Refresher Course
in
Life Sciences: Synthetic Biology
(14-28 December 2020)

FINAL REPORT

Course Coordinator
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A Multidisciplinary Refresher Course in Life Sciences-Synthetic Biology (MDRC_LS) has been organized during 14-28 December 2020, by the Human Resource Development Centre (HRDC) of Pt. Ravishankar Shukla University. A total of 40 Assistant Professors, usually teaching to UG and PG students, belonging to various colleges and university teaching departments of various Universities of different states including Chhattisgarh, Madhya Pradesh, Maharashtra, West Bengal, Odisha and Uttar Pradesh, were attended this MDRC_LS (Table 1). The participants of this MDRC_LS were of various streams of Life Sciences such as Botany, Zoology, Microbiology, Biotechnology, Bioscience, and Biochemistry (Table 1).

Table 1. List of participants of the MDRC_LC.

S. No.	Name	Subject	Institution
1	Dr. Eeshwari Prasad Chelak	Botany	Govt. M.V.P.G. College, Mahasamund, CG
2	Mr. Shashi Kumar Markande	Botany	Govt. College Pathalgaon, Dist Jashpur, CG
3	Dr. Ratnaprabha J Rudey	Zoology	MG Arts & Science College, Nagbhid, Dist. Chandrapur, MH
4	Dr. Shailesh Shivdas Bhaisare	Zoology	LGM Arts, Commerce & Science College, Mandangad, Ratnagiri, MH
5	Dr. Sangita Aanandrao Ghadge	Botany	LGM Arts, Commerce & Science College, Mandangad, Ratnagiri, MH
6	Dr. Vinodkumar Dhananjay Chavan	Botany	LGM Arts, Commerce & Science College, Mandangad, Ratnagiri, MH
7	Dr Swetlana Nagal	Microbiology	Govt Mata Karma Girls College, Mahasamund, CG
8	Mr. Asit Kumar	Zoology	Govt. Rajmata Vijaya Raje Sindhiya Girls College, Kawardha, CG
9	Dr. Richa Mishra	Microbiology	A.P.S.G.M.N.S. Govt. P.G. College Kawardha (C.G.)
10	Dr. Sangita Devi Sharma	Botany	Government Naveen College, Bori, Durg, CG
11	Dr. Pramod Kumar Mahish	Biotechnology	Govt. Digvijay Autonomous PG College, Rajnandgaon, CG
12	Dr. Santosh Kumar Agrawal	Zoology	Dr. Bhimrao Ambedkar Govt. College, Pamgarh, Dist. Janjgir-Champa, CG
13	Dr. Raju Mahobia	Botany	Govt. D.K. P.G. College, Baloda Bazar, CG
14	Dr. Arpita Rakshit	Zoology	Seth Anandram Jaipuria College, Kolkata, WB
15	Deepali Rajwade	Biotechnology	Govt. N.P.G.College of Science, Raipur, CG
16	Dr.Sadhana Jaiswal	Microbiology	Govt. N.P.G.College of Science, Raipur, CG
17	Dr. Jai Godheja	Life Science	ITM University, Raipur, CG
18	Dr. Archana Pandey	Zoology	Govt. PG College, Champa, CG

19	Dr. Shriram Kunjam	Botany	Government V.Y.T. PG Autonomous College, Durg, CG
20	Dr. Ujwala Wamanarao Fule	Zoology	Hutatama Rashtriya Arts and Science College, Ashti, Dist. Wardha, MH
21	Mrs.Rekha Gupta	Microbiology	Government V.Y.T. PG Autonomous College, Durg, CG
22	Dr. Seema Anil Belorkar	Microbiology	Department of Microbiology, ABB University, Bilaspur, CG
23	Dr. Rashmi Parihar	Microbiology	Govt. E. Raghawendra Rao PG Science College, Bilaspur, CG
24	Dr. Vijay Laxmi Naidu	Botany	Government V.Y.T. PG Autonomous College, Durg, CG
25	Dr.Shipra Sinha	Zoology	Kalyan Post Graduate College, Bhilai, CG
26	Dr. Swati Sahu	Zoology	Govt. K.H. College, Abhanpur, CG
27	Dr. Debashish Dey	Biotechnology	School of Biotechnology, Banaras Hindu University, Varanasi
28	Dr. Richa Tikariha	Zoology	Govt. D.B. Girls' P.G. College, Raipur, CG
29	Dr. Annmary Xalxo	Botany	Govt. Science College, Ambikapur, CG
30	Ms Chhanda Ramdas Samrit	Zoology	Late N.P.W.College,Chopa/ Goregoan (Gondia), MH
31	Dr. Shivendra SIngh Dewhare	Bioscience	School of Studies in Life Science, Pt. Ravishankar Shukla University, Raipur, CG
32	Dr. Atul Kumar Tiwari	Zoology	Dr. B.S.Porte Govt. College, Pendra, CG
33	Dr. Sarita Das	Botany	Department of Botany, Berhampur University, Berhampur, Odisha
34	Dr. Mrutyunjay Jena	Botany	Department of Botany, Berhampur University, Berhampur, Odisha
35	Mr. Yaser Qureshi	Zoology	Govt. College, Khertha, Dist. Balod, CG
36	Dr. Pravin Dinkar Patil	Botany	Shankarlal Agrawal Science College, Salekasa, Dist. Gonidia, MH
37	Dr. Bhupeshkumar Keshorao Mendhe	Botany	Shankarlal Agrawal Science College, Salekasa, Dist. Gonidia, MH
38	Mrs. Madhulika Pandaw	Botany	Kirodimal Govt Arts and Science College, Raigarh, C.G.
39	Ms Anita Pandey	Zoology	Kirodimal Govt. Arts and Science College, Raigarh, C.G.
40	Dr. Sushma Patel	Botany	Govt. Arts And Science College, Raigarh, CG

In the 14 days of this MDRC_LS, a total of 33 lectures were delivered, through online mode, by 30 different distinguished resource persons belonging to various streams of Life Sciences. Among these, two resource persons were from United States of America, one from Bangladesh, five from New Delhi, three from West Bengal, two from Maharashtra, two from Odisha, one from Uttaranchal, one from Madhya Pradesh, six from Uttar Pradesh, five from Chhattisgarh, one from Andhra Pradesh and one from Puduchery (Table 2). Apart from the lectures on various streams of Life Sciences, one

lecture each was organized on Patenting and IPR, and Plagiarism and Academic Writing Ethics (Table 2). In addition to the lectures, several other academic activities like Microteaching, Seminar presentation, Project preparation and term end MCQ based test of the participants has also been conducted (Table 2). Moreover, following the instructions of the UGC, New Delhi, all the participants were advised to compulsorily give their feedback, through online mode, on each of the lectures, which was strictly followed by the participants, all through this course.

Table 2. Details of resource persons, evaluators, topic of the lectures, schedule of other academic activities, etc., of the MDRC_LC.

Activity Schedule		
Date	**Time**	**Title/ Speaker**
14.12.XX	**10.30-12.00**	**Registration; Inauguration; Induction**
	12.15-13.45 (L1)	**Countless Facades of Eukaryotic Gene Regulation** **Prof Biswadip Das** Department of Life Science and Biotechnology, Jadavpur University, Kolkata 700 032 Emil: biswadip_das@yahoo.com
	14:15-15:45 (L2)	**Development of Low Arsenic Accumulating Rice Variety for Safer Human Consumption** **Dr Debasis Chakrabarty** Biotechnology and Molecular Biology Division, CSIR-National Botanical Research Institute, Lucknow 226 001 Email: debasis1972@rediffmail.com
	16:00-17:30 (L3)	**Engineering Antibody and Peptide Vaccine to Combat Viral Diseases** **Dr Rinkoo D. Gupta** Faculty of Life Sciences and Biotechnology, South Asian University, New Delhi 110 021 Email: rdgupta@sau.ac.in
15.12.XX	**10.30-12.00 (L4)**	**Human Papilloma Virus Infection and Cervix Cancer** **Prof J. K. Roy** Department of Zoology, Banaras Hindu University, Varanasi 221 005 Email: jkroy@bhu.ac.in
	12.15-13.45 (L5)	**Harnessing Synthetic Biology to Design Biosensors in Baker's Yeast: Where we Stand?** **Prof Biswadip Das** Department of Life Science and Biotechnology, Jadavpur University, Kolkata 700 032 Emil: biswadip_das@yahoo.com
	14:15-15:45 (L6)	**Applications of Synthetic Biology in the Creation of Synthetic Life and Bioprospecting** **Prof Joseph Selvin** Department of Microbiology, Pondicherry University, Puducherry 605 014 Email: josephselvinss@gmail.com
	16:00-17:30 (L7)	**Genetic Polymorphism at Drug Metabolizing Genes in Relation to Oral Cancer** **Prof Mitashree Mitra** School of Studies in Anthropology, Pt. Ravishankar Shukla University, Raipur 492 010 Email: mitashree.mitra@gmail.com

16.12.XX	**10.30-12.00 (L8)**	**Synthetic Biology - Applications in Agriculture** **Prof S.B. Verulkar** Department of Plant Molecular Biology and Biotechnology, Indira Gandhi Agriculture University, Raipur 492 014 Email: satishverulkar@gmail.com
	12.15-13.45 (L9)	**Signaling Framework for Synthetic Circuit Immuno-Modulation-Case Studies (Part-I)** **Dr Shailza Singh** National Centre for Cell Science, NCCS Complex, Ganeshkhind, Pune 411 007 Email: singhs@nccs.res.in
	14:15-15:45 (L10)	**Drug Discovery Studies Using Multi-pronged Translational Approach** **Prof Ena Ray Banerjee** Immunology & Regenerative Medicine Research Laboratory, Department of Zoology, University of Calcutta, Kolkata 700 019 Email: erb@caluniv.ac.in; enaraybanerjee@gmail.com
	16:00-17:30 (L11)	**Signaling Framework for Synthetic Circuit Immuno-Modulation-Case Studies (Part-II)** **Dr Shailza Singh** National Centre for Cell Science, NCCS Complex, Ganeshkhind, Pune 411 007 Email: singhs@nccs.res.in
17.12.XX	**10.30-12.00 (L12)**	**Understanding the Design of Living System** **Prof Madan Mohan Chaturvedi** Laboratory for Chromatin Biology, Department of Zoology, University of Delhi, Delhi 110 007 Email: mchaturvedi@zoology.du.ac.in
	12.15-13.45 (L13)	**Biopesticides for Sustainable Agriculture** **Prof R. C. Dubey** Department of Botany and Microbiology, Gurukula Kangri University, Haridwar 249 404 Email:profrcdubey@gmail.com
	14:15-15:45 (L14)	**DNA the Beautiful Molecule of Life** **Prof Sujoy Kumar Das Gupta** Department of Microbiology, Centenary Campus, Bose Institute, Kolkata 700 054 Email: sujoy@jcbose.ac.in
	16:00-17:30 (L15)	**Synthetic Biology Approach to Produce Sesquiterpenoid Drugs in Plants** **Dr Shashi Kumar Rhode** Metabolic Engineering (Biofuels and Industrial Biotechnology), International Centre for Genetic Engineering and Biotechnology, New Delhi 110 067 Email: skrhode@icgeb.res.in
18.12.XX	**10.30-12.00 (L16)**	**The Evolving Story of CRISPR Cas** **Prof Sujoy Kumar Das Gupta** Department of Microbiology, Centenary Campus, Bose Institute, Kolkata 700 054 Email: sujoy@jcbose.ac.in
	12.15-13.45 (L17)	**Research Innovation, Patents and Commercialization** **Dr Smita Sahu** Institute of Biotechnology and Patent Cell, Amity University, Sector 125, Noida 201 313 Email: ssahu@amity.edu

