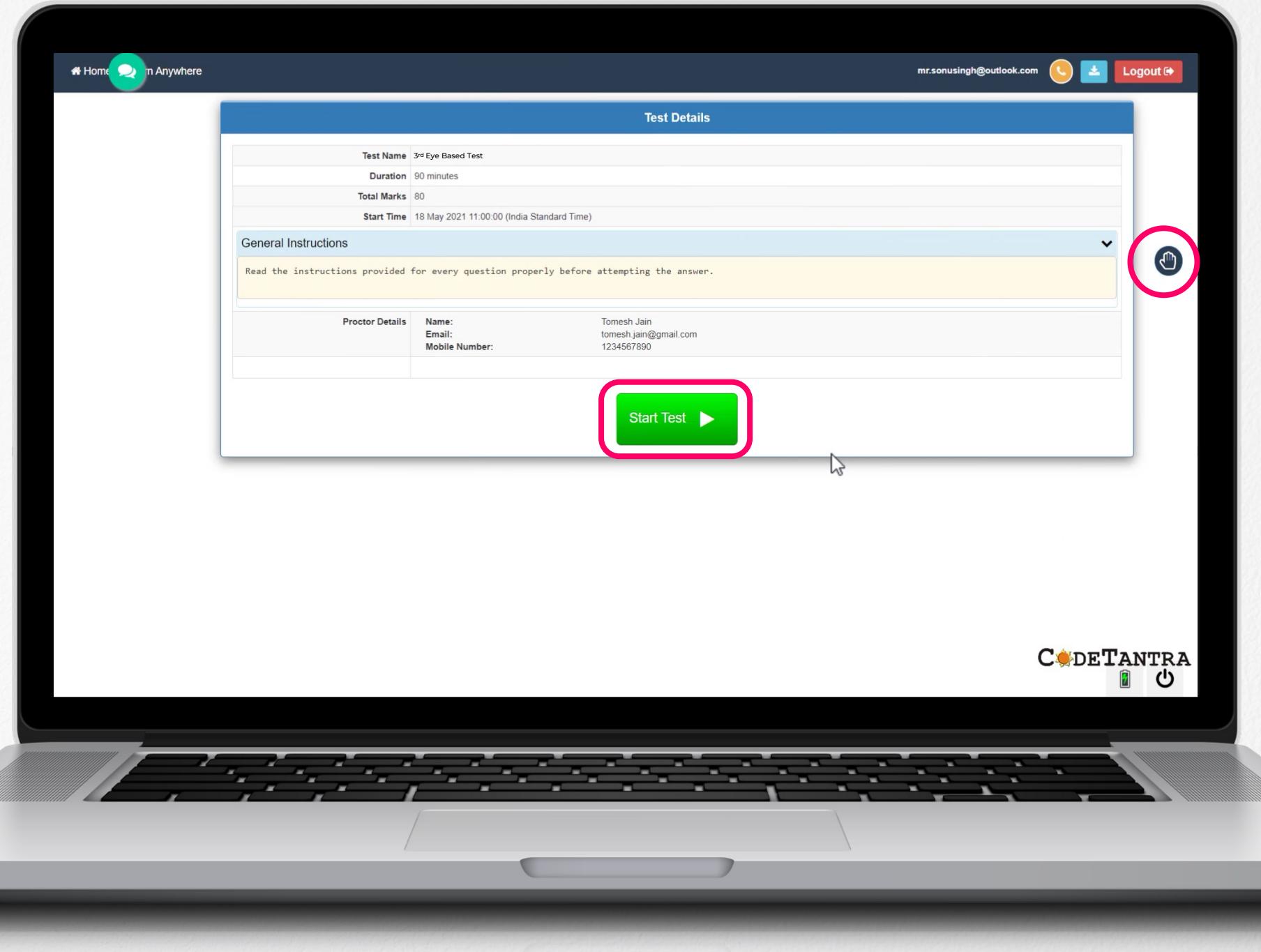
Let's move back to Laptop/Desktop now to start with exam.

Step 1: Start Test

Once the 3rd Eye is connected, you will be **unblocked** by the **proctor** after verification. Once proctor unblocks, you will be able to see the start test button

Important Notes:

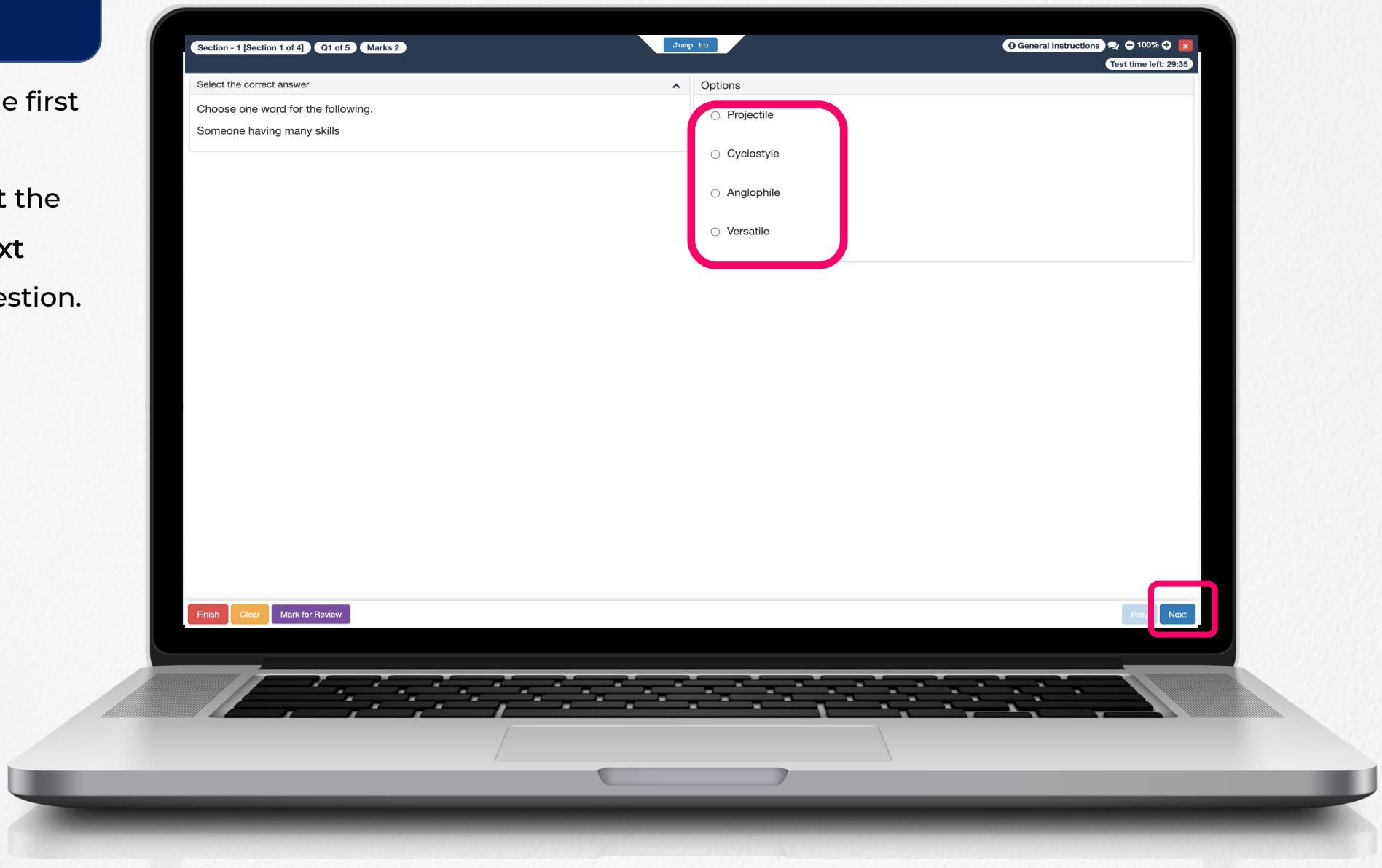
- Once you connect to 3rd eye, you can speak and request your proctor to unblock. Once proctor verify your seating area, the proctor will unblock you.
- If proctor is not unblocking, then you can request him through SOS by clicking on the hand symbol in the right side of the screen



