GOVERNMENT COLLEGE , MALKAJGIRI
DEPARTMENT OF PHYSICS
ACTION PLAN FOR ACADEMIC YEAR 2020-21

Month & Year	Curricular Activities	Co-Curricular Activities	Extra-Curricular Activities	Remarks
June -2020	Preparation of Video lessons			
July - 2020	Preparation of Video lessons			
August - 2020	Preparation of Video lessons			
September-2020	Commencement of classes for III & V semester	Remedial Classes		conducted
October-2020	Class room teaching	Student Seminars and Assignments	NSS/NCC Education day	Online mode
November-2020	Class room teaching			Online mode
December-2020	Commencement of classes for I Semester Class room teaching			conducted
January-2021	Class room teaching			Online mode
February-2021	I Internal Assessment examinations for III & V semesters		National Science Day	conducted
March-2021	1.Internal-2 Assessment examinations for III & V semesters 2. Mid Sem Examinations for III & V semesters 3. Commencement of classes for IV & VI semester	Student Seminars and Assignments		conducted

April -2021	1. Mid Sem Examinations for Ist semester 2. Commencement of classes for II semester	1. Student centric activities;- Seminars/Project work etc., 2.Extension/Guest lectures	Career Guidance Activities	Conducted Jignasa project started
May- 2021	Class room teaching		P.G entrance Guidance classes	At the end of each unit we discussed
June- 2021	End Sem Examinations for VI semester		P.G entrance Guidance classes	
July- 2021	End Sem Examinations for VI semester		P.G entrance Guidance classes	
August - 2021	End Sem Practical Examinations for VI semester		National webinar on 'Research and Innovation'	
September-2021	1. End Sem Practical Examinations for II & IV semester 2. End Sem Examinations for II & VI semesters.		Teachers Day	

Note: Due to covid pandemic actions most of the actions are not taken.

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https://youtu.be/voFT9WeC3Cg

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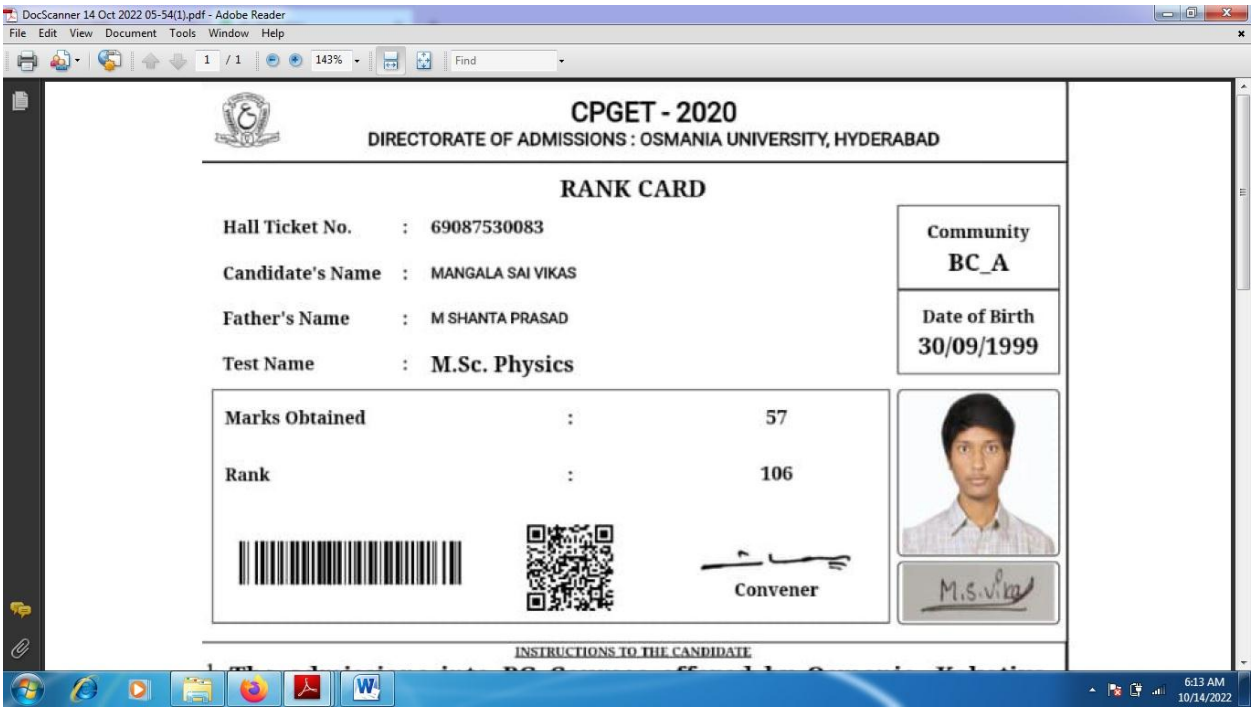
https://youtu.be/DvqZbhsbiWA

https://youtu.be/J5WvzZWHxBA

https://youtu.be/b6sUsMyc6P8

In regular teaching classes after completion of a unit I discussed PG and BEd entrance model bits. But separate coaching is not taken. Two students selected for PG physics. One student Akash got seat in HCU ST category, and another student got 106 rank in Osmania university.