	14:15-15:45 (MT) **16.00-17.30 (MT)**	**Evaluation of Micro Teaching** **Prof Arti Parganiha** School of Studies in Life Sciences, Pt. Ravishankar Shukla University, Raipur 492 010 Email: arti.parganiha@gmail.com
19.12.XX	**10.30-12.00 (L18)**	**Synthetic Apomixis: Clonal Propagation Through Seeds** **Dr Pankaj Kaushal** National Institute of Biotic Stress Management, Baronda (Raipur) 493 225 Email: jdrnibsm@gmail.com
	12.15-13.45 (L19)	**Genes, Genomics and Metagenomics** **Prof. Prasad A Wadegaonkar** Department of Biotechnology, SGB University, Amravati 444 602 Email: prasadwadegaonkar@sgbau.ac.in
	14:15-15:45 (MT) **16.00-17.30 (MT)**	**Evaluation of Micro Teaching** **Prof Reeta Venugopal** School of Studies in Physical Education, Pt. Ravishankar Shukla University, Raipur 492 010 Email: reetavenugopal@yahoo.com
20.12.XX	**SUNDAY**	
21.12.XX	**10.30-12.00 (L20)**	**Introduction to Bioinformatics and its Applications in Drug Design and Development** **Prof P. P. Mathur** Birla Global University, Bhubaneswar 751 029 E mail: ppmathur@yahoo.com
	12.15-13.45 (L21)	**Gallic Acid-Induced Aggregation with Possible Implication in Metal Based Therapy** **Prof Rizwan Hasan Khan** Interdisciplinary Biotechnology Unit, Aligarh Muslim University, Aligarh 202 002 Email: Email: rizwanhkhan1@gmail.com
	14:15-15:45 (L22)	**Generalizing Fluorescence: Concept and Applications** **Prof P. K. Mohapatra** Department of Botany, Ravenshaw University, Cuttack 753 003 Email: pradiptamoha@yahoo.com
	16:00-17:30 (L23)	**Genomic Profiling of Sézary Syndrome** **Dr Anagh Anant Sahasrabuddhe** University of Pennsylvania, PA, United States of America Email: anagh@pennmedicine.upenn.edu
22.12.XX	**10.30-12.00 (L24)**	**Physiological and Molecular Mechanism of Metal/Metalloid Toxicity and Tolerance in Plants** **Prof Mirza Hasanuzzaman** Department of Agronomy, Sher-e-Bangla Agricultural University, Dhaka-1207, Bangladesh E-mail: mhzsauag@yahoo.com
	12.15-13.45 (L25)	**Importance of Chemistry in Life Science** **Prof Satish Kumar Awasthi** Chemical Biology Laboratory, Department of Chemistry, Delhi University, Delhi 110 007 Email: satishpna@gmail.com
	14:15-15:45 (SM) **16.00-17.30 (SM)**	**Evaluation of Seminar** **Prof Preeti K. Suresh** University Institute of Pharmacy, Pt. Ravishankar Shukla University, Raipur 492 010 Email: suresh.preeti@gmail.com

23.12.XX	**10.30-12.00 (L26)**	**Millet Genomics for Food and Nutritional Security** **Dr Manoj Prasad** National Institute of Plant Genome Research, Aruna Asaf Ali Marg, New Delhi 110067 Email: manoj_prasad@nipgr.ac.in
	12.15-13.45 (L27)	**Health Hazards of Distillery Waste and its Biodegradation for Environmental Safety** **Prof Ram Chandra** Department of Microbiology, Babasaheb Bhimrao Ambedkar University, Lucknow 226 025 Email: prof.chandrabbau@gmail.com
	14:15-15:45 (SM) **16.00-17.30 (SM)**	**Evaluation of Seminar** **Prof S. K. Jadhav** School of Studies in Biotechnology, Pt. Ravishankar Shukla University, Raipur 492 010 Email: jadhav9862@gmail.com
24.12.XX	**10.30-12.00 (L28)**	**Obesity Regulation in Connection with Gut and Brain** **Dr Rohit Seth** Department of Zoology, Guru Ghasidas Vishwavidyalaya, Bilaspur 495 009 Email: rohitseth123@gmail.com
	12.15-13.45 (L29)	**Understanding, Detecting and Avoiding PLAGIARISM** **Dr Suparna Sen Gupta** Pt. Sundarlal Sharma Library, Pt. Ravishankar Shukla University, Raipur 492 010 Email: suparnasengupta61@gmail.com
	14:15-15:45 (L30)	**How Soil Microbes May Transform the Global Agriculture and Water Usage?** **Dr Harsh Bais** Plant and Soil Science Department, University of Delaware, United States of America Email: bais@dbi.udel.edu
	16:00-17:30 (TT)	**MCQ Based Test** **Dr Arvind Agrawal** Human Resource Development Centre, Pt. Ravishankar Shukla University, Raipur 492 010 Email: dr.arvind02@gmail.com
25.12.XX	**CHRISTMAS DAY**	
26.12.XX	**10.30-12.00 (L31)**	**Synthetic Biology and its Applications** **Prof Anjana Sharma** Department of Biological Sciences, RD University, Jabalpur 482 001 Email: anjoo1999@gmail.com
	12.15-13.45 (L32)	**Synthetic Biology: Basics and Applications** **Dr Seema Mishra** School of Life Sciences, University of Hyderabad, Hyderabad 500 046 Email: smsl@uohyd.ernet.in
	14:15-15:45 (PP) **16.00-17.30 (PP)**	**Evaluation of Project Presentation** **Prof Aditi Poddar** School of Studies in Life Sciences, Pt. Ravishankar Shukla University, Raipur 492 010 Email: adinpod@gmail.com
27.12.XX	**SUNDAY**	

28.12.XX	**10.30-12.00 (L33)**	**Nitric Oxide and its Role in Managing Chromium (VI) Toxicity in Vegetables by Application of Nutrients** **Prof S M Prasad** Department of Botany, University of Allahabad, Allahabad 211 001 Email: profsmprasad@gmail.com
	12.15-13.45 (PP) **14.15-15.45 (PP)**	**Evaluation of Project Presentation** **Prof Zenu Jha** Department of Plant Molecular Biology and Biotechnology, Indira Gandhi Agriculture University, Raipur 492 014 Email: jhazenu@gmail.com
	16:00-17:30	**Valedictory & Concluding Session**

In addition, for smooth running of various sessions, associated academic activities, in view to welcome and introduce distinguished resource persons and summarize activities of each of the sessions, each of the participants were assigned duty to serve as Chairperson, and Reporter for one of the sessions (Table 3).

Table 3. Lists of chairpersons and reporters of various sessions.

Date	Chairperson	Reporter	Chairperson	Reporter
14.12.20	Dr. Eeshwari Prasad Chelak	Mr. Shashi Kumar Markande	Dr. Ratnaprabha J Rudey	Dr. Shailesh Shivdas Bhaisare
15.12.20	Dr. Sangita Aanandrao Ghadge	Dr. Vinodkumar Dhananjay Chavan	Dr. Swetlana Nagal	Mr. Asit Kumar
16.12.20	Dr. Richa Mishra	Dr. Sangita Devi Sharma	Dr. Pramod Kumar Mahish	Dr. Santosh Kumar Agrawal
17.12.20	Dr. Raju Mahobia	Dr. Arpita Rakshit	Mrs. Deepali Rajwade	Dr. Sadhana Jaiswal
18.12.20	Dr. Jai Godheja	Dr. Archana Pandey	Dr. Shriram Kunjam	Dr. Ujwala Wamanarao Fule
19.12.20	Mrs. Rekha Gupta	Dr. Seema Anil Belorkar	Dr. Rashmi Parihar	Dr. Vijay Laxmi Naidu
21.12.20	Dr. Shipra Sinha	Dr. Swati Sahu	Dr. Debashish Dey	Dr. Richa Tikariha
22.12.20	Dr. Annmary Xalxo	Mrs. Chhanda Ramdas Samrit	Dr. Shivendra Singh Dewhare	Dr. Atul Kumar Tiwari
23.12.20	Dr. Sarita Das	Dr. Mrutyunjay Jena	Mr. Yaser Qureshi	Dr. Pravin Dinkar Patil
24.12.20	Dr. Bhupeshkumar Keshorao Mendhe	Mrs. Madhulika Pandaw	Dr. Anita Pandey	Dr. Eeshwari Prasad Chelak
26.12.20	Mr. Shashi Kumar Markande	Dr. Ratnaprabha J Rudey	Dr. Shailesh Shivdas Bhaisare	Dr. Sangita Aanandrao Ghadge
28.12.20	Dr. Vinodkumar Dhananjay Chavan	Dr Swetlana Nagal	Mr. Asit Kumar	Dr. Richa Mishra

Brief reports of each of the sessions of all the fourteen days of this MDRC_LS, emphasizing details of various activities, names and addresses of resource persons/ evaluators, their addresses, and short summaries of the lectures delivered are given below.

Day/ Session Wise Report

14.12.2020 **Day-1** **Session-I**	**Inauguration** In the Inaugural Session of MDRC_LS, **Prof KL Verma**, Hon'ble Vice-Chancellor of Pt. Ravishankar Shukla University, Raipur, was the **Chief Guest**, **Prof AK Gupta,** Director, HRDC, Pt. Ravishankar Shukla University, Raipur, was the **Chairperson,** and **Prof Keshav Kant Sahu,** Head, School of Studies in Biotechnology, Pt. Ravishankar Shukla University, Raipur, was present as **Course Coordinator**. This session was started with the inaugural speech of **Prof KL Verma Sir,** in which he addressed all the participants to be attentive during entire session and encouraged them to protect our nature and conserve the endangered species with the help of synthetic biology. He concluded his speech by expressing gratitude to the HRDC team for organizing this course and best wishes to all the participants. **Lecture-1** The first lecture of this session was delivered by **Prof. Biswadip Das, Department of Life Science and Biotechnology, Jadavpur University, Kolkata,** on **Countless Facades of Eukaryotic Gene Expression,** which was a very informative and knowledgeable one. His lecture was based on central dogma concept of protein synthesis and on various features of transcriptional and translational level of genes expression. He has also briefly described about eukaryotic activators and insulators.
14.12.2020 **Day-1** **Session-II**	**Lecture-2** **Dr. Debasis Chakrabarty** of **National Botanical Research Institute, Lucknow,** was delivered a lecture on **Development of Low Arsenic Accumulating Rice Variety for Safer Human Consumption**. He started his lecture with introductory concept on Arsenic (As) pollution. He described that As highly affects human health and may cause cancer when consumed for long time. His lecture was based on how to transform inorganic As to non toxic organic As in rice plants by using molecular basis of As metabolism. He also explained how the relevant genes (*OsPRX*, Fungal *methyl transferase*, *metallothionein*, *phytochelatin synthase*, etc.) help in transforming toxic inorganic As to nontoxic volatile organic As in cultivated rice variety and/or by editing the desired gene or by establishing the fact that natural variants in rice germplasm can also be identified for non accumulation of As. This will have a tremendous communal impact on public health consequences. His lecture was very interactive.