Step 2: Answer the questions now.

This is the time to answer the first question.

To answer a question, **Select** the right option and click on **Next** button to bring the next question.

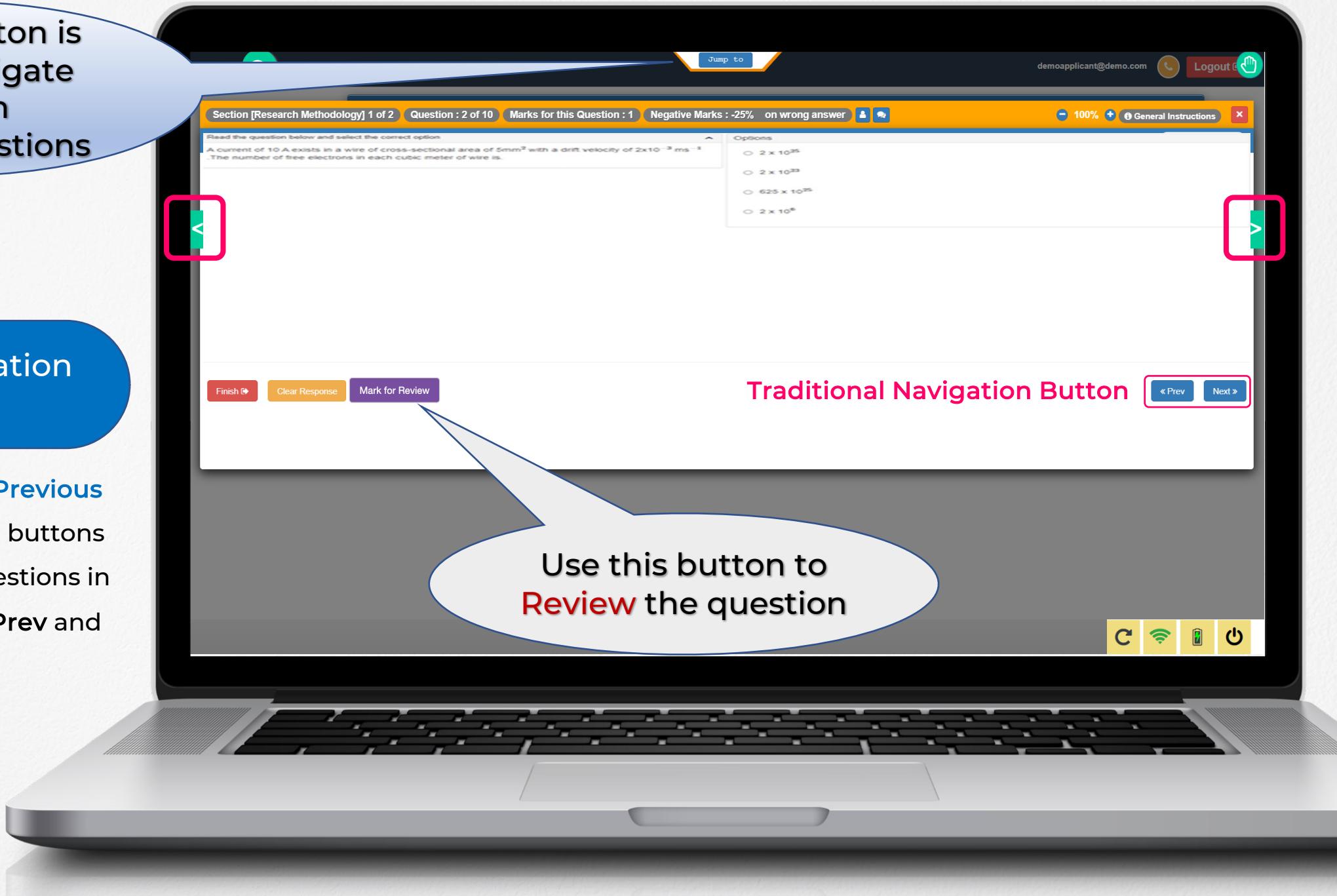


**Let's Explore The Other
Elements Of The
Interface**

Jump to button is used to Navigate between sections/Questions

Alternate Navigation Button

You can use alternate **Previous** and **Next** arrow shaped buttons to navigate through questions in addition to traditional **Prev** and **Next** Button