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CPGET - 2020

DIRECTORATE OF ADMISSIONS : OSMANIA UNIVERSITY, HYDERABAD

RANK CARD

Hall Ticket No.	:	69087530083
Candidate's Name	:	MANGALA SAI VIKAS
Father's Name	:	M SHANTA PRASAD
Test Name	:	M.Sc. Physics

Community: BC_A

Date of Birth: 30/09/1999

Marks Obtained	:	57
Rank	:	106

Convener

INSTRUCTIONS TO THE CANDIDATE

My own books are kept in department Library to help the students

Books

1) Atomic and molecular spectra by Rajkumar
2) Quantum mechanics by D.J. Griffiths
3) Electromagnetism by D.J. Griffiths
4) Introduction to thermal and statistical physics by Garg
5) Fundamentals of physics Resnick and Halliday
6) Introduction to solid state physics by srivastava
7) Introduction to statistical Mechanics by Rief

UGC-HRDC & RUSA

OSMANIA UNIVERSITY, HYDERABAD

Opp. Law College, Osmania University, Hyderabad 500007, Telangana

Phone No: 040-27098102, 27682346, Website: https://www.osmania.ac.in/hrdc/ E-Mail: hrdc@osmania.ac.in

E-Certificate of Participation

This is to certify that

Veerareddy Vippala, Assistant Professor, Physics,
Government Degree College Malkajgiri, Osmania University

has successfully completed One Week Online FIP Short-term Course on

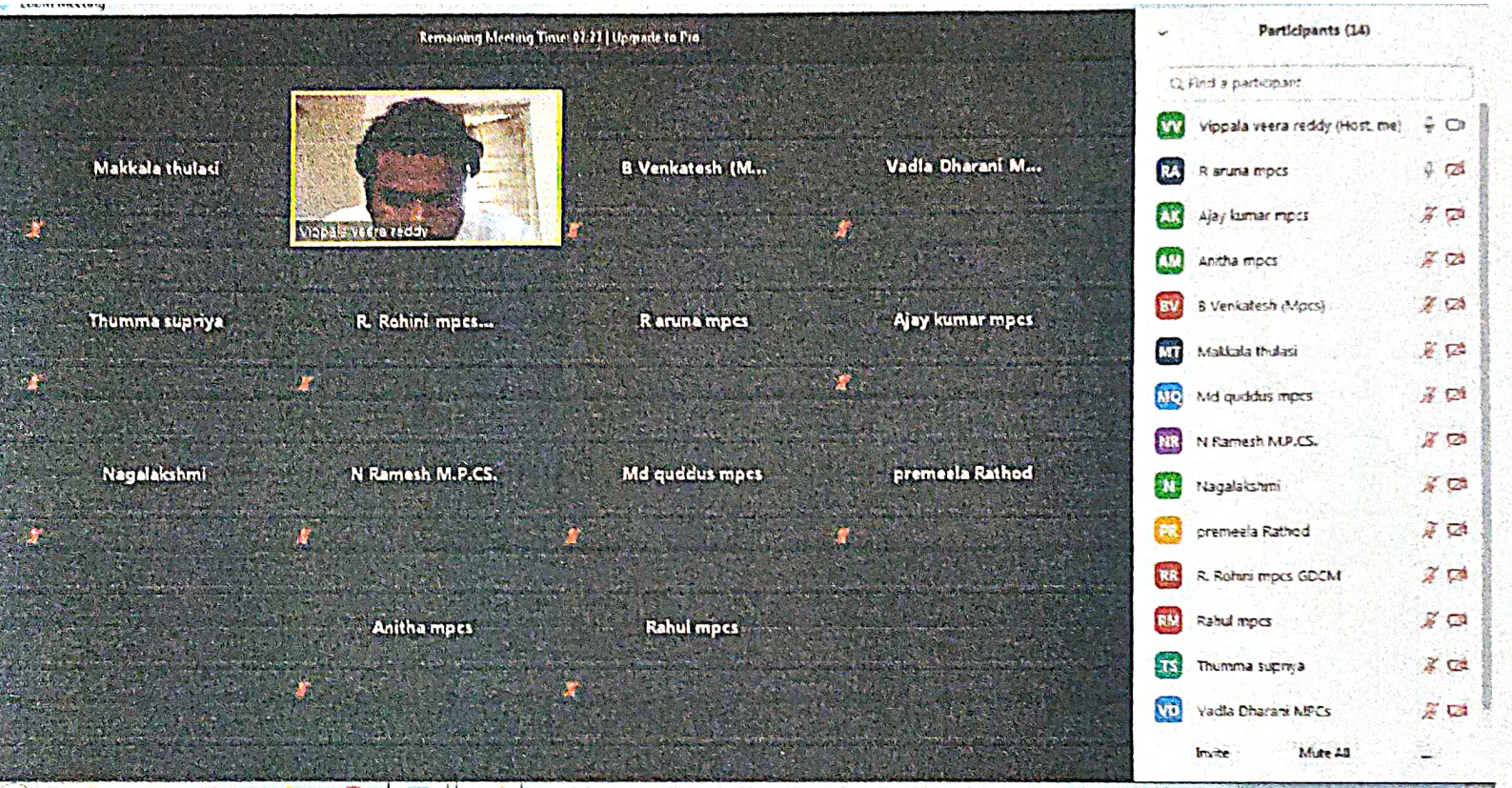
ICT Tools in Higher Education

Sponsored by **UGC-HRDC-RUSA** organized from **20-08-2020 to 26-08-2020**.