	Lecture-3 **Dr. Rinku D. Gupta** of **Department of Biotechnology, South Asian University, New Delhi**, delivered her lecture on **Engineering Peptide Vaccine to Combat Viral diseases**. In her talk she emphasized on engineering techniques for designing new or enhanced quality proteins for numerous biotechnological applications and also informed that several therapeutic antibodies have been engineered for the treatment of cancer, autoimmune diseases as well as viral diseases, and many of them are under clinical trial. She also highlighted monoclonal antibody and peptide vaccine to combat dengue. Major hurdle in the development of effective antibody and vaccine is the presence of several serotypes of the virus leading to antibody-dependent enhancement of the disease. Hence, her work aimed to develop a therapeutic monoclonal antibody that can bind efficiently to all four serotypes of dengue virus to neutralize them. To achieve this goal, antibody may be targeted to a highly conserved region of dengue virus envelope protein. Therefore, two highly conserved regions (Fu and Bc loops) were identified very close to each other in domain II of the envelope protein. Thus, Fu and Bc loops were considered as an antigen for the antibody development. *In silico* docking, molecular cloning, recombinant protein expression, protein purification, mutagenesis, ELISA and SPR analyses were some of the common techniques applied for this study. To demonstrate the immunogenicity for the development of vaccine, Fu and Bc fusion proteins were injected in BALB/c mice. It was observed that Fu and Bc fusion peptide elicited strong IgG titer either in presence or in absence of an adjuvant as compare to the titer elicited by Fu and Bc peptide separately. The antibodies generated in response to Fu and Bc peptide would potentially be able to neutralize all four viral serotypes without eliciting antibody dependent enhancement effects as Fu and Bc sequence is highly conserved in all the serotypes.
15.12.2020 **Day-2** **Session-I**	**Lecture-4** This lecture was delivered by **Prof JK Roy, Department of Zoology, Banaras Hindu University, Varanasi,** on the topic **Human Papilloma Virus Infection and Cervix Cancer**. He started his lecture with brief introduction on mechanisms of DNA replication, transcription, translation, cell cycle, mutation and development of cancerous cells. After that he talked about symptoms, risk factors and the events of Human Papilloma Virus (HPVs) infection and Cervix cancer. Next to that, he elaborated all molecular details of HPVs especially two set of genes – early genes (E5, E4, E2, E1, E7 and E6), late genes (L1 and L2) and also an upstream regulatory region (URR). Later, he focused on main aspect of cervix cancer *i.e.* host cellular factors like BRN3A (transcription factors of POU family) responsible for increase in the division of

	E6 and E7 genes, which leads to the development of Cervix cancer. This session was interactive, informative and knowledgeable. All the participants enjoyed the lecture of Prof. J. K. Roy very much. **Lecture-5** **Prof. Biswadip Das, Department of Life Science and Biotechnology, Jadavpur University, Kolkata,** is the second guest speaker of this session. He started his lecture, entitled **Harnessing Synthetic Biology to Design Biosensors in Baker's Yeast: Where we stand?**, with the definition of Synthetic Biology. Then, he elucidated the difference between Synthetic Biology and System Biology. After that, he discussed about synthetic biotechnological breakthroughs by giving some examples. Highlighting the advantages of yeast model, he explained how it is extremely powerful and convenient model organism in the field of Genomics, Proteomics and Synthetic Biology. Afterwards, he focused on the utilization of yeast in the field of biopharmaceuticals and also in the production of other commercially important compounds. Later part of this session was mainly based on the ideas to modulate or construct the yeast genome with our desirable genes. Finally, he stated that the yeast has been successfully utilized as Biosensor to detect various pollutants and heavy metals in the water used for the drinking, irrigation and industry.
15.12.2020 **Day-2** **Session-II**	**Lecture-6** The first lecture of second session was delivered by **Prof Joseph Selvin**, **Department of Microbiology, Pondicherry University, Puducherry,** on **Applications of Synthetic Biology in the Creation of Synthetic Life and Bioprospecting,** which was quite relevant with the theme of this refresher course. He started his lecture with basic information on synthetic biology and further talked about gene editing technology and discussed various important tools of synthetic biology. He also explained about repressilators, synthetic biofilms, and introduced CAD software that can be applied for the study of it *i.e.* GenoCAD. He elucidated different methods such as NIH Human Microbiome Project, Genomics, Metagenomics, Gene edited babies, SIGEX to screen an environment metagenome library for obtaining catabolic genes. Apart from this, future prospects of synthetic biology were also discussed. **Lecture-7** The seond lecture of this session was delivered by **Prof Mitashree Mitra** from **School of Studies in Anthropology, Pt. Ravishankar Shukla University, Raipur,** entitled **Genetic Polymorphism at Drug Metabolizing Genes in Relation to Oral Cancer.**

	She started with central dogma concept and human genome. She discussed about diversity and how it can be used to investigate genetic history, relatedness, evolution and variations. She also explained DNA polymorphism approach to know risk of a disease by candidate gene approach. She described the global scenario of oral cancer, drug abuse, risks of carcinogenic hazards. In addition to this, she gave details on relative risk of oral squamous cell carcinoma in relation to polymorphism at GSTM1, GSTT1, GSTM3, GSTP1, CYP2 loci among tobacco users of Chhattisgarh. She also explicated genomic DNA isolation, PCR amplification and gel electrophoresis techniques. She concluded her lecture saying that postnatal prediction of any disease due to inherited mutations is important for its control and prevalence.
16.12.2020 **Day-3** **Session-I**	**Lecture-8** First guest speaker of this session was **Prof Satish Verulkar**, **Department of Plant Molecular Biology and Biotechnology, Indira Gandhi Agriculture University, Raipur**. He gave his lecture on the topic **Synthetic Biology: Application in Agriculture,** in which he explained about top down and bottom up approaches for redesigning of biological system applicable for future agriculture process. He also described difference between classical and synthetic biology, current status of synthetic biology in plant system, peptide nucleic acid designing circuit and pathway design to achieve high succinate yield. In addition to above information, he updated us about biodegradable plastic obtained from maize and how salt concentration plays important role in protein folding. Overall, his lecture was very informative and interesting. **Lecture-9** Another lecture of this session was delivered by **Dr Shailza Singh, National Centre of Soil Science, Pune,** on the topic entitled **Signaling Framework for Synthetic Circuit: Immunomodulation Case Studies (Part 1)**. Her lecture threw light on analysis of various networks like simulation of the toggle switch model, synthetic oscillatory gene network or repressilator which helps in finding target that can be modified synthetically to achieve therapeutic effects. One of the case studies related to Leismaniasis was also discussed. The overall objective of her presentation was to give knowledge of reconstructional signaling network by computational and mathematical aspects. Her works gave knowledge of the technology that will produce new creature through synthetic biology.
16.12.2020 **Day-3** **Session-II**	**Lecture-10** The first speaker of this session was **Prof Ena Ray Banerjee, Immunology and Regenerative Medicine Research Laboratory, Department of Zoology, University**

	of Calcutta, Kolkata, who spoke on **Drug Discovery Studies Using Multi-Pronged Translational Approach.** Her lecture was focused on drug discoveries of inflammation and degeneration which causes asthma, Rheumatoid arthritis, dermatitis, *etc*. She described about stem cell therapy, probiotic therapy, phytotherapy, nanoparticles antibody therapy, *etc*. She stated that her research interest was based on engineering of novel format of nanoantibodies as diagnostic and therapeutic agents. She also described about: Use of nanovehicles in drug discovery studies; Use of nano polymer as Bio scaffolds for homing of transplanted cells to sites of tissue degeneration; Use of nanoparticles in several models of acute and chronic inflammation; Use of combinatorial probiotics therapeutic agent in model of inflammatory bowel disorder; Use of stem cells in tissue regeneration; How to develop camelid antibodies; and Use of camelid antibodies and its comparison with human antibodies. **Lecture-11** Session was preceded by lecture of **Dr Shailza Singh, National Centre for Cell Science, Pune,** on the topic **Signaling Framework for Synthetic Circuit Immuno-Modulation-Case Studies (Part-II)**. Her lecture was focused on dynamic mathematical model of immune modulation and its basic features. She described dynamic mathematical models as state variables and model parameters. She stated about global and local behaviour, deterministic models and stochastic models and clarified that deterministic models are far more tractable than stochastic models for both simulation and model analysis. She also described numerical simulation of differential equations. Finally, her lecture ended with a case study of Liesmaniasis.
17.12.2020 **Day-4** **Session-I**	**Lecture-12** **Prof Madan Mohan Chaturvedi, Laboratory for Chromatin Biology, Department of Zoology, University of Delhi,** delivered his lecture on the topic **Understanding the Design of Living System.** Prof. Chaturvedi started his talk with three questions: (1) How to define a living system? (2) Is water a solvent that support life processes? and (3) Why are bacteria not multicellular? He discussed on the design of a living system as complex, very beautiful and intelligent. The living systems are composed of several interrelated and interdependent components. He also discussed the chemical components of a cell, and water is the major component which constitutes about 70% by weight of *E. coli* cell and animal cell. He discussed on the property of "emergence" in the system, and the design and role of immediate surrounding (the solvent, the water). He also explained the works of Nobel Laureate Jack Szostack, "water is really a noxious, toxic, corrosive and generally lethal environment for life. In fact given the well

	known properties of water one might almost be tempted to say that it's a miracle that life ever began in such a solvent". He also explained chemiosmotic theory, hydrothermal vents. He has explained evolution that drives the stochastic design and not the creation. This session has ended with a beautiful interaction of the participants with the guest speaker. All of the participants became enriched with his valuable talk and the session was very interactive. **Lecture-13** **Prof RC Dubey, Department of Botany and Microbiology, Gurukula Kangri University, Haridwar,** spoke on **Biopesticides for Sustainable Agriculture**, with a discussion on use of biopesticides from very ancient time. Since the neolithic age, agriculture has been practiced by the ancient civilization. Even during Mahabharat, there was evidence of several manures, oil cakes, animal excreta that upon adding in soil increase crop yield. However, during the 20th century, Norman Ernest Borlaug (1914 –2009), led initiatives worldwide that contributed to the extensive increases in agricultural production which was termed as Green Revolution. He has given a State wise consumption of pesticides in India. He has discussed fertilizers market in India. Then, he defined biopesticides. Biopesticides work through amensalism (antibiosis, predation and lysis), competition and parasitism (mycoparasitis, mycophagy and nematophagy). He also explained brief history of biopesticides, insect pests of economic crop plants. He further explained the application of viral pesticides, the role of 'cry genes' and 'CRY Proteins' and their mode of action in Integrated Pest Management.
17.12.2020 **Day-4** **Session-II**	**Lecture-14** **Dr Sujoy Kumar Das Gupta,** of **Department of Microbiology, Bose Institute, Kolkata,** delivered lecture on **DNA: The Beautiful Molecule of Life".** In a very simple yet insightful way, he covered the entire span of the molecule of life right from its history, going through the classical central dogma and ultimately reaching the current trends in the field of recombinant DNA technology. He spanned the beautiful journey from 1950s describing the valuable contributions of eminent scientists like Dr. Hargobind Khorana to the present era of Craig Venter's Synthetic Genomics. He talked about synthetic chromosomes and their introduction into microorganisms. All the participants were amazed by the overall content and simplicity in which Dr. Das Gupta discussed this very fundamental topic of life sciences. At last, the resource person answered all the queries of the participants and further assured to solve the queries through email.

<table>
<tr><td></td><td>Lecture-15
The next speaker for the session was Dr Shashi Kumar Rhode, from Department of Metabolic Engineering, Biofuels and Industrial Biotechnology, International Center for Genetic Engineering and Biotechnology, New Delhi. He delivered a wonderful lecture on the topic Synthetic Biology Approach to Produce Sesquiterpenoid Drugs in Plants. He discussed the importance of isoprenoid in the modern medicine. The major focus of his work was on Artemisinin which has the fastest rate of parasite clearance of all current antimalarial drugs. He discussed the role of synthetic biology through metabolic engineering of chloroplasts in Artemisinin biosynthesis. In a precise manner Dr. Rhode presented his amazing work and answered all the queries related to it.</td></tr>
<tr><td>18.12.2020
Day-5
Session-I</td><td>Lecture-16
This session started with the lecture of Dr Sujoy Kumar Das Gupta, Department of Microbiology, Bose Institute of Kolkata, on the topic The Evolving Story of CRISPR Cas9. He explained how CRISPR functions on the bacteria. He told about different types of Cas9 which cuts DNA. He also explained that CRISPER System is also an excellent example of Lamarkian evolution.