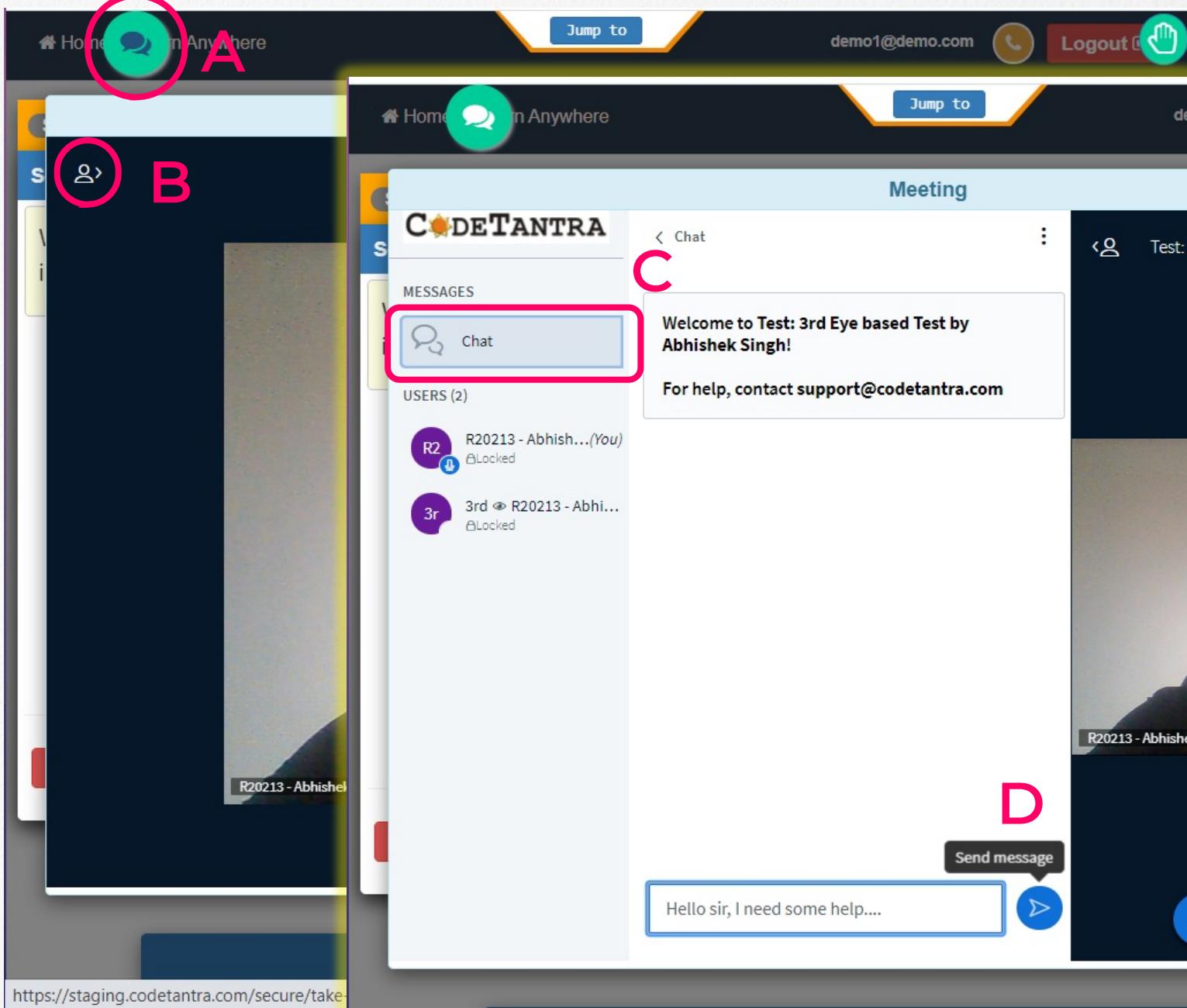
Use of Jump To for navigating between the questions

You can access any question of any section from the current question by clicking on the desired question number.

The screenshot illustrates the 'Jump to' feature in a test interface. At the top, a navigation bar shows 'Section - 1 [Section 1 of 4]', 'Q1 of 5', 'Marks 2', 'General Instructions' (with a speech icon), '100%', and a red close button. The test time left is 29:37. A green oval highlights the 'Jump to' button. A large red arrow points down to a modal window titled 'Jump to'. This modal lists three sections: 'Section - 1 2 mark(s)', 'Section - 2 4 mark(s)', and 'Section - 3 2 mark(s)'. Each section has a set of numbered buttons (1, 2, 3, 4, 5). Below the sections, a legend indicates: 19 - Not Visited (grey), 1 - Visited (orange), 0 - Attempted (green), 0 - Marked for Review (purple), and 0 - Answered & Marked for Review (teal). The 'Section - 1' button is highlighted with a blue border. The bottom of the modal has a 'Close x' button. The main test area below the modal shows the question: 'Select the correct answer Identify which part of the sentence has the error. The Dean (1)/ assured us that (2)/ a list of industrie'.

Chat with Proctor

- A. Select green color chat icon.
- B. Click on human face icon.
- C. Click on Chat icon, which will open chat panel.
- D. Type the message in the chat box and click on Send.



Viewing the General Instructions

- A. Click on **General Instructions** button to open instruction panel.
- B. Click on close after viewing the Instructions

The screenshot shows a web-based exam application. At the top, there's a header bar with a user icon, 'Jump to', 'demo1@demo.com', and 'Logout'. Below the header, a navigation bar displays 'Section - B1 2 of 2', 'Question : 1 of 5', 'Marks for this Question : 2', a progress bar at '130%', and a 'General Instructions' button. A red arrow points from the text 'Click on General Instructions button' to the 'General Instructions' button. The main content area shows a question about student weights. A large white pop-up window titled 'General Instructions' is centered over the page. It contains the following text:

General Instructions

Read the instructions provided for every question properly before attempting the answer.

Section - 1 : contain(s) **5** question(s) and each question carries **2** mark(s).

Section - 2 : contain(s) **5** question(s) and each question carries **2** mark(s).

Click **Finish** only after completion of the Exam.

At the bottom right of the pop-up is a blue 'Close' button, which is also highlighted with a red box. At the bottom left of the pop-up is a 'Clear Response' button. At the very bottom of the page, outside the pop-up, are navigation links '« Prev' and 'Next »'.

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Zooming in/out the Exam Screen

You can resize the text of the question and answers by clicking on – and + button.