PROF B SRINAGESH
DIRECTOR

UGC-HRDC Osmania University Hyderabad-7

REGISTRAR/
VICE CHANCELLOR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Nagalakshmi
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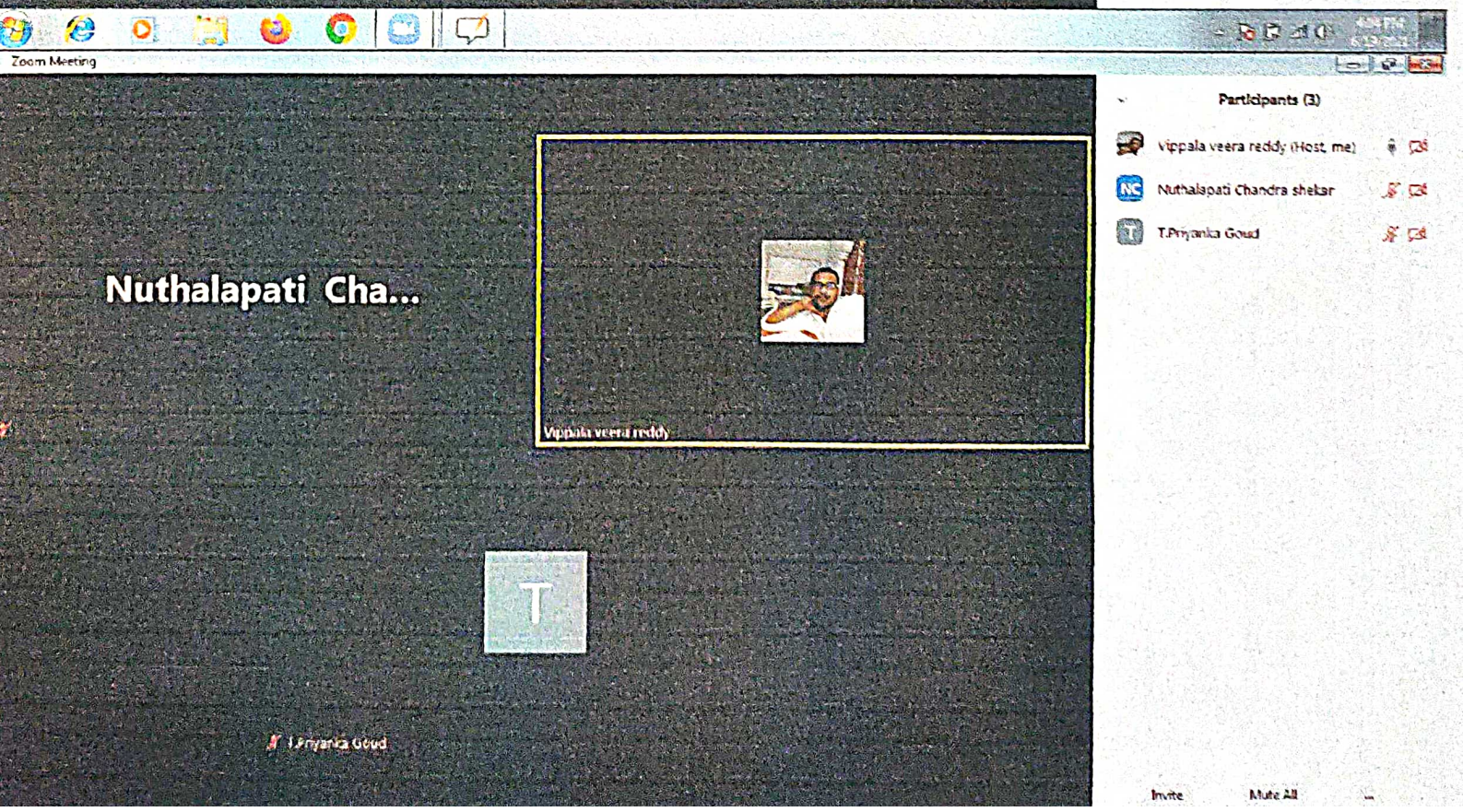
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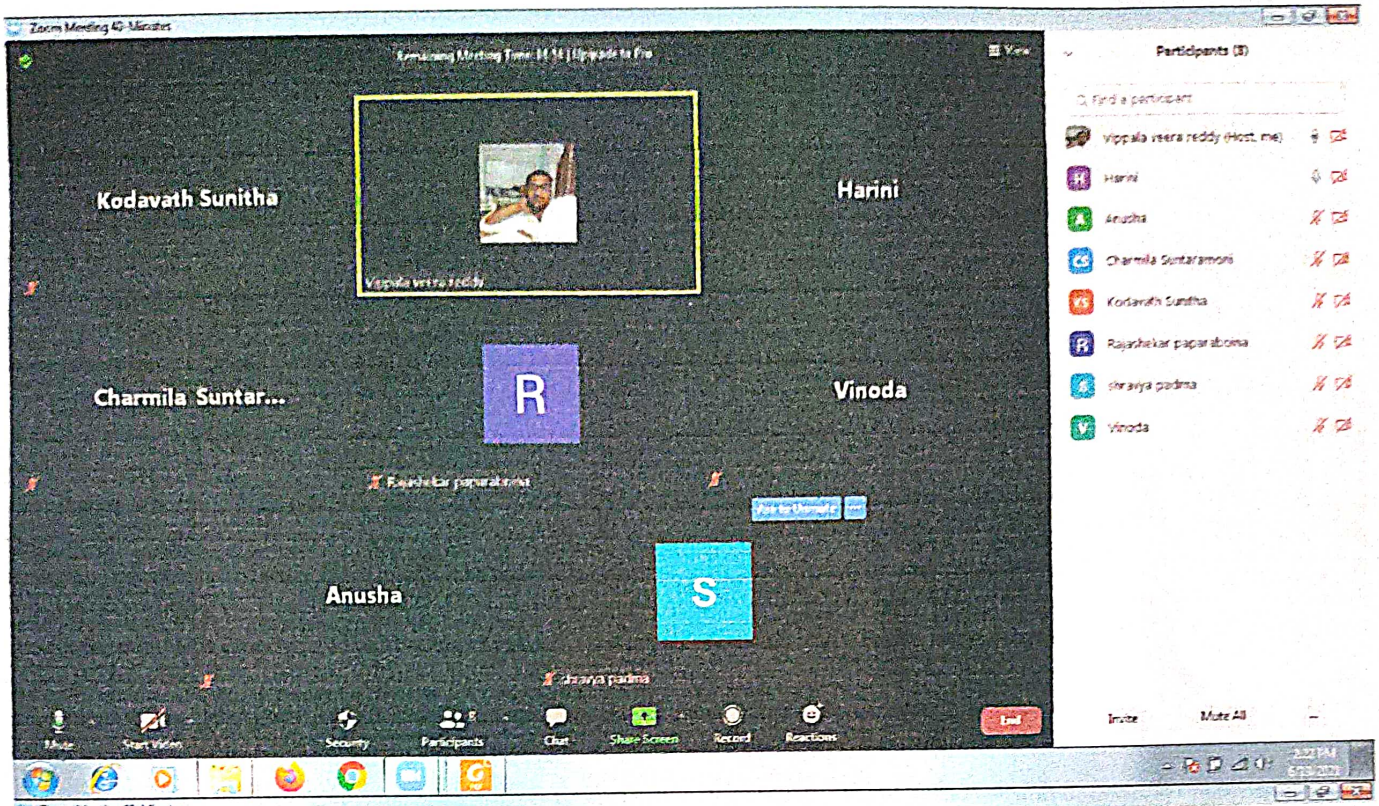