Lecture-17
Dr. Smita Sahu, Department of Biotechnology and IPR Cell, Amity University, Noida, delivered a lecture on Research innovation, Patents and Commercialization. She told about the importance of IPR. She explained the meaning of 3I’s- IDEA, INVENTION and INNOVATION. She emphasized that before publication of any authentic research data, seek for the patent protection first. She also explained 3P’s- PATENT, PUBLISH and PROSPER. All the participants are got benefitted from her lecture.</td></tr>
<tr><td>18.12.2020
Day-5
Session-II</td><td>In this session, Microteaching activity of first 20 participants was evaluated by Prof Zenu Jha, Department of Plant Molecular Biology and Biotechnology, Indira Gandhi Agriculture University, Raipur. Most of the participants were used Power Point Presentation while a few were used White Board for demonstration. Below are the details;
<table><tr><th>Names</th><th>Topics</th></tr><tr><td>Dr. Eeshwari Prasad Chelak</td><td>Myccorhiza</td></tr><tr><td>Mr. Shashi Kumar Makhande</td><td>Funaria</td></tr><tr><td>Dr. Ratnaprabha J. Rudey</td><td>Counter current multiplication</td></tr><tr><td>Dr. Sangita Anandrao Ghadge</td><td>Aestivation</td></tr><tr><td>Dr. Vinodkumar D. Chavan</td><td>Photoperiodism</td></tr><tr><td>Dr Swetlana Nagal</td><td>Glycolysis</td></tr><tr><td>Mr Asit kumar</td><td>Metabolism</td></tr></table></td></tr>
</table>

Dr. Richa Sharma	Colorimetry
Dr Sangitadevi Sharma	Glycolysis
Dr Pramod Kumar Mahish	mRNA Covid-19 vaccine
Dr. Santosh Kumar Agrawal	Mitochondria
Dr Raju Mahobia	Azobacteria
Dr. Arpita Rakshit	Apoptosis
Deepali Rajwade	The Lac Operon
Dr. Sadhana Jaiswal	Bacteriophage multiplication cycle
Dr. Jai Godheja	Antibiotic structure
Dr. Archana Pandey	Physiology of digestion in human
Dr. Shriram Kunjam	Types of ovule
Dr. Ujwala W. Fule	Stored grain weevil
Dr. Shailesh S. Bhaisare	Nutritional apparatus of amoeba

Suggestion given by the Evaluator: In the age of virtual teaching, visual representation of your teaching gives you extra benefit. PPT's convey your teaching to the students easily. It is a mean to make a particular topic understood in detailed manner. Microteaching should be completed in time.

19.12.2020
Day-6
Session-I

Lecture-18

The first session witnessed the speaker **Dr. Pankaj Kaushal**, **National Institute of Biotic Stress Management, Baronda, Raipur,** who focused on the topic **Synthetic Apomixis: Clonal Propagation Through Seeds**. This lecture elucidated the process of seed formation involving events generating variation in future generation. He explained Apomixis process as a means of generating variation without the involvement of conventional meiosis and fertilization process. This process therefore can be a method to synthesize clonal seeds of the maternal parent. He described the process and targeted major applications of the technique with special reference to agriculture and for hybrid seeds production. He also explained that seed production would be highly cost effective. This process of reproduction is quite common in perennial grasses, Rosacea and Citrus family of flowering plants. He focused on cereals and the non occurrence of this process in them. He explained the solution to this issue is an approach of synthetic apomixis. The future prospects were also discussed.

Lecture-19

The second lecture entitled **Genes, Genomics and Metagenomics,** was delivered by **Prof. Prasad A Wadegaonkar**, **Department of Biotechnology, SGB University, Amravati**. The lecture was a deep insight into the discovery of DNA and its associated activities like replication and transcription. In the lecture there was intense discussion regarding the fundamental experiments involving DNA structure and proof of it being the genetic material. The lecture involved certain experimental proofs which established

<table>
<tr><td></td><td>basic concepts regarding genetic material and gene expression. Further, he explained Metagenomics, its definition and its use as a tool to study prokaryotes and viruses in the environment via the analysis of their DNA obtained directly from environmental samples. It involves isolation of DNA from an environmental sample, cloning the DNA into a suitable vector, transforming the clones into a host bacterium, and screening the resulting transformants. He also discussed the possibility of integration of metagenomics analysis with system biology as an upcoming approach.</td></tr>
<tr><td>19.12.2020
Day-6
Session-II</td><td>In this session, Microteaching activity of rest 20 participants was evaluated by Prof Reeta Venugopal, School of Studies in Physical Education, Pt. Ravishankar Shukla University, Raipur. Most of the participants were used Power Point Presentation while a few were used White Board for demonstration. Below are the details;
<table>
<tr><th>Names</th><th>Topics</th></tr>
<tr><td>Dr. Rekha Gupta</td><td>Functional types of proteins</td></tr>
<tr><td>Dr.Seema Anil Belorkar</td><td>RNA Splicing</td></tr>
<tr><td>Dr.Rashmi parihar</td><td>Differential culture medium,</td></tr>
<tr><td>Dr. Vijay Laxmi Naidu</td><td>Photoperiodism</td></tr>
<tr><td>Shipra Sinha</td><td>Wobble hypothesis</td></tr>
<tr><td>Dr.Swati Sahu</td><td>Acoustico Lateralis system</td></tr>
<tr><td>Dr.Debashish Dey</td><td>Resistance mechanisms in plants</td></tr>
<tr><td>Dr. Richa Tikariha</td><td>Composite fish culture</td></tr>
<tr><td>Dr.Annamary Xalxo</td><td>Modifications of adventitious roots</td></tr>
<tr><td>Chhanda Ramdas Samrit</td><td>Phylum Annelida</td></tr>
<tr><td>Dr.Shivendra Singh Dewhare</td><td>Southern blotting</td></tr>
<tr><td>Dr.Atul Kumar Tiwari</td><td>Urea cycle</td></tr>
<tr><td>Dr.Sarita Das</td><td>Bacterial transformation</td></tr>
<tr><td>Dr. Mritunjay Jena</td><td>Single cell protein</td></tr>
<tr><td>Mr.Yaser Qureshi</td><td>General introduction and classification of phylum Coelenterata</td></tr>
<tr><td>Dr.Pravin Dinkar Patil</td><td>Fertilization in angiosperms</td></tr>
<tr><td>Dr. Bhupesh Keshorao Mendhe</td><td>Kingdom plantae</td></tr>
<tr><td>Mrs. Madhulika Pandaw</td><td>Structure of Gram +ve and Gram –ve bacteria</td></tr>
<tr><td>Mrs. Anita Pandey</td><td>Structure of Antibody</td></tr>
<tr><td>Dr. Shushma patel</td><td>Pinus needle</td></tr>
</table>
Prof Venugopal Madam had given some tips to the participants like how to make the presentation more informative, etc. She appreciated the work of all the participants.</td></tr>
<tr><td>21.12.2020
Day-7
Session-I</td><td>Lecture-20
First Speaker of this day was Prof PP Mathur, Birla Global University, Bhubaneswar. He delivered his lecture on Introduction to Bioinformatics and its Applications in Drug Designing and Development. Prof Mathur told that bioinformatics is a new discipline and it is a management information system for molecular biology. It has many practical applications. This discipline represents the</td></tr>
</table>

	convergence of genomics, biotechnology and information technology. Biotechnology encompasses analysis and interpretation of data, modeling of biological phenomena, and development of algorithms and statistics. In simple words, Prof Mathur explained that bioinformatics is a science of collecting and analyzing complex biological data. Further, it was told that bioinformatics also plays an important role in the design of new drug compounds. He explained that drug discovery is a highly complex and multidisciplinary process with many branches and possibilities. Drug compounds are designed to inhibit, restore or otherwise modify the structure and behavior of disease-related proteins and enzymes. Biopharmaceutical industry utilizes rational drug design (RDD) process to discover and develop new drug compounds. RDD practices a variety of computational methods to identify novel compounds, design compounds for selectivity, efficacy and safety. **Lecture-21** Second speaker was **Prof Rizwan Hasan Khan,** from **Department of Biotechnology, Aligarh Muslim University, Aligarh**. He delivered lecture on **Gallic Acid-Induced Aggregation with Possible Implication in Metal Based Therapy.** He even discussed various other things related to the thirst area of the topic. He told that metal ions play a vital role in the aggregation of proteins by interfering with their correct folding, thereby affecting protein homeostasis and cell viability, leading to neurodegenerative diseases like Alzheimer's and Parkinson's. Further, he added that Gallic acid is a well characterized anti-aggregation compound, towards inhibition of metal-induced aggregation of a model enzyme, the human lysozyme. Using various spectroscopic and microscopic techniques they showed that Gallic acid inhibits metal induced aggregation. In addition, his research group is focusing on many aspects of protein mis-folding and aggregation to find out the molecular mechanism of toxicity of protein aggregates using neuronal cell lines and animal models to find as well as synthesize new suitable drug molecule for the treatment of debilitating protein aggregation diseases.
21.12.2020 **Day-7** **Session-II**	**Lecture-22** **Dr. Pradipta Kumar Mohapatra, School of Life Sciences, Department of Botany, Ravenshaw University, Cuttack,** was the guest speaker who spoke on the title **Generalizing Fluorescence: Concept and Applications.** He started his talk with the historical background of fluorescence. Further, he explained that fluorescence is generated as emission from a molecule, atom, compound, ion or nanostructure on relaxation of an orbital electron from an excited singlet state to a stable ground state

	(may be via a more stable and less energetic triplet state). He described the application of this phenomenon in experimental biology to understand various biological processes and to qualitatively and quantitatively estimate various biochemical reactions. He explained the application of synthetic fluophores like aminochloro methoxy acridine (ACMA), 9-aminoacridine, disodium salts of fluoresceine, uranine, methylumbeliferone (MUF), Fluo dyes (Fluo 1 through 4), ICT-INR, *etc.*, in biological investigations. Further he focused on the energy transfer in antenna pigment complex in plants. He suggested that besides the natural pigments like phycobiliproteins, chlorophylls and its degradation products, pigment derivatives, and pigment complexes are also analyze for their fluorescence responses under various environmental conditions to measure the photosynthetic performance and stress adaptations of plants. **Lecture-23** **Dr. Anagh Anant Sahasrabuddhe, University of Pennsylvania, PA, United States of America**, spoke on the **Genomic Profiling of Sézary Syndrome.** He started his lecture with the introduction of Se´zary syndrome. He mentioned that Se´zary syndrome is an aggressive leukaemia of mature T cells with poor prognosis and limited options for targeted therapies. He described about the next generation sequencing applications and its importance in cancer treatment. He explained his research methodology and results of integrated whole-genome sequencing (n¼6), whole-exome sequencing (n¼66) and array comparative genomic hybridization-based copy number analysis (n¼80) of primary Se´zary syndrome samples. His results highlight the complex genomic landscape of Se´zary syndrome and a role for inhibition of JAK/STAT pathways for the treatment of Se´zary syndrome.
22.12.2020 **Day-8** **Session-I**	**Lecture-24** **Prof Mirza Hasanuzzaman, Department of Agronomy, Sher-e-Bangla Agricultural University, Dhaka-1207, Bangladesh**, delivered lecture on **Physiological and Molecular Mechanism of Metal/ Metalloid Toxicity and Tolerance in Plants**. Heavy metal (HM) pollution is increasing day by day, affecting all the forms of life. Plants are also continuously facing the challenges of HM stress and it is one of the major cause of declining crop production and productivity around the world. Although a number of metal elements are essential for the growth of plants in low concentrations, their excessive amounts in soil above threshold values can result in toxicity. Plants respond to HM stress by not only developing tolerance but they can also help in HM decontamination of soil. Prof. Hasanuzzaman was very enthusiastic and interacted with the participants during discussion in a friendly manner and wonderfully clarified the

queries of the participants. This was really an interesting and informative talk.

Lecture-25

Second lecture was started with the introduction of **Prof Satish Kumar Awasthi, Chemical Biology Laboratory, Department of Chemistry, Delhi University, New Delhi.** Prof. Awasthi delivered an amazing lecture on **Importance of Chemistry in Life Science**. He shared some of his research experience on natural therapeutics, their isolation, purification and characterization using the modern tools like, GC-MS, FT-IR, NMR, *etc*. He explained about some important phytomolecules with tremendous biopotential in combating different diseases like cancer, diabetes and other viral and bacterial infections. Prof. Awasthi was versatile, though he hailed from a chemistry background, still he justified his talk for RC in Life Sciences and interacted very nicely and clarified various queries of participants magnificently. All participants were enriched by the knowledge of Prof Awasthi. This session ended with a thank you address by the Chairperson.