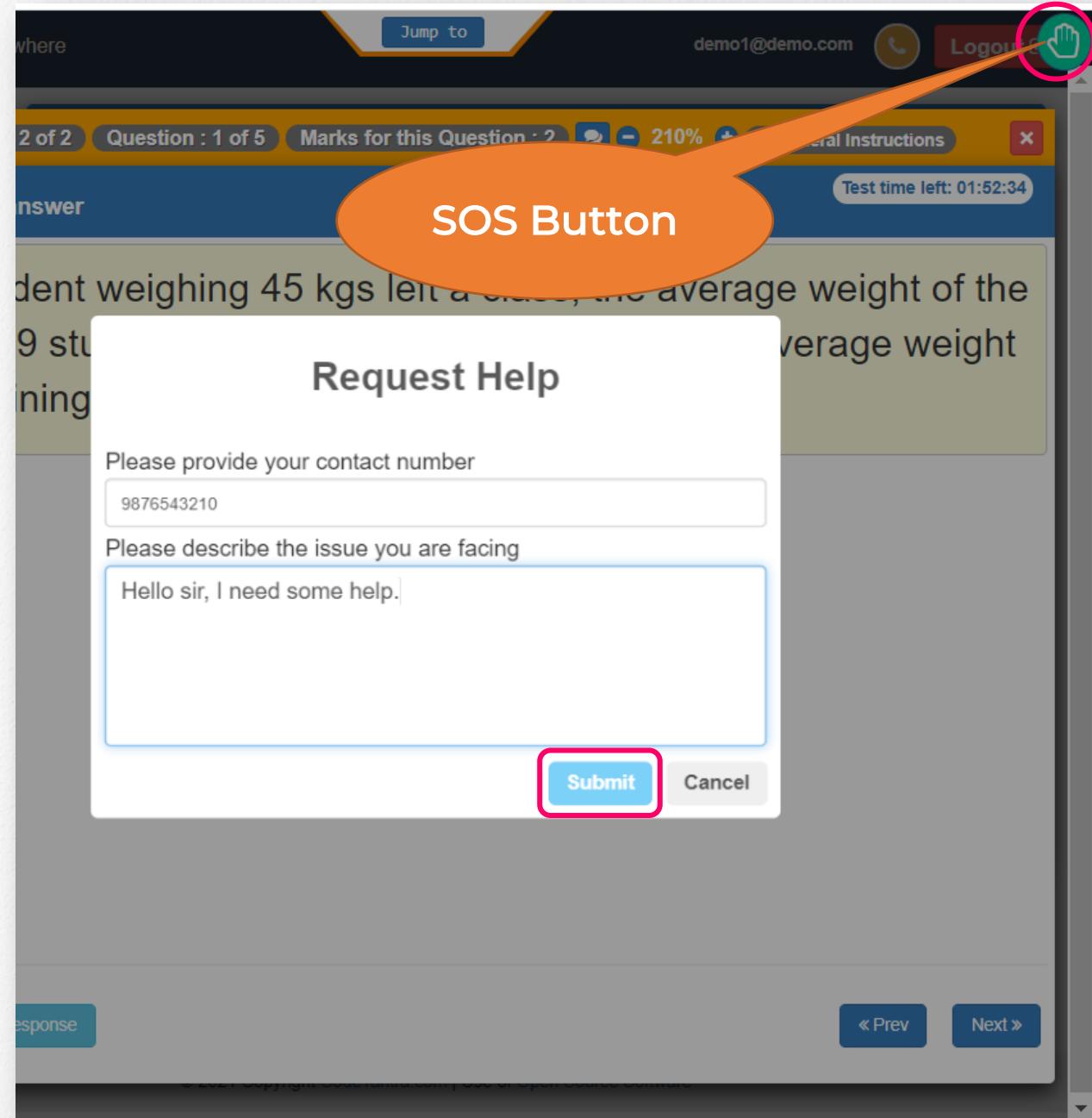
If there is any image in the question or option, you can click on the image to zoom in.

After viewing the image you can click on minimize button available at top right corner of the image.

The screenshot shows a web-based exam interface. At the top, there's a navigation bar with a home icon, a speech bubble icon, and the text "On Anywhere". To the right are buttons for "Jump to", "demo1@demo.com", and "Logout" with a user icon. Below the navigation bar is a toolbar with sections for "Section [Section - B] 2 of 2", "Question : 1 of 5", "Marks for this Question : 2", and a zoom control. The zoom control consists of a minus sign (-), a value of "210%", and a plus sign (+). This entire toolbar area is highlighted with a red rectangle. To the right of the toolbar is a "General Instructions" link and a close button (X). On the far right, it says "Test time left: 01:54:53". The main content area has a blue header "Select the correct answer". Below it is a yellow box containing a math problem: "When a student weighing 45 kgs left a class, the average weight of the remaining 59 students increased by 200g. What is the average weight of the remaining 59 students." The entire yellow box is bordered by a purple line.

Sending the message in case of candidate needs help

- i. You can ask for the emergency help by clicking on the SOS button on the right top.
- ii. Fill in your mobile number and describe your problem and then Submit.



How To Finish The Test

- i. On the last question of the test, **Next button is disabled**.
- ii. To finish the test, click on the **Finish** Button.
- iii. A Test Summary will appear, after verifying the Summary, you can click on **Yes, I want to Finish and Exit**.
- iv. Otherwise, in case you want to go back to the test screen, then click at **No, I want to continue the Test**.

The image shows a laptop screen with a test interface. The top right corner displays a user's email (mr.sonusingh@outlook.com) and a logout button. The main content area shows a 'Test Summary' table and a question with four options. A cursor is hovering over the 'Yes, I want to Finish and Exit' button.

Sections	No. of Questions	Answered	Not Answered	Not visited
Maths	25	2	2	21
Physics	25	0	0	25
Chemistry	25	0	0	25
English	2	0	0	2
Aptitude	3	0	0	3

There is still time for the Test to finish. Do you still want to exit?

No, I want to continue the Test. Yes, I want to Finish and Exit.

Finish, Clear Response, Mark for Review, Next >, CodeTANTRA logo.

Tests

Search between : 2021/06/30 2021/07/05 [Search](#)

#	Test Name	Time	Status	Result
1	3rd Eye Based Test	Start Time 02 Jul 2021 01:00:00 (India Standard Time) Duration 60 minutes	Completed	--

Congratulations!
You have successfully
submitted the test.



LPUNEST Remote Proctoring Online exam rules

Applicants Appearing For LPUNEST Online Exam Must Adhere To The Following Instructions.