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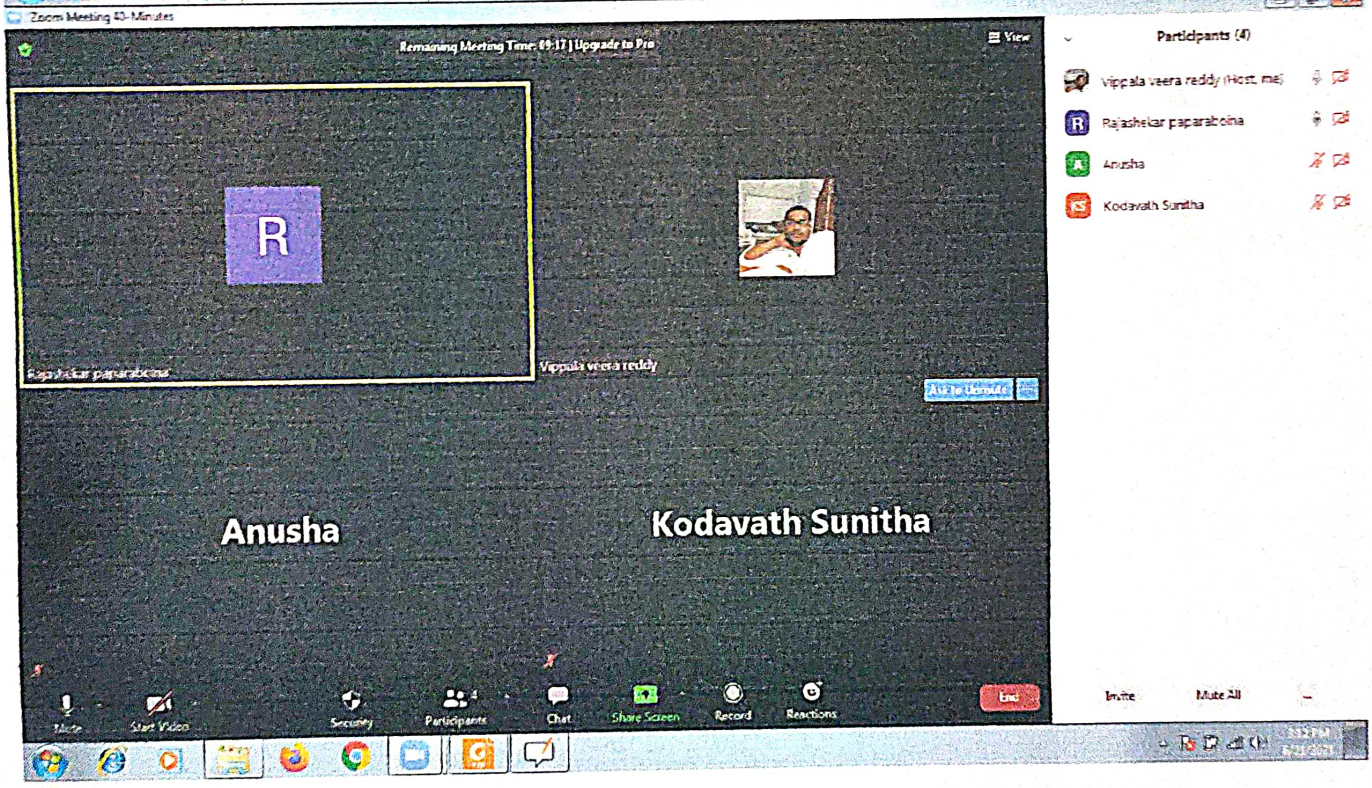
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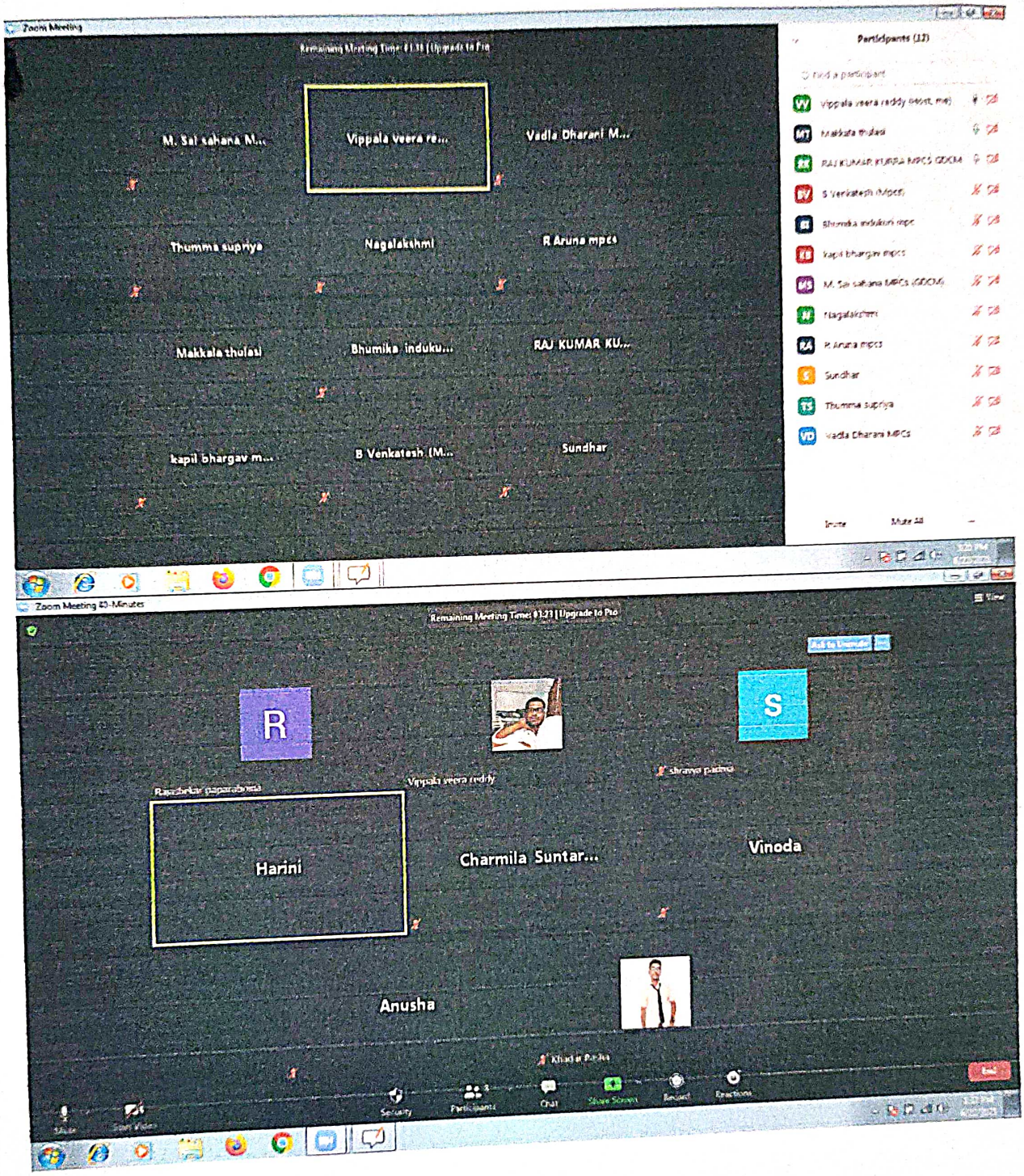