22.12.2020
Day-8
Session-II

In this session, **Seminar Presentation** activity of 19 participants was evaluated by **Prof Preeti K Suresh, University Institute of Pharmacy, Pt. Ravishankar Shukla University, Raipur.** All the participants were used Power Point Presentation. Below are the details;

Names	**Topics**
Dr. Eeshwari Prasad Chelak	Data deficient
Dr Shashi Kumar Markande	Data deficient
Dr. Shailesh Bhaisare	Effect of Ethanolic plant extractive on BmNPV inoculated larvae of *Bombyx mori*
Dr. Sangita Ghadge	*Lantana camara* as a source of manure
Dr. Vinod Kumar Chavan	Physiological changes during BABA induced resistance in *B.Carinata* against *A.brassicae*
Dr. Swetlana Nagal	Production of feather hydrolysate and keratinolytic proteases
Mr Asit Kumar	Aquaculture practises in C.G.
Dr. Richa Mishra	Cyanobacteria
Dr. Sangita Devi Sharma	How plants provide a clean solution for indoor air quality
Dr. Santosh Kumar	Knowledge and practices regarding dengue in Bilaspur
Dr. Raju Mahobia	Inflorescence
Dr. Arpita Rakshit	Life below water
Mrs Deepali Rajwade	Chromosome inactivation and autoimmune disorders
Dr. Jai Godheja	Micro remediation can be done by microspheres
Dr. Archana Pandey	Data deficient
Dr. Shriram Kunjam	Production of synthetic seeds
Dr. Ujjwala Fule	Methods of Pearl Culture

	Prof. Preeti K. Suresh Madam concluded the session with appreciation and suggestions for improvements.
23.12.2020 **Day-9** **Session-I**	**Lecture-26** **Dr Manoj Prasad, National Institute of Plant Genome Research, New Delhi,** delivered his lecture on **Millet Genomics for Food and Nutritional Security**. Dr Prasad has elaborated his research work and experience is his lecture. Dr Prasad also shared his experience about the development stress tolerant millet plants. He emphasized on development of large-scale genome-wide molecular markers, high-throughput genotyping and genome-wide association studies for major traits, characterization of genes and gene families, and construction of comprehensive databases for open access into the genetic and genomic resources developed so far in his lecture. At the end of lecture he has interacted with the participants during discussion and wonderfully clarified the queries of participants. This was really a wonderful lecture. He has enlightened and enriched the knowledge of all the participants about modern techniques in genomic studies of Millet. **Lecture-27** **Prof Ram Chandra, Department of Microbiology, Babasaheb Bhimrao Ambedkar University, Lucknow,** delivered his lecture on **Health Hazards of Distillery Waste and its Biodegradation for Environmental Safety**. He shared his vast research experience in the field phytoremediation. Further, he spoke various research approaches are being carried out in his laboratory to remove Hazardous materials in the distillery waste in Chatishgarh, Odisha, Andhra Pradesh by different locally isolated useful bacteria and plants. He emphasized that how to identify some useful bacteria and heavy metals tolerant bacteria and how these could be used to remove hazardous materials from different industrial effluent or waste through modern bioremediation methods. His research work really appeasable. His publications in high impact journals motivated us. During discussion, Prof. Ram Chandra has interacted very nicely and clarified various queries of participants wonderfully. In general Prof. Ram Chandra lecture was excellent and he has enriched the knowledge of all the participants in the field of bioremediation.
23.12.2020 **Day-9** **Session-II**	In this session, **Seminar Presentation** activity of 21 participants was evaluated by **Prof SK Jadhav, School of Studies in Biotechnology, Pt. Ravishankar Shukla University, Raipur.** All the participants were used Power Point Presentation. Prof Jadhav was suggested few things like way of slide preparation, topic should be correlated with the theme of refresher course, *etc*.

24.12.2020 **Day-10** **Session-I**	**Lecture-28** This session was started with the lecture of **Dr Rohit Seth, Department of Zoology, Guru Ghasidas Vishwavidyalaya, Bilaspur,** on the topic **Obesity Regulation in Connection with Gut and Brain.** His lecture was a detailed discussion on scientific impacts of eating. He described various reasons of obesity and explained why physiological and psychological factors affect it. Further, he explained the harmful effects of irregular lifestyle on health and suggested the use of Leptin and Amylin to cure obesity. The lecture was very informative for all the participants. **Lecture-29** **Dr. Suparna Sen Gupta, Pt. Sundarlal Sharma Library, Pt. Ravishankar Shukla University, Raipur,** was the second speaker of this session who spoke on **Understanding, Detecting and Avoiding Plagiarism.** He began his lecture by giving a brief introduction on basic research and plagiarism. Then, he shared various software with the help of which plagiarism can be detected and prevented. A practical demonstration of using these software was also showed to the participants by him. His lecture was very useful to all the new researchers.
24.12.2020 **Day-10** **Session-II**	**Lecture-30** **Dr Harsh Bais, Plant and Soil Science Department, University of Delaware, USA**, delivered lecture on **How Soil Microbes may Transform the Global Agriculture and Water Usage.** He elucidated the importance of microflora. He also discussed in his lecture about microflora and leaf attack, root colonization, stomatal physiology and soil water content, PGPRs and symbiotic interaction which is followed by queries by the participants. **MCQ Based Test** In the second half of this day, a MCQ based test of all the participants was conducted through Google Class Room. In this test, a total of 30 MCQs, based on the lectures so far delivered, were asked and the time allotted was an hour. This activity was solely monitored and organized by **Dr Arvind Agrawal, Human Resource Development Centre, Pt. Ravishankar Shukla University, Raipur**.
26.12.2020 **Day-11** **Session-I**	**Lecture-31** **Prof Anjana Sharma, Department of Bioscience, Rani Durgawati University, Jabalpur**, delivered her lecture on **Synthetic Biology and it's Applications**. She spoke that worldwide, researchers and companies are trying to explore indigenous methods to resolve various problems in medicine, agriculture, industry, *etc*. Synthetic biology

enables to develop immunogens engineered for efficient production, purification and rapid assays. Synthetic biology has myriads of applications in making green chemicals from agricultural waste, developing a suite of biobased products and services, nonpetroleum based sugars and many more. She had delivered an extensive talk on multiple applications of synthetic biology, so there could not be any discussion because of shortage of time and Chairperson offered a quick thanks note to the speaker for spending her valuable time and delivering an elaborate lecture.

Lecture-32

Dr Seema Mishra, School of Life Sciences, University of Hyderabad, Hyderabad, spoke on the title **Synthetic Biology: Basics and Applications**. Dr. Mishra tried to explain the recent advances, basic mechanisms followed and the ongoing and future applications of Synthetic Biology. During her talk, Dr. Mishra tried to give emphasis on designing biological circuits with medical significance and several other applications using the design principles of engineering. She answered effectively to the queries of the participants.

26.12.2020
Day-11
Session-II

In this Session, **Project Presentation** activity of first five groups was evaluated by **Prof Aditi Poddar, School of Studies in Life Sciences, Pt. Ravishankar Shukla University, Raipur.** Project presentation of groups 1, 2, 3, 4 and 5 was evaluated by her.

No.	Members	Title of the Project
01	Dr. Eeshwari Prasad Chelak Dr. Richa Mishra Mr. Shashi Kumar Markande Dr. Ratnaprabha J Rudey	Study of fungal diversity in polluted and non polluted area of Raipur, Chhattisgarh
02	Dr. Shailesh Shivdas Bhaisare Dr Swetlana Nagal Dr. Sangita Devi Sharma Dr. Annmary Xalxo	Limnological study of fresh water Tulsi Lake, Mandangad, Ratnagiri
03	Dr. Sangita Aanandrao Ghadge Mr. Asit Kumar Dr. Sarita Das Dr. Jai Godheja	Phytochemical analysis and bioactive potential of Pomegranate seed extract against uropathogenic bacteria
04	Dr. Vinod Dhananjay Chavan Dr. Santosh Kumar Agrawal Dr. Sushma Patel Dr. Debashish Dey	Assessment of chemical constituents and larvicidal activity of reconstituted essential oils from selected medicinal plants against *Anopheles* mosquito
05	Dr. Pramod Kumar Mahish Dr. Arpita Rakshit Dr. Ujwala Wamanarao Fule Mrs. Madhulika Pandaw	Impact of lockdown on dietary habit of different age group people

28.12.2020
Day-12
Session-I

Lecture-33

Prof Sheo Mohan Prasad, Department of Botany, University of Allahabad, Allahabad, delivered his lecture on **Nitric Oxide and its Role in Managing Chromium (VI) Toxicity in Vegetables by Application of Nutrients.** Nitric oxide is a wonderful molecule it was first discovered by Pristely as colorless and toxic gas. In 1847, Alfred Nobel discovered Nitro-glycerine and developed dynamite. In 1980 Robert F Furchgott (NewYork) studied the effect of Enothelium derived relaxing factor (EDRF) and louise J Ignarro (Los Angles) in 1986 found that chemical nature of EDRF is similar to NO. This was for the first time a gas molecule was discovered as signal molecule. Nitric oxide also plays significant role as environmental and endogenous cues in plants physiology for secretion of exopolysaccharide in defence against pathogens, programmed cell death etc,. Dietary nitrate is also important source of NO. A number of green vegetables like beetroot, spinach cabbage contain high concentration of nitrate which are converted into NO in salvary glands. In this study, role of Ca, S and NO with reference to Cr (VI) and NO accumulation, components of phenylpropanoid pathway, cell cycle dynamics, photosynthesis, ROS and antioxidant potential in managing Cr (VI) toxicity was discussed in detail in the lecture.

28.12.2020
Day-12
Session-II

In this Session, **Project Presentation** activity of rest five groups was evaluated by **Prof Arti Parganiha, School of Studies in Life Sciences, Pt. Ravishankar Shukla University, Raipur.** Project presentation of groups 6, 7, 8, 9 and 10 was evaluated by her.

No.	Members	Title of the Project
06	Dr. Raju Mahobia Mrs. Chhanda Ramdas Samrit Dr. Rashmi Parihar Dr. Atul Kumar Tiwari	Ecological studies of Khutaghat Dam, Ratanpur, District Bilaspur with special reference to plankton diversity
07	Mrs. Deepali Rajwade Dr. Shriram Kunjam Dr. Swati Sahu Dr. Mrutyunjay Jena	Screening of bioavailability and production potential of vitamin B12 in algae
08	Dr. Bhupesh Keshorao Mendhe Dr. Anita Pandey Dr. Shivendra Singh Dewhare Mrs. Rekha Gupta	Bioremediation and Rhizoremediation of heavy metals from soil samples of Korba District, Chhattisgarh
09	Dr. Sadhana Jaiswal Dr. Archana Pandey Dr. Vijay Laxmi Naidu Dr. Richa Tikariha	Estimation of Melatonin in different varieties of rice in Chhattisgarh
10	Dr. Seema Anil Belorkar Mr. Yaser Qureshi Dr. Pravin Dinkar Patil Dr. Shipra Sinha	Physiochemical, microbiological and heavy metal analysis on municipal waste water discharge in river Shivnath, Durg District

	Valedictory Function In this function, **Prof KL Verma**, Hon'ble Vice-Chancellor of Pt. Ravishankar Shukla University, Raipur, was the **Chief Guest**, **Prof AK Gupta,** Director, HRDC, Pt. Ravishankar Shukla University, Raipur, was the **Chairperson,** and **Prof Keshav Kant Sahu,** Head, School of Studies in Biotechnology, Pt. Ravishankar Shukla University, Raipur, was present as **Course Coordinator**. Initially, Prof Keshav Kant Sahu was given the overall report of this refresher course. Thereafter, opportunity was given to all the participants for providing their feedback and all the participants shared their wonderful experiences, and some of them suggested organizing refresher course on pure subject like Microbiology also. Honorable V.C. Prof. K. L. Verma Sir blessed all the participants with his valuable words and congratulated all for completing online refresher course successfully. In the last, Prof AK Gupta Sir was given vote of thanks to the guests and everyone for their participation.