- ❖ Before the start or in the midst of the exam, you will be asked to show the surroundings. You will be required to provide a 360-degree view of the room in which you are taking the proctored exam and a scan of the area above and under your desk or table.
- ❖ Do not look sideways during the exam. Non-adherence of the same will lead to cancellation of the exam after 3 warnings.



- ❖ For the entire duration of the exam, please remain seated in front of your webcam. In case you found leaving your seat during the exam, your exam will be cancelled.



cont....

- ❖ Do not try to cover your camera or unplug the external camera from the system.



- ❖ You are not allowed to touch the keyboard while you are attempting your exam. You are only allowed to scroll cursor with mouse to answer the question.

*Keyboard will be used only to enter Numeric Value for Fill in the Blank type questions if applicable.

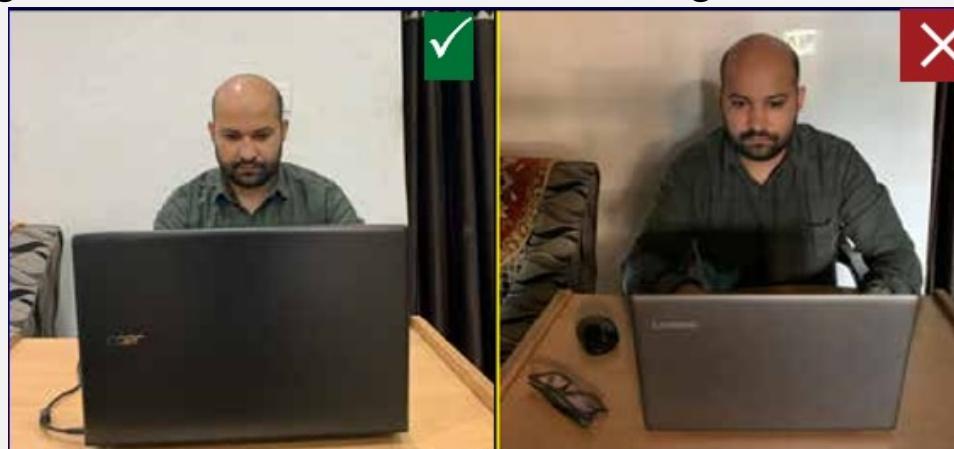


cont....

- ❖ Do not try to navigate away from the exam screen. Doing so will automatically terminate your exam.
- ❖ No other person is allowed to enter the room while you are taking the proctored exam.



- ❖ The lighting in the room must be bright enough to be considered “daylight” quality. Overhead lighting is preferred. If overhead lighting is not available, the source of light must not be behind you.



cont....

- ❖ You must sit before a clean desk or table.
- ❖ The desk or walls around you must not have any writing.



- ❖ The room must be as quiet as possible. Sounds such as music or television are not permitted.
- ❖ The following items must not be on your desk or used during your proctored exam such as books, papers, pens, gadgets, calculators, notebooks, eatables etc.



DO'S

- Candidate must have **TWO DEVICES** to appear in exam.(Laptop/Desktop and Smartphone). Both are mandatory.
- Charge the laptop/smartphone well in advance to last for at least 3 hours.
- Student to be seated using a wall as the background.
- Ensure proper lighting in the room so that the pictures captured during the exam are not blurred.
- Photograph clicked must be of good quality.
- Candidate must have Identity proof ready at the time of test.
- Check the power plugs.
- You should ensure proper internet connectivity is available on your laptop/desktop/Smartphone.
- You must make sure webcam/camera and mic of your Laptop/Desktop and Smartphone is working properly.
- You will be under constant observation during the entire duration of the exam via artificial intelligence tools and live monitoring by the proctors. Any suspected activity will lead to the immediate termination of the exam.
- The room must be as quiet as possible. Sounds such as music or television are not permitted.
- You should have your water bottle at your table before start of exam as you are not allowed to leave the test screen during exam

DON'TS

- Do not try to navigate from the main screen. Doing so will automatically terminate your exam.
- You are not allowed to talk to anyone while your exam is being conducted, as Real Time Monitoring is being done by the Proctor in the university.
- You are not allowed to use any other material or electronic gadget(*like smart watch, notebook, calculator etc.*) on the day of exam. If found, then it will be considered for the cancellation of your exam by the Proctor.
- Do not move in front of camera.
- Do not try to cover your camera or unplug the external camera from the system.
- You are not allowed to touch the keyboard/keypad while you are attempting your test, you are only allowed to scroll cursor with mouse to answer the question.
- You are not allowed to start the test from multiple devices at a time. It will be again in the notice of proctor and your exam may be cancelled.
- There should be no disturbance in the surroundings.
- You must not use headphones, ear buds, or any other type of listening equipment.
- You must not leave the room for any reason during exam.
- The use of any unfair means or malpractices including impersonation during the Proctored Exam would result in severe disciplinary action as per the rules of LPUNEST Examination Committee and will even lead to the cancellation of your exam.

SCHOOL NAME

*Physics investigatory
project*



NAME:

CLASS: **XII**

ROLL NO:

SESSION: **2023-24**

C E R T I F I C A T E

This is to certify that

Student Name

*has successfully completed her Physics project
titled*

INTERNAL RESISTANCE OF A CELL

under the supervision and guidance of

PHYSICS TEACHER

*in the partial fulfillment of the Biology
practical*

KNOWLEDGE CYCLE
*assessment conducted during the
academic year*

2023-2024.

EXAMINER

TEACHER

ACKNOWLEDGEMENT

I would like to express my immense gratitude to my physics teacher **TEACHER NAME** for the help and guidance he/she provided for completing this project.

I also thank my parents who gave their ideas and inputs in making this project. Most of all I thank our school management, for providing us the facilities and opportunity to do this project.

Lastly, I would like to thanks my classmates who have done this project along with me. Their support made this project fruitful.