V. Veeraiah

Signature of the Lecturer

M. Shiv

Signature of the Principal

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Malkajgiri, Medchal Dist

Remedial Coaching Data for AY 2020-21, GDC Malkajgiri

Subject: Physics

Name of the Lecturer: V. Veera Reddy

SNo	Paper	Students attended	No. of periods taken	No. of students passed after remedial coaching	Timings
1	1	15	10	7	In each practical period one hour is allotted for remedial coaching
2	II	8	12	3	
3	III	8	12	4	
4	IV	6	10	4	
5	V	5	12	3	
6	VI	7	10	4	

V. Veera Reddy

Signature of the Lecturer

M. Sujai

Signature of the Principal

PRINCIPAL
Govt. Degree College
Malkajgiri, Medchal Dist

Mechanical Oscillations of Lungs and Removal of Excess Mucus in COPD and Corona Patients

Student Study Project Jignasa -2022

Subject: Physics

by

V. Dharani, BSc MPCs Second Year
R. Aruna, BSc MPCs Second Year
B. Venkat, BSc MPCs Second Year
Vani Supraja, BSc MPCs Final Year
D. Durga, BSc MPCs Final Year

Under the Supervision of
V.Veera Reddy
Assistant Professor of Physics

Government Degree College, Malkajgiri,
Medchal District-500056

1 Introduction and Motivation

"Necessity is the mother of invention"

In the Covid-19 treatment various branches of science and technology worked together and sometimes independently. Pharmacy sector in India played a key role in the development of vaccine. Information Technology sector designed apps like Arogyasetu helped a lot in the vaccine distribution.

IIT- Hyderabad designed low cost(Rs4 Lakh) ventilator as an alternate for imported ventilator of cost, Rs $10-15$ Lakh. IIT- Delhi launched low cost covid-19 rapid antigen kit, RT-PCR test kit and Anti viral face masks. This institute got 13 patents, 4 Technology transfers and 19 licensing deals with industries/startups so far.

These innovations encouraged us to propose this project.

2 Gaps in the existing work

There is no clear understanding, how HFCWO devices interact with lungs bio mechanism even it's success rate is high[4]. Operating frequency is decided by doing experiments on patients without theoretical explanation. Only model available till date is discussed in the paper[**?**]. In this model lung tissue is assumed as homogeneous elastic medium which interact with air flow which is assumed as fluid.

3 Objectives of the project work

We are proposing a model for lungs to explain why HFCWO is working efficiently in certain frequency range. This model helps to find the efficient frequencies when excess mucus is formed in the lungs. Hence it increases the ability of HFCWO in removing mucus in various pulmonary diseases.

4 Literature Review

4.1 Natural Oscillations

A tuning fork can vibrate with different frequencies (modes) given by [2]

$$f_n = \frac{\pi K}{8L^2}\sqrt{\frac{Y}{\rho}} \times [3.011^2, 5^2, 7^2, ...(2n-1)^2] \tag{1}$$

where
L is length of the prong of the tuning fork, Y is Young's modulus of the tuning fork material, ρ mass density of the material, K is radius of gyration of the prong cross section. Tuning fork stem and prongs are assumed as free ends (freely suspended tuning fork).
First one(3.011^2) is first harmonic and remaining are called over tones. If we give the soft blow to the prongs they oscillate in all possible modes but except fundamental frequency remaining overtones will die quickly. If we give hard blow prongs oscillates with frequencies which is integral multiples of fundamental frequency(n). Either it is soft or hard blow these oscillations are called Natural oscillations. Natural oscillations depends on material, mass density, elasticity shape and dimensions of the object.

$$f = \frac{\pi K}{8L^2}\sqrt{\frac{Y}{\rho}} \times [3.011^2, 5^2, 7^2, ...(2n+1)^2] \tag{2}$$

L is the length of the prongs,
Y is the Young's modulus (elastic modulus or stiffness) of the material the fork is made from,
K is the radius of gyration the cross-section,
$\rho$is the density of the material the fork is made from.