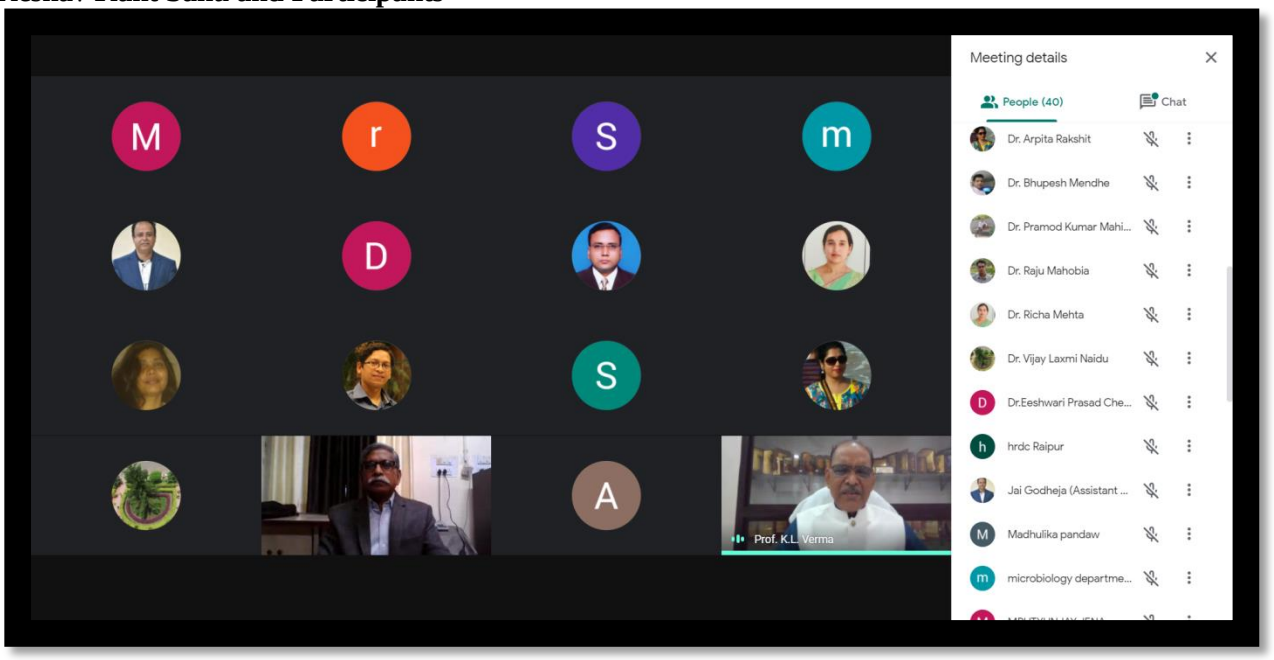
(Keshav Kant Sahu)

Course Coordinator

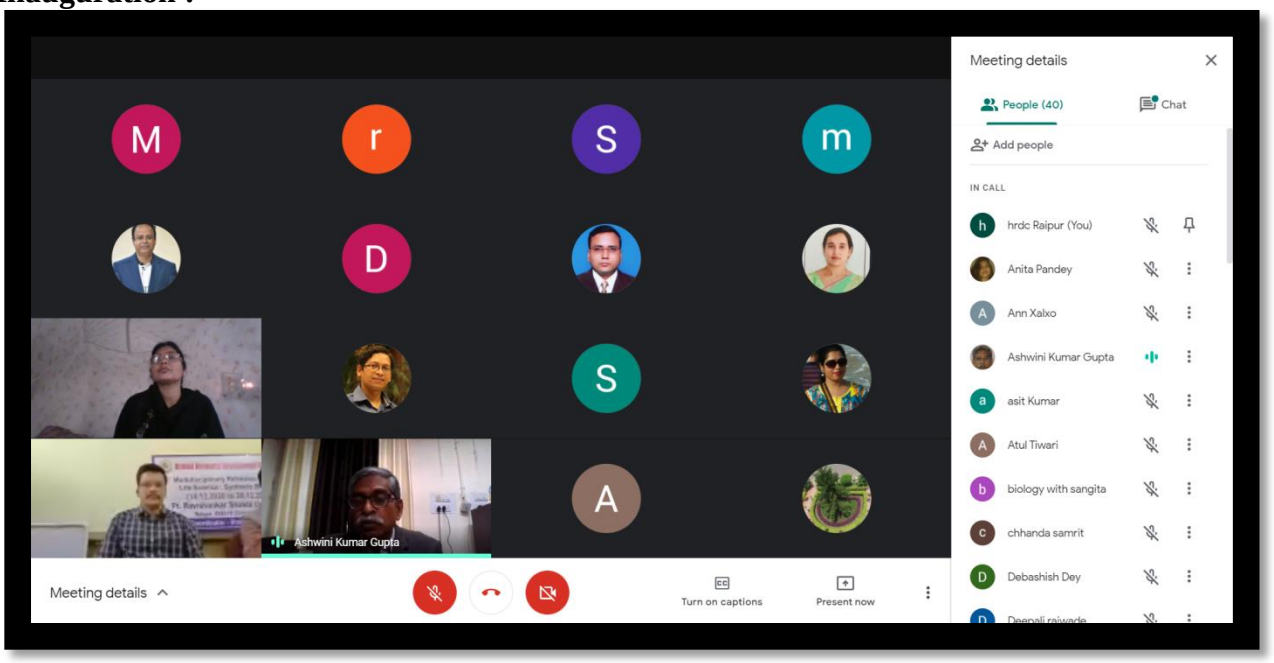
Digital Record of course – Life Science: Synthetic Biology

14.12.20 (1st Session) **Inauguration :-**

Vice Chancellor of Pt. RSU – Prof. K.L. Verma, Director HRDC – Prof. A.K. Gupta, Course Coordinator – Keshav Kant Sahu and Participants



Inauguration :-



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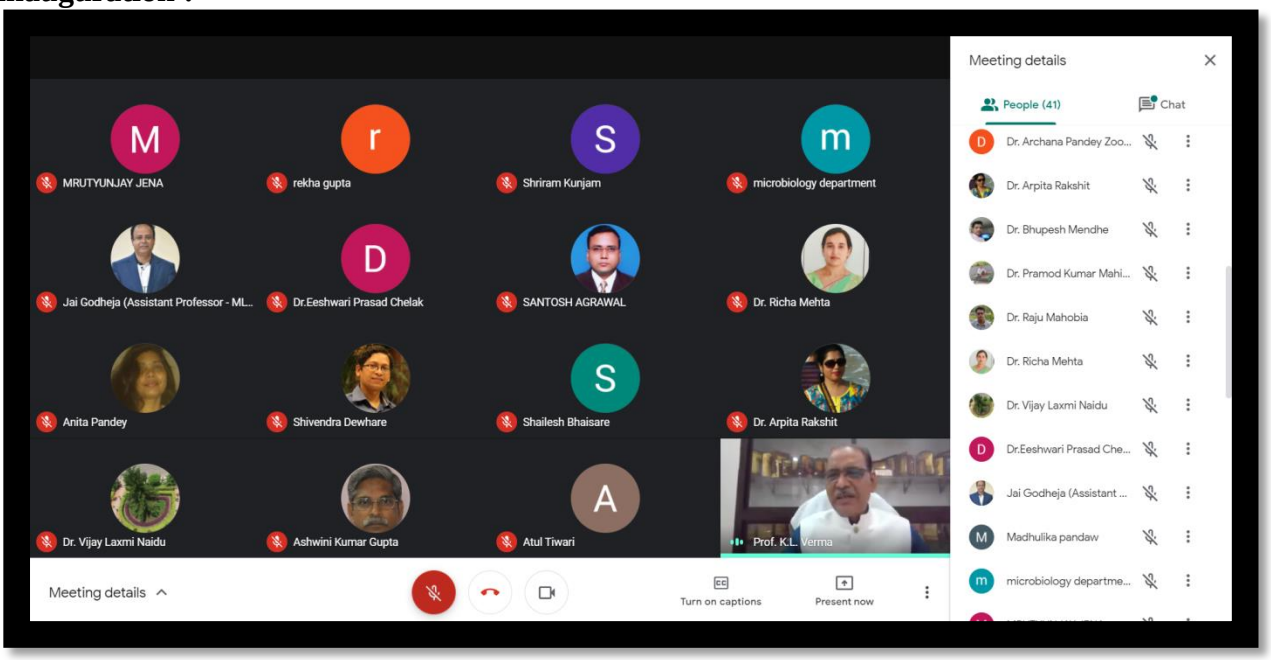
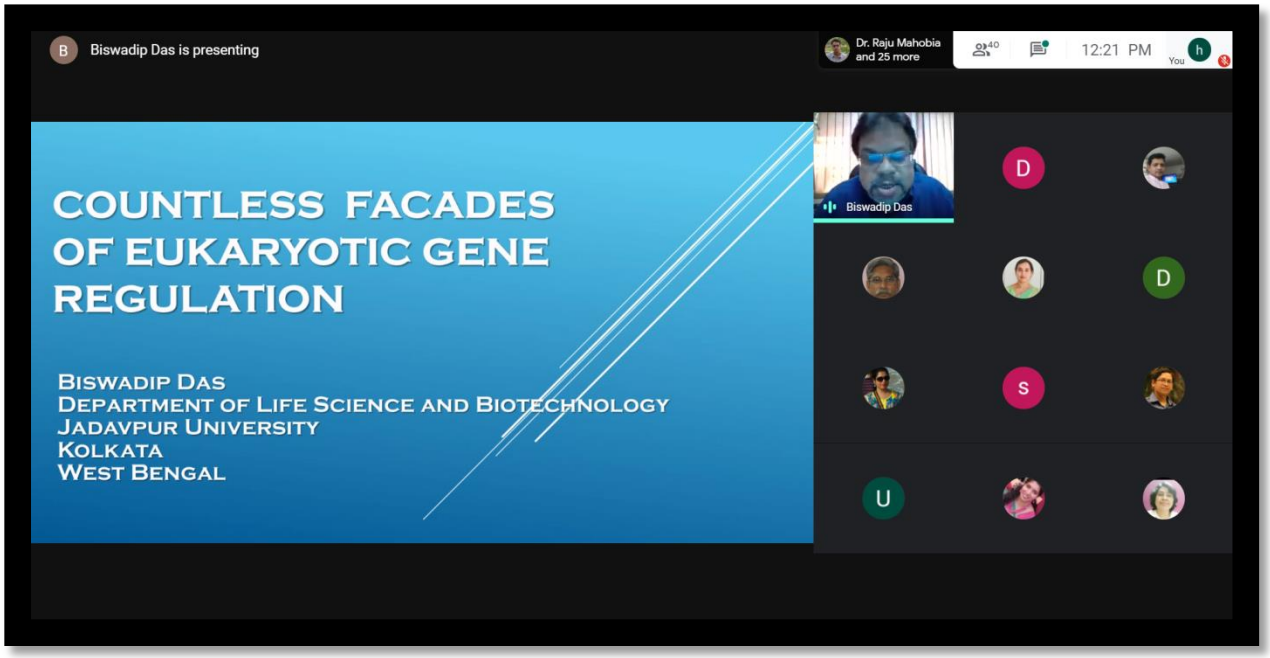


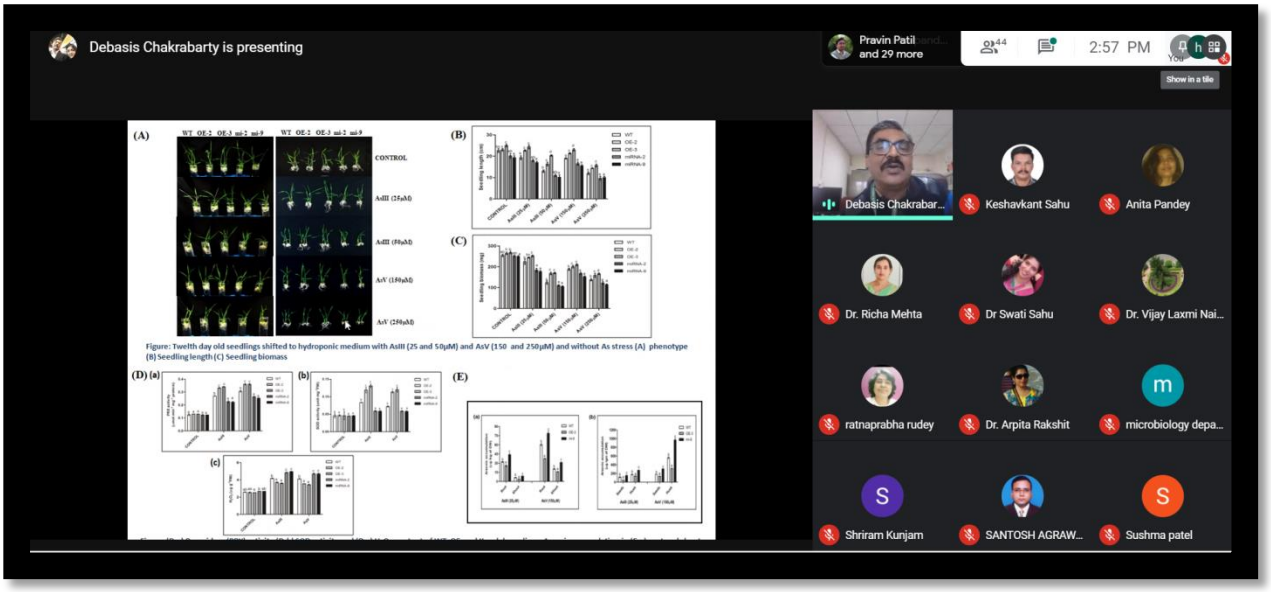
14.12.20 (2nd Session) **Prof. Biswadip Das -** Department of Life Science and Biotechnology, Jadavpur University, Kolkata WB