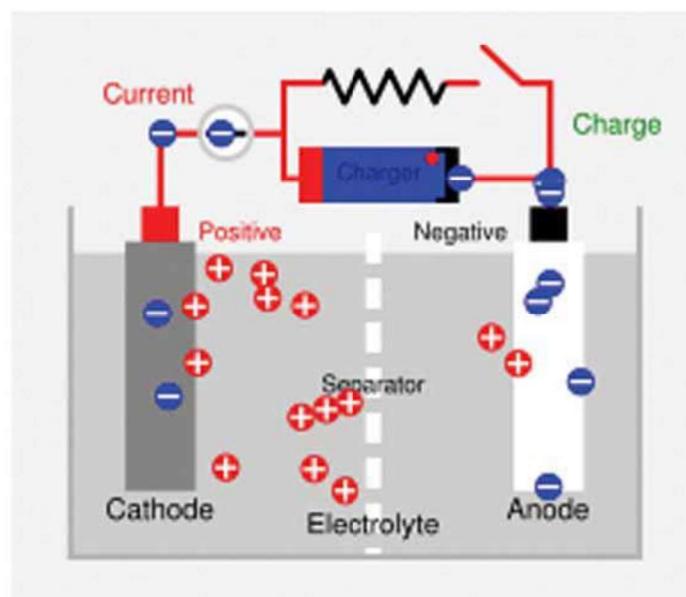
-STUDENT NAME

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TOPIC

To study the various factor on which the Internal Resistance/e.m.f. of cell depends

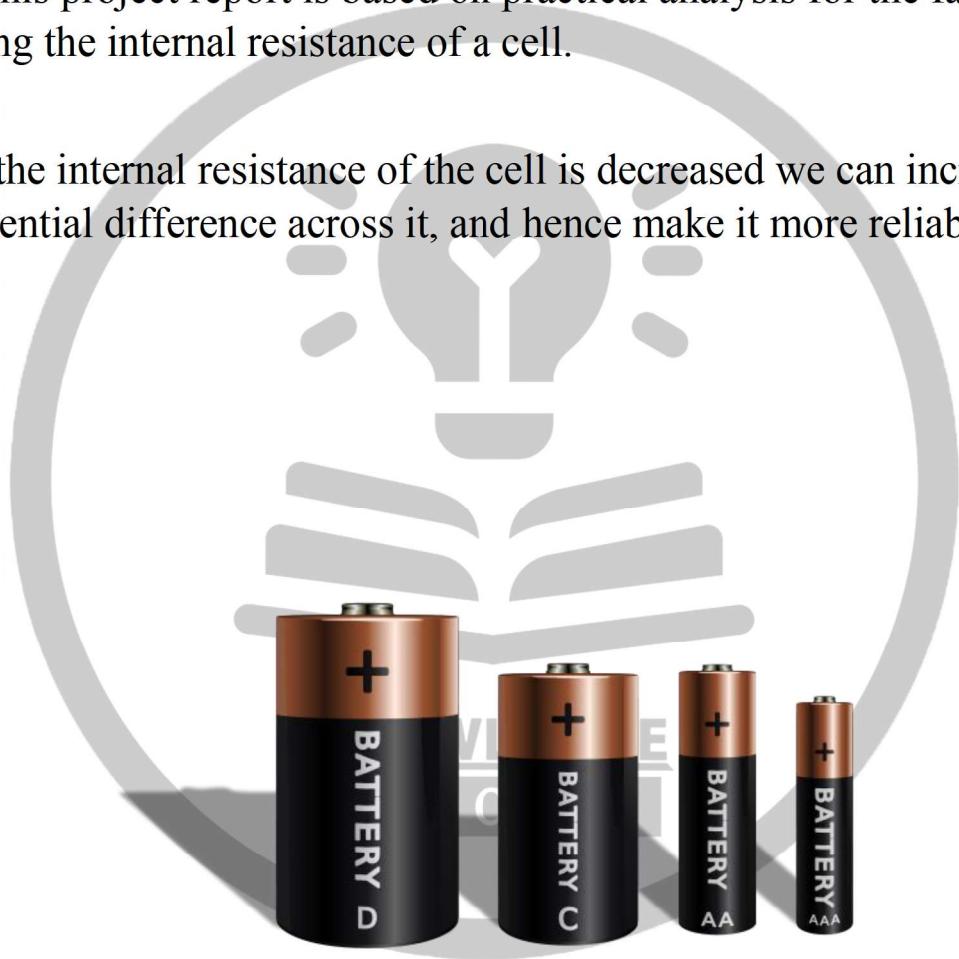


INTRODUCTION

There is a great need of batteries in our daily use electronic appliances and the use is increasing every day. Thus, the batteries need to be made more powerful so that their potential can be increased greatly.

Thus, this project report is based on practical analysis for the factors affecting the internal resistance of a cell.

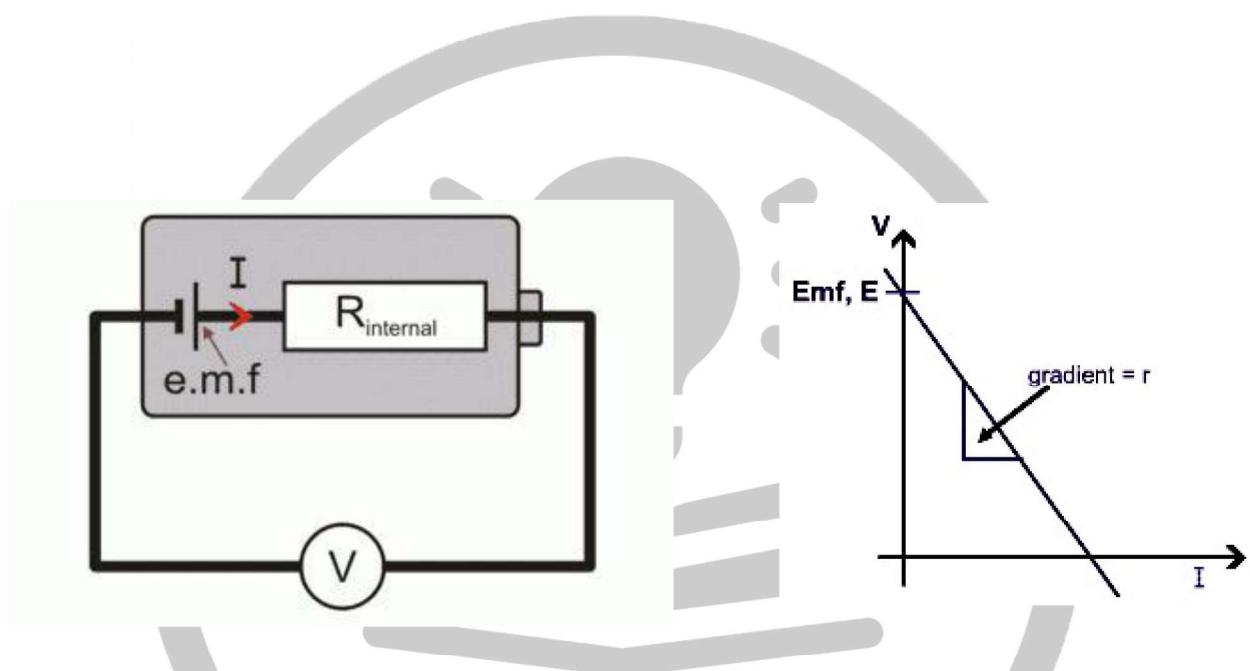
When the internal resistance of the cell is decreased we can increase the potential difference across it, and hence make it more reliable.