4.2 Forced Oscillations Oscillations:

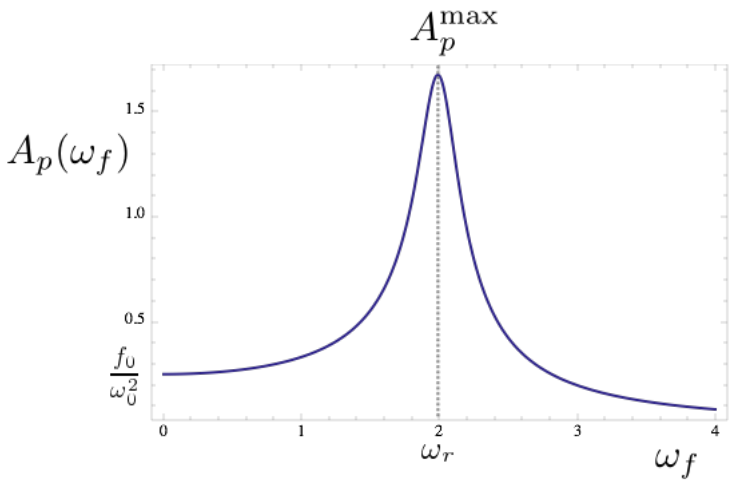
If we apply an external periodic force on an object it oscillates with the periodic force frequency instead of it's natural frequency. These oscillations are called forced oscillations.

4.3 Resonance:

If the external periodic force is equal to natural frequency of the oscillator, then oscillator oscillates, with high amplitude. This phenomenon is called as resonance[1].

5 Methodology

Left and right lungs are assumed as two prongs of a tuning fork. Lung length is considered as prong length and average thickness of the lung is taken as diameter of the prong. Lung tissue young's modulus varies with the volume of the lung. By collecting various physical properties of lungs and substituting



in the following formula, we can calculate natural frequency range of the lungs.

$$f = \frac{\pi K}{8L^2}\sqrt{\frac{Y}{\rho}} \times [3.011^2, 5^2, 7^2, ...(2n+1)^2] \tag{3}$$

5.1 Calculatio of natural frequency range

Lung average mass(tissue and air) density citealapont2019stress is given by $\rho = 1000\, Kg/m^3$. Lung tissue young's modulus[6] varies between $2KPa - 18KPa$. Lung average length [7] $0.24m$ and average thickness[8] $d = 0.01m$. Moment of inertia of the solid cylinder about it's axis of symmetry is

$$I = MK^2 = M\frac{MR^2}{2} = \frac{Md^2}{8} \tag{4}$$

$$Radius\ of\ gyration K = \frac{d}{2\sqrt{2}} \tag{5}$$

Radius of gyration $K = \frac{d}{2\sqrt{2}}$ After substituting these values we can get frequency of the lung which is given by

$$f = 0.6\sqrt{\frac{Y}{\rho}} Hz \tag{6}$$

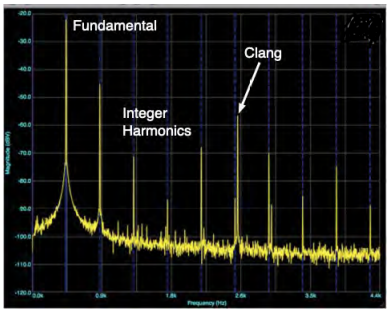
For Young's modulus $2Pa$ frequency is given by

$$f = 0.6\sqrt{2} = 0.8Hz \tag{7}$$

For Young's modulus $18KPa$ frequency is given by

$$f = 0.6\sqrt{18} = 2.4Hz \tag{8}$$

Nearly 10 harmonics are appeared in the following figure. For 10^{th} harmonic,



For Young's modulus $2Pa$ frequency is given by

$$f = 6\sqrt{2} = 8.5Hz \tag{9}$$

For Young's modulus $16KPa$ frequency is given by

$$f = 6\sqrt{16} = 24Hz \tag{10}$$

6 Conclusions

We got the resonance frequency range $0.85 - 24$Hz. This is not exactly same as $3 - 16Hz$ but it is in the same order. These results nearly coincide with the model[**?**]. Due to excess mucus average lung density deviate from the value $1000Kg/m^3$. If we estimate the average densities of lungs for various amounts of mucus, we can calculate the HFCWO frequency range. This helps to remove the excess mucus in COPD and corona patients.

References

[1] Halliday, David, Robert Resnick, and Jearl Walker. Fundamentals of physics. John Wiley & Sons, 2013.

[2] Russell, Daniel A. "The Tuning Fork: An Amazing Acoustics Apparatus." Acoustics Today 16.2 (2020): 480.

[3] Brunengo, Michaël, et al. "Optimal efficiency of high-frequency chest wall oscillations and links with resistance and compliance in a model of the lung." Physics of Fluids 33.12 (2021): 121909.

[4] Barto, Tara Lynn, et al. "Real-life experience with high-frequency chest wall oscillation vest therapy in adults with non-cystic fibrosis bronchiectasis." Therapeutic advances in respiratory disease 14 (2020): 1753466620932508.

[5] Alapont, V. Modesto I., M. Aguar Carrascosa, and A. Medina Villanueva. "Stress, strain and mechanical power: Is material science the answer to prevent ventilator induced lung injury?." Medicina intensiva 43.3 (2019): 165-175.