Title - Countless Facades of Eukaryotic Gene Regulation



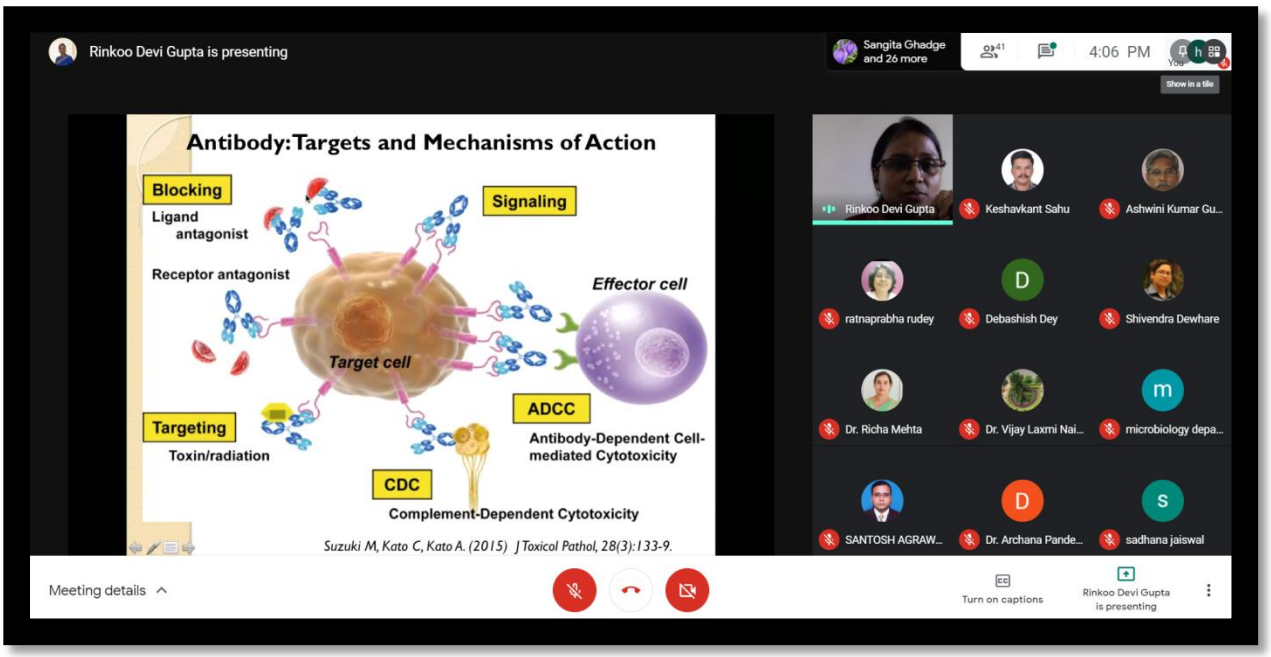
14.12.20 (3rd Session) **Dr. Debasis Chakrabarty -** Biotechnology and Molecular Biology Division, CSIR-National Botanical Research Institute, Lucknow UP

Title - Development of Low Arsenic Accumulating Rice Variety for Safer Human Consumption



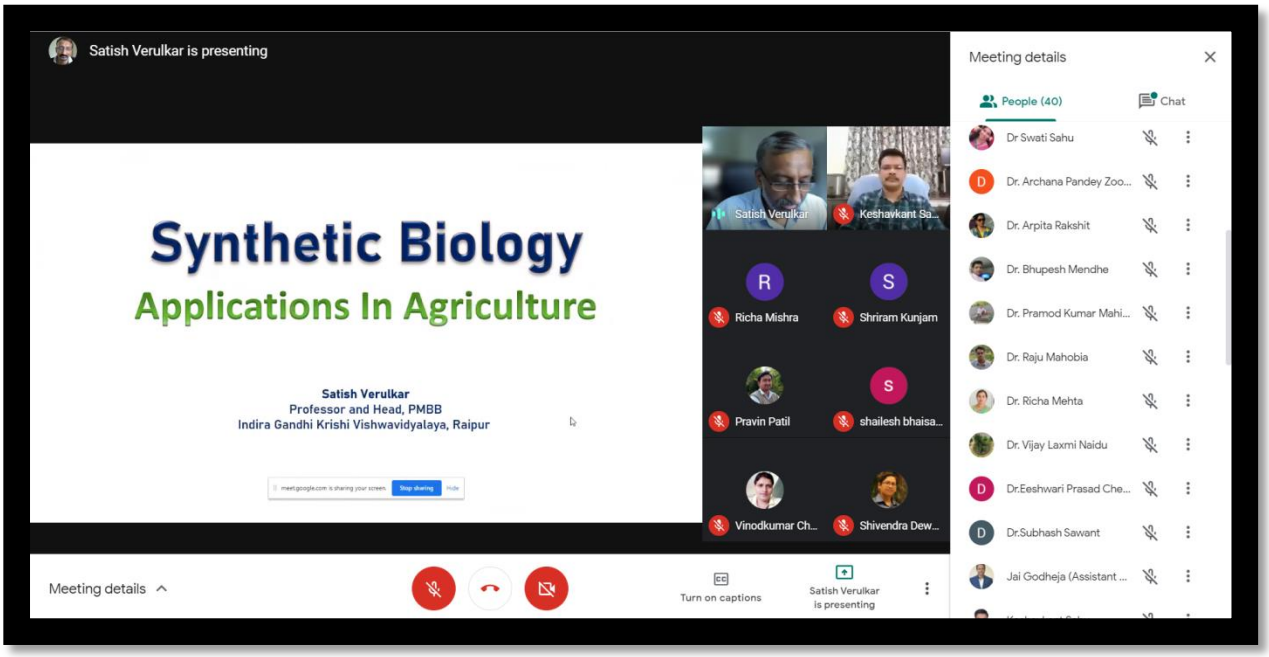
14.12.20 (4th Session) **Dr. Rinkoo D. Gupta -** Faculty of Life Sciences and Biotechnology, South Asian University, New Delhi

Title - Engineering Antibody and Peptide Vaccine to Combat Viral Diseases



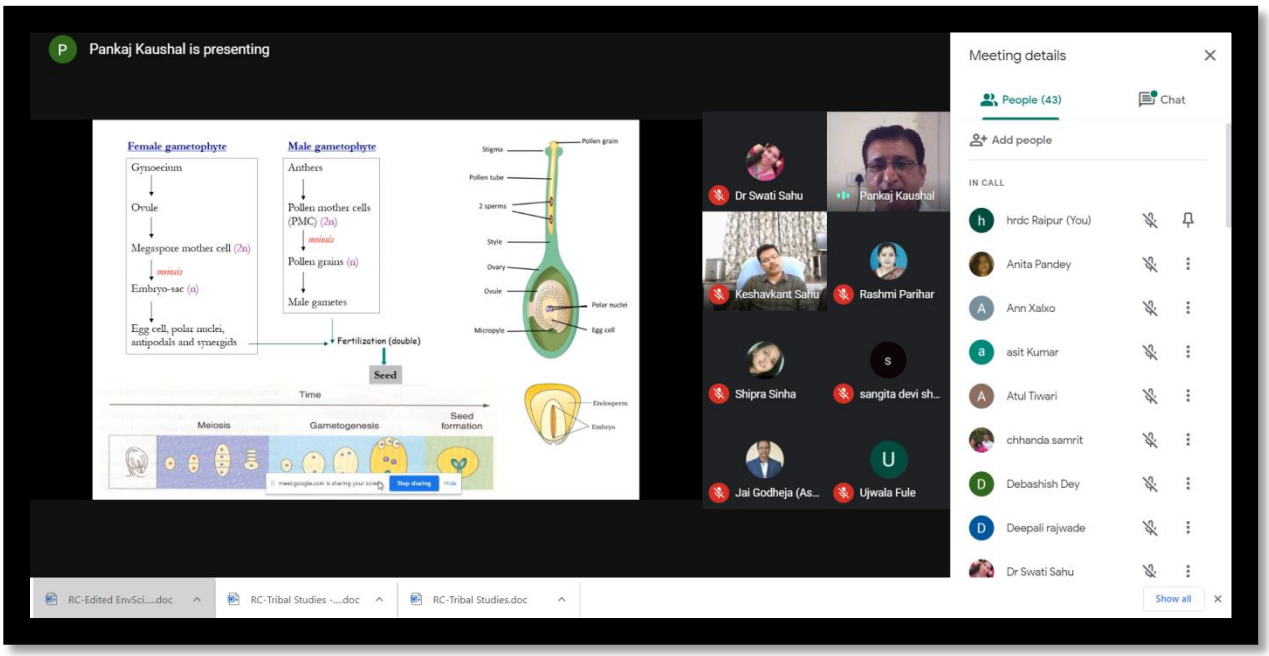
16.12.20 (1st Session) **Prof. S.B. Verulkar -** Department of Plant Molecular Biology and Biotechnology, Indira Gandhi Agriculture University, Raipur CG

Title - Synthetic Biology - Applications in Agriculture



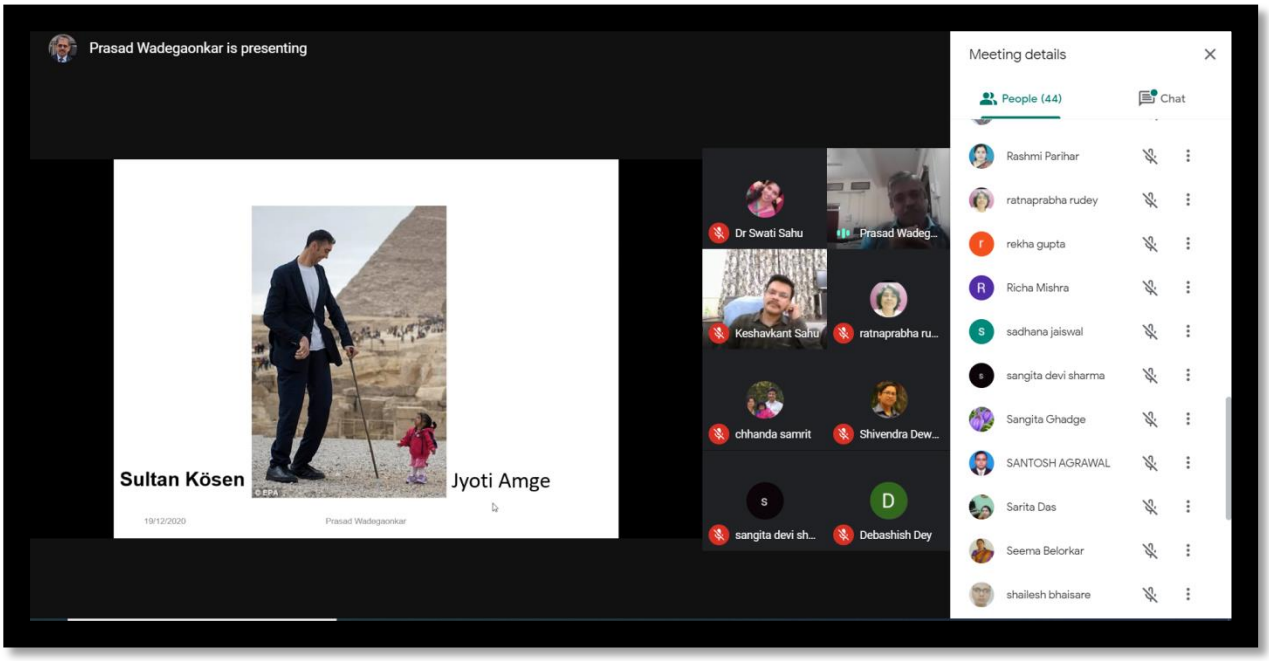
19.12.20 (1st Session) **Dr. Pankaj Kaushal -** National Institute of Biotic Stress Management, Baronda, Raipur CG