INTERNAL RESISTANCE

Internal resistance is defined as the resistance offered by the electrolyte of the cell to the flow of ions.

- It's S.I. unit is **Ohm (Ω)**



For a cell of e.m.f. (E) and internal resistance (r), connected to an external resistance (R) such that (I) is the current flowing through the circuit.

$$E = V + Ir$$

$$\text{Internal Resistance } (r) = \frac{E-V}{I}$$

PRACTICAL ANALYSIS

OBJECTIVE

To study the various factors on which the internal resistance of a cell depends.

APPARATUS

Potentiometer

Battery (or battery eliminator)

Two one-way keys

Rheostat

Galvanometer

Resistance box

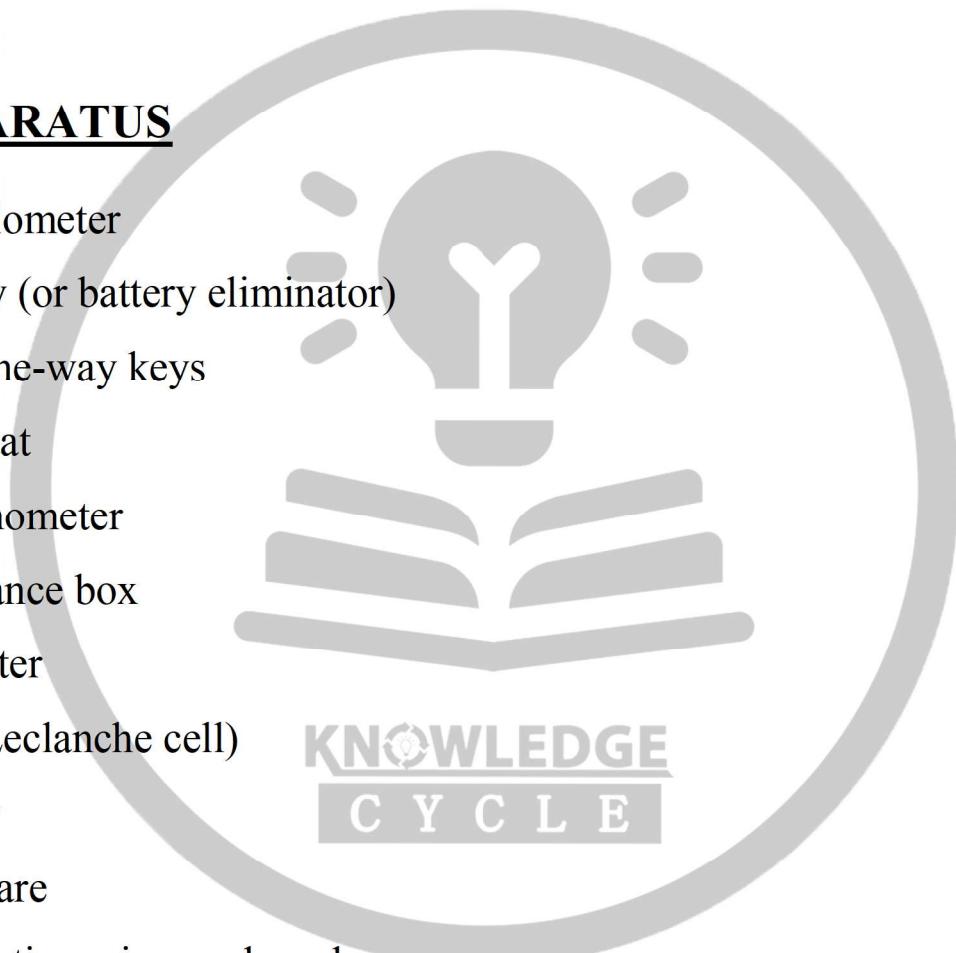
Ammeter

Cell (Leclanche cell)

Jockey

Setsquare

Connecting wires and sand paper.



THEORY

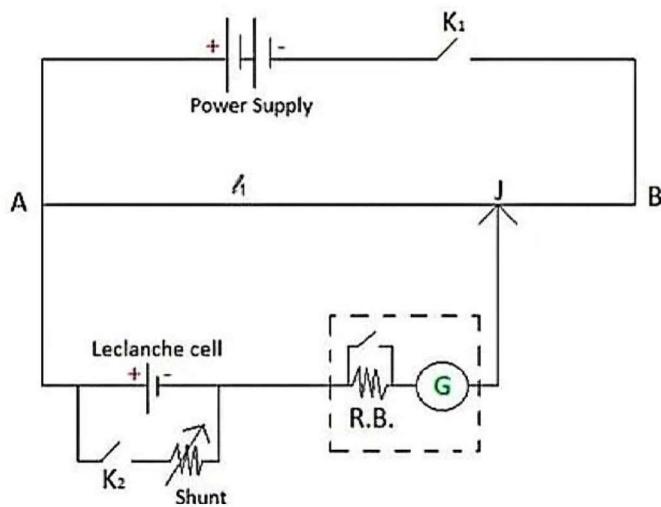
The internal resistance of a cell is the resistance offered by its electrolyte to the flow of ions. The internal resistance of a cell

- Is directly proportional to the distance between the electrodes.
- Is inversely proportional to facing surface area of the electrodes in electrolyte.
- Decreases with increase in temperature of electrolyte.
- Is inversely proportional to concentration of electrolyte.

The internal resistance of a cell is given by:

$$r = \frac{E - V}{R}$$

CIRCUIT DIAGRAM



PROCEDURE

- Clean the ends of the connecting wires with sand paper and make tight connections according to the circuit diagram.
- Tighten the plugs of the resistance box.
- Check the e.m.f. of the battery and of the cell and make sure that e.m.f. of the battery is more than that of the cell, otherwise null or balance point will not be obtained.