[6] de Ryk, Jessica, et al. "Stress distribution in a three dimensional, geometric alveolar sac under normal and emphysematous conditions." International journal of chronic obstructive pulmonary disease 2.1 (2007): 81.

[7] D'Angelis, Christopher A., Jacqueline J. Coalson, and Rita M. Ryan. "Structure of the respiratory system: lower respiratory tract." Pediatric Critical Care. Elsevier Inc., 2011. 490-498.

[8] Walpot, Jeroen, et al. "Left ventricular mid-diastolic wall thickness: normal values for coronary CT angiography." Radiology: Cardiothoracic Imaging 1.5 (2019): e190034.

Paper wise Result Analysis 2020-21, GDC Malkajgiri

Subject: Physics

Name of the Lecturer: V. Veera Reddy

SNO	Semester	paper	Appeared	Passed	Percentage
1	I	I	57	34	59.6
2	II	II	57	21	36.8
3	III	III	27	15	55.5
4	IV	IV	25	12	48.0
5	V	V	40	30	75
6	V	VI	40	32	80
7	VI	VII	36	36	100
8	VI	VIII	36	36	100

V. Veeraredy

Signature of the Lecture

M. Sup

Signature of the Principal

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Internal pass percentage is 100%

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PHYSICS OF ELEMENTARY PARTICLES AND ATOMIC NUCLEI. THEORY

Radiation Reaction in Noncommutative Electrodynamics

V. Veera Reddy[a], Sashideep Gutti[a], and Asrarul Haque[a, *]

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Received June 23, 2021; revised August 30, 2021; accepted September 3, 2021

Abstract—We study the radiation reaction acting on an accelerating charge moving in noncommutative spacetime and obtain an expression for it. Radiation reaction, due to a nonrelativistic point charge, is found to receive a small noncommutative correction term. The Abraham–Lorentz equation for a point charge in noncommutative spacetime suffers from the preacceleration and the runaway problems. We explore as an application the radiation reaction experienced by a charge which undergoes harmonic oscillations in a noncommutative plane.

DOI: 10.1134/S1547477122010101

1. INTRODUCTION

An accelerated charge emits electromagnetic radiation which carries away certain amounts of the energy and momentum of the charge [1–3]. The loss of energy leads to a deceleration of the charge which implies that there must be a force acting on the charge due to the electromagnetic fields it produces. This retarding force is known as the radiation reaction. Thus, the effect caused by the radiation on the dynamics of the charge is to modify the equation of motion of the charge with the radiation reaction.

An accelerated charge produces electromagnetic field, say $A^{\mu}(x, y, z, t)$, whose spacetime coordinates commutate among themselves, i.e.,

$$[x_i, x_j] = 0, \quad [x_i, t] = 0; \quad i, j = 1, 2, 3.$$

However, there are physical instances where the notion of spatial coordinates may not commute

$$[x_i, x_j] \neq 0; \quad i, j = 1, 2, 3.$$

could be realized [4].

It is natural to ask: "How the radiation reaction and hence the dynamics of an accelerated charge will change in a spacetime manifold equipped with noncommuting spacetime coordinates?"

Physics at high energy, might alter the continuum nature of spacetime, serves as one of the main motivations behind the study of the spacetime coordinates that do not commute. One of the variants of the granular structure of spacetime could be thought in terms of the uncertainties in the measurements of the spacetime coordinates which give rise to the idea of the noncommutative spacetime.

It was Snyder [5] who first introduced noncommutative space, as a possible cure of ultraviolet divergences which stem from the ill-defined product of the fields at the same space–time point in quantum field theories. Moreover, noncommutative spaces are found to arise in several different contexts. At short distance, the interplay between quantum theory and gravitation suggests a nontrivial structure of space–time and a noncommutative structure of space–time is a possibility. In fact, the concept of space–time as a c^{∞} manifold may break down to the distance-scales of the order of Plank length scale [6]. Noncommutative structure of spacetime naturally appears in string theory [7]. We consider fields defined on noncommutative spacetime manifold which obeys

$$[\hat{x}^{\mu}, \hat{x}^{\nu}] = i\theta^{\mu\nu}, \tag{1}$$

where $\theta^{\mu\nu}$ is a constant real antisymmetric matrix of length dimension two. Electromagnetic field theory in commutative space time could be generalized to a noncommutative space–time via replacing ordinary local product by a Moyal star product of the two functions [8]

$$(fg)(x) := e^{\frac{i}{2}\theta^{\mu\nu}\partial_{\mu}^{x}\partial_{\nu}^{y}} f(x)g(y)\big|_{x=y}. \tag{2}$$

The question arises: can such spacetime noncommutativity induce any modification to the radiation reaction associated with an accelerated charge in commutative spacetime?

The goal of the present work is to compute the radiation reaction force experienced by an accelerated charge moving in the noncommutative spacetime. We perform the calculation of radiation reaction on an accelerating charge to capture any effect whatsoever arising due to noncommutativity in spacetime with a hope to find the resolutions to the pathologies and

V. Veera Reddy
Signature of the Lecturer.

M. Sup
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