Title - Synthetic Apomixis: Clonal Propagation Through Seeds



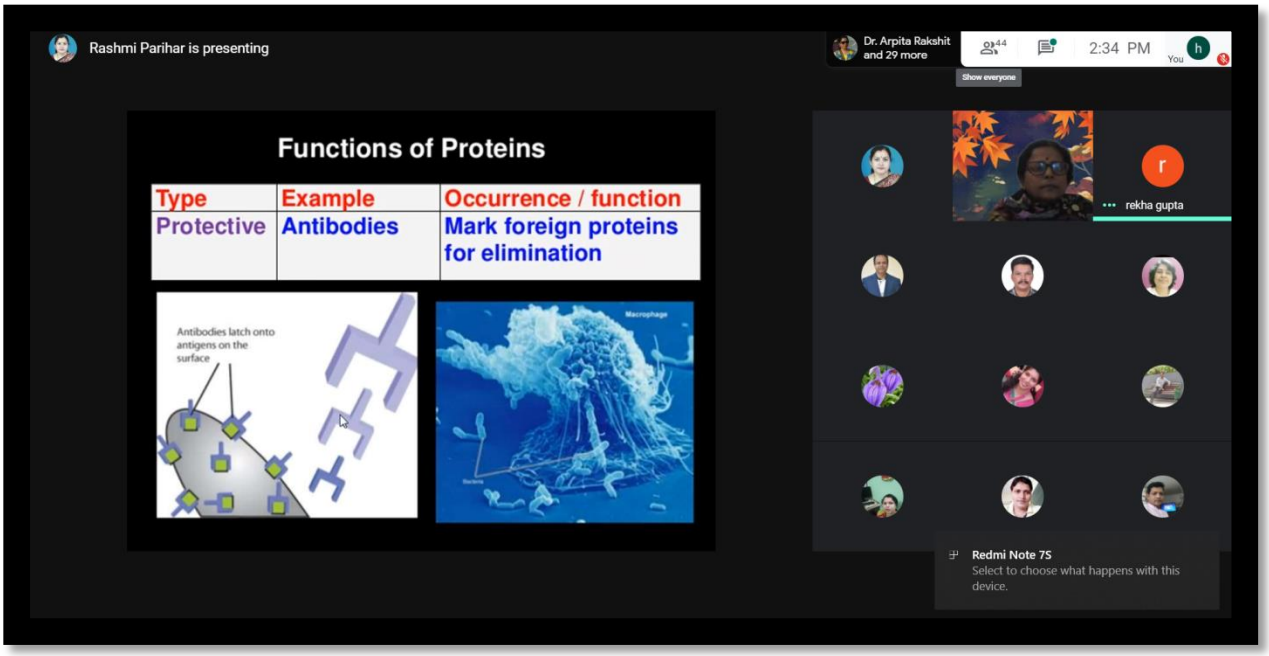
19.12.20 (2nd Session) **Prof. Prasad A Wadegaonkar -** Department of Biotechnology, SGB University, Amravati MH

Title - Genes, Genomics and Metagenomics



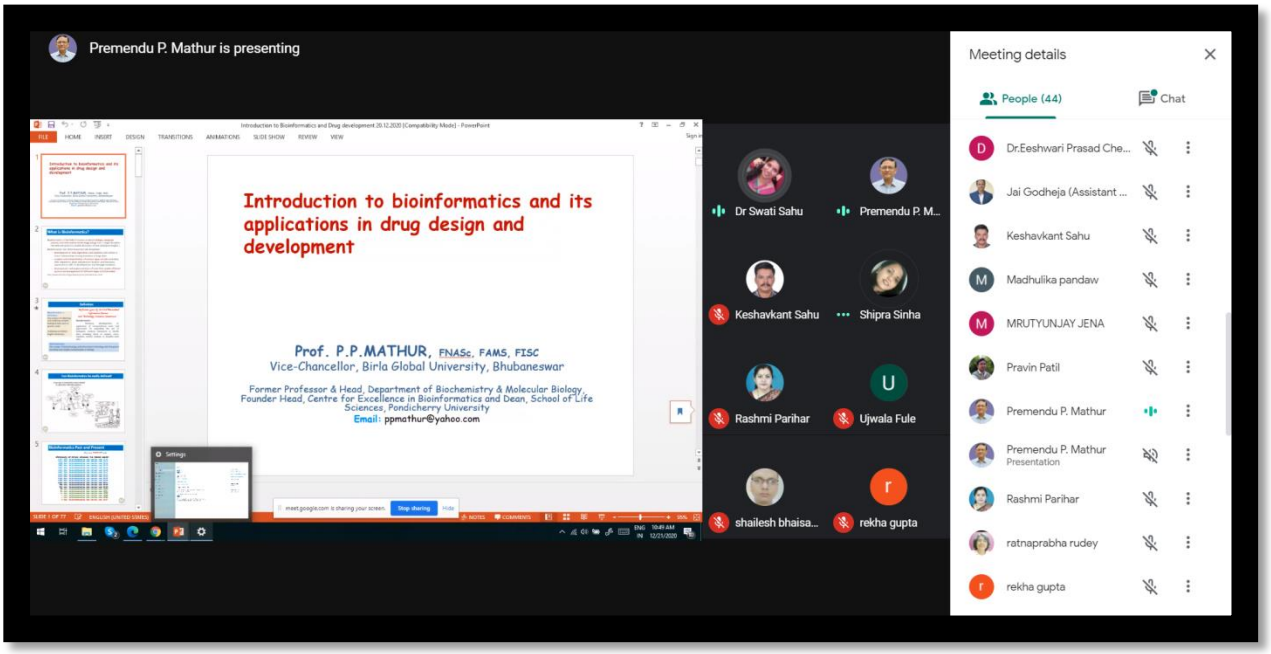
19.12.20 (3rd & 4th Session) **Prof. Reeta Venugopal -** School of Studies in Physical Education, Pt. Ravishankar Shukla University, Raipur CG

Title - Evaluation of Micro Teaching



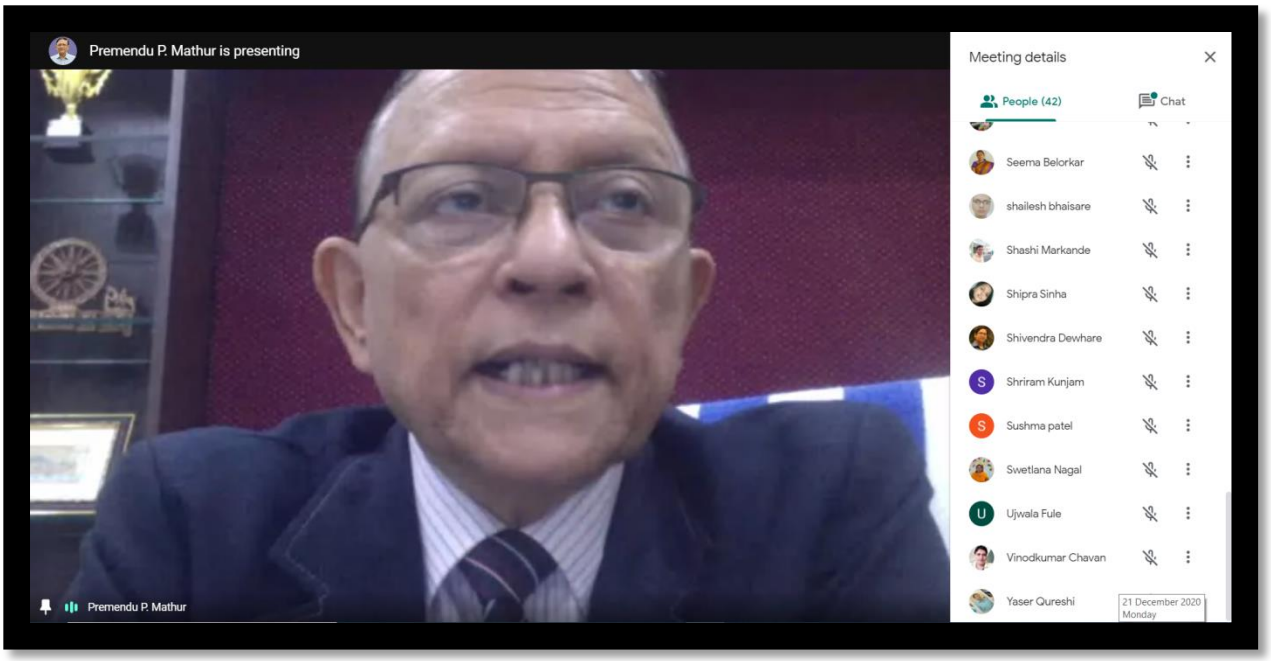
21.12.20 (1st Session) **Prof. P. P. Mathur -** Birla Global University, Bhubaneswar Odisha

Title - Introduction to Bioinformatics and its Applications in Drug Design and Development



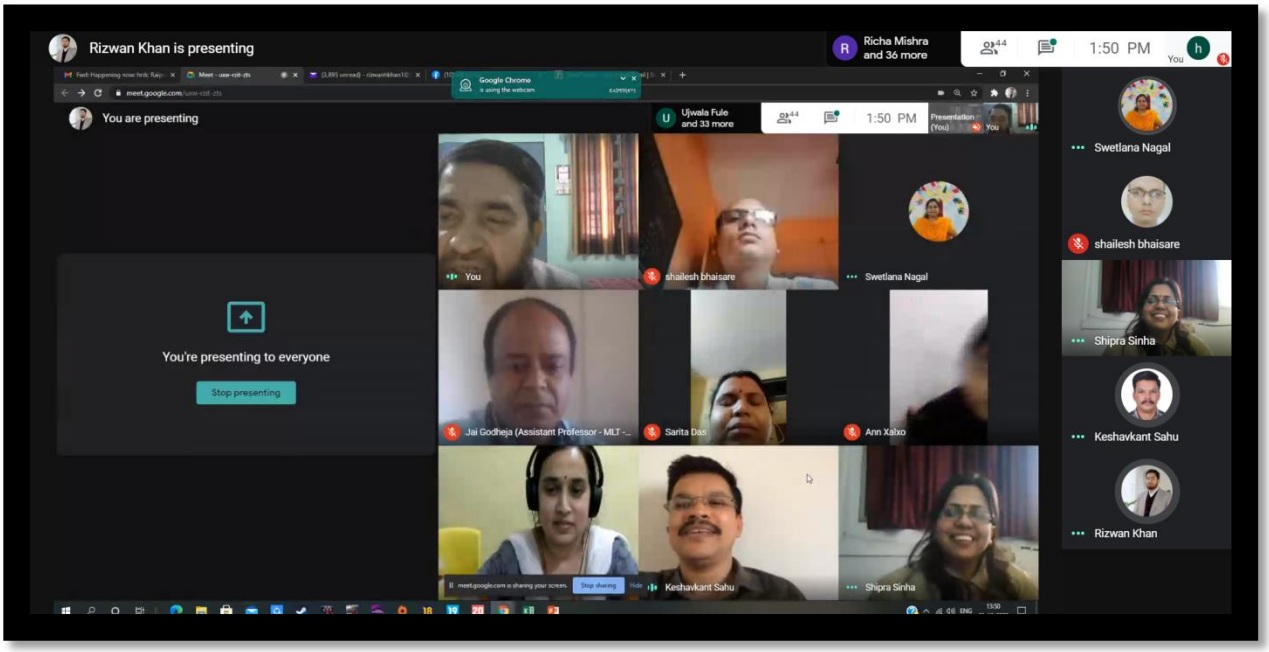
21.12.20 (1st Session) **Prof. P. P. Mathur -** Birla Global University, Bhubaneswar Odisha

Title - Introduction to Bioinformatics and its Applications in Drug Design and Development