To study variation of internal resistance with distance of separation

- Keep both the electrodes at a distance of 16 cm.
- Take maximum current from the battery, making rheostat resistance small.
- Without inserting a plug-in key K_1 , adjust the rheostat so that a null point is obtained on the last wire of the potentiometer.
- Determine the position of the null point accurately using a set square and measure the balancing length (l) between the null point and the end P.
- Next introduce plugs in both keys K_1 and K_2 . At the same time, take out a small resistance (1-5 W) from the shunt resistance box

connected in parallel with the cell.

- Slide the jockey along a potentiometer wire and obtain the null point.
- Measure the balancing length (l_2) from end P. Record these observations.
- Now keep the electrodes 12 cm apart.
- Then remove the plugs of keys K₁ and K₂. Wait for some time and repeat steps 7 to 10.
- Next, keep the electrodes 9 cm apart to obtain another set of observations.

To study variation of internal resistance with area of electrodes

- Keeping all other factors constant, increase the area of electrodes in the electrolyte by dipping them into the electrolyte at different depths for each observation.
- Obtain three such observations by repeating steps 7 to 10. Record your readings.

To study variation of internal resistance with concentration of electrolyte

- Keeping all other factors constant, decrease the concentration of electrolyte by adding distilled water for different observations.
- Obtain three such observations by repeating step 7 to 10. Record your readings.

To study variation of international resistance with Temperature

- Keeping all other factors constant, increase the temperature of electrolyte
- Obtain three such observations by repeating step 7 to 10. Record your readings.

OBSERVATIONS

S.no.	Ammeter Reading (A)	Position of null point (cm)		Shunt Resistance R (Ω)	Internal Resistance r (Ω)
		With R (l_1)	Without R (l_2)		
1	0.3	660.5	35.5	1	0.94
2	0.3	660.5	77.2	2	1.77
3	0.3	660.5	108.3	3	2.51

Table for effect of separation between electrodes

S.no.	Separation between electrodes d (cm)	Balancing point l_1 (cm)	Balancing point l_2 (cm)	Internal Resistance r (Ω)	r/d
1	1.2	326.6	276.9	0.456	0.38
2	2.5	320.7	219.1	0.95	0.38
3	3.7	660.5	350.9	1.406	0.38

RESULT AND INFERENCES

- The Electromotive Force of the cell is constant and is equal to $E = 0.98$ Volt.

- The internal resistance of a cell is directly proportional to the separation between the electrodes.

- The internal resistance of a cell is inversely proportional to the area of the electrodes dipped in electrolyte.

- The internal resistance of a cell is inversely proportional to the temperature of electrolytes.

- The internal resistance of a cell is inversely proportional to the concentration of the electrolyte.



PRECAUTIONS

- The connections should be neat, clean and tight.

- The plugs should be introduced in the keys only when the observations are to be taken.

- The positive polls of the battery E and cells E, and E2 should, all be connected to the terminal at the zero of the wires.

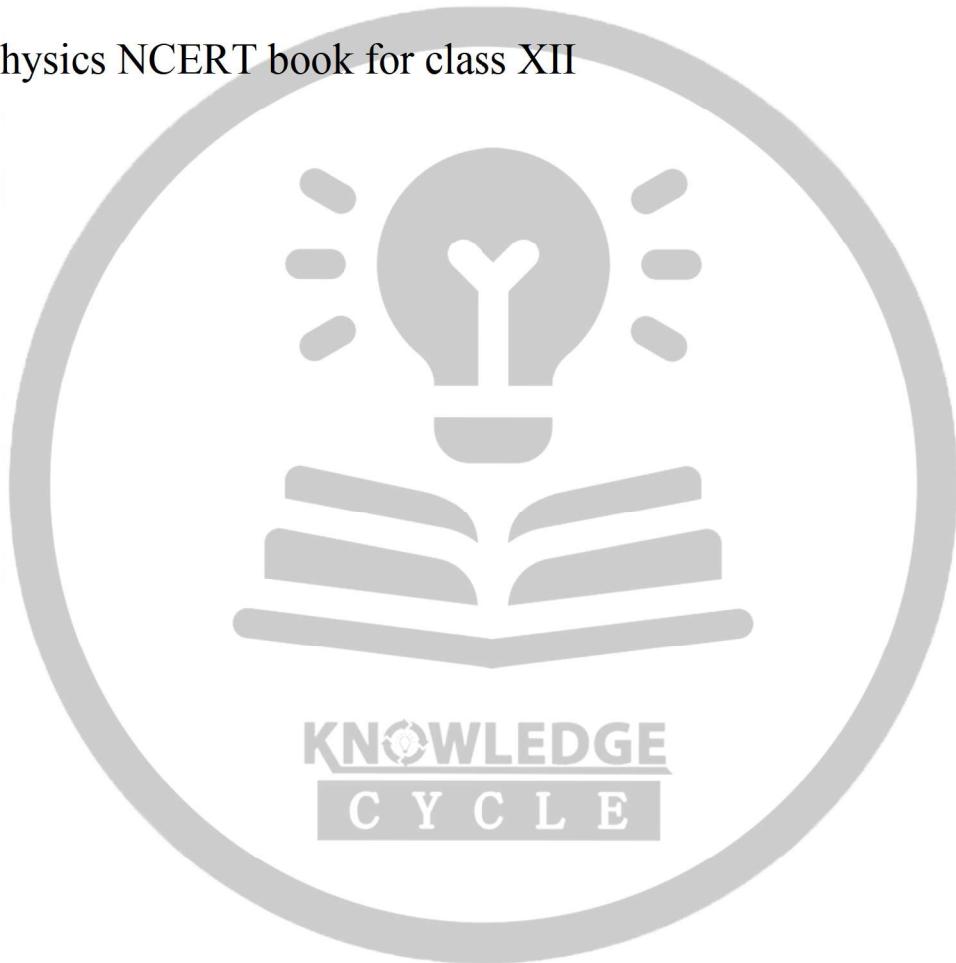
- The jockey key should not be rubbed along the wire. It should touch the wire gently.

- The ammeter reading should remain constant for a particular set of observation. If necessary, adjust the rheostat for this purpose.



BIBLIOGRAPHY

- Wikipedia.com
- Google search engine
- Physics NCERT book for class XII



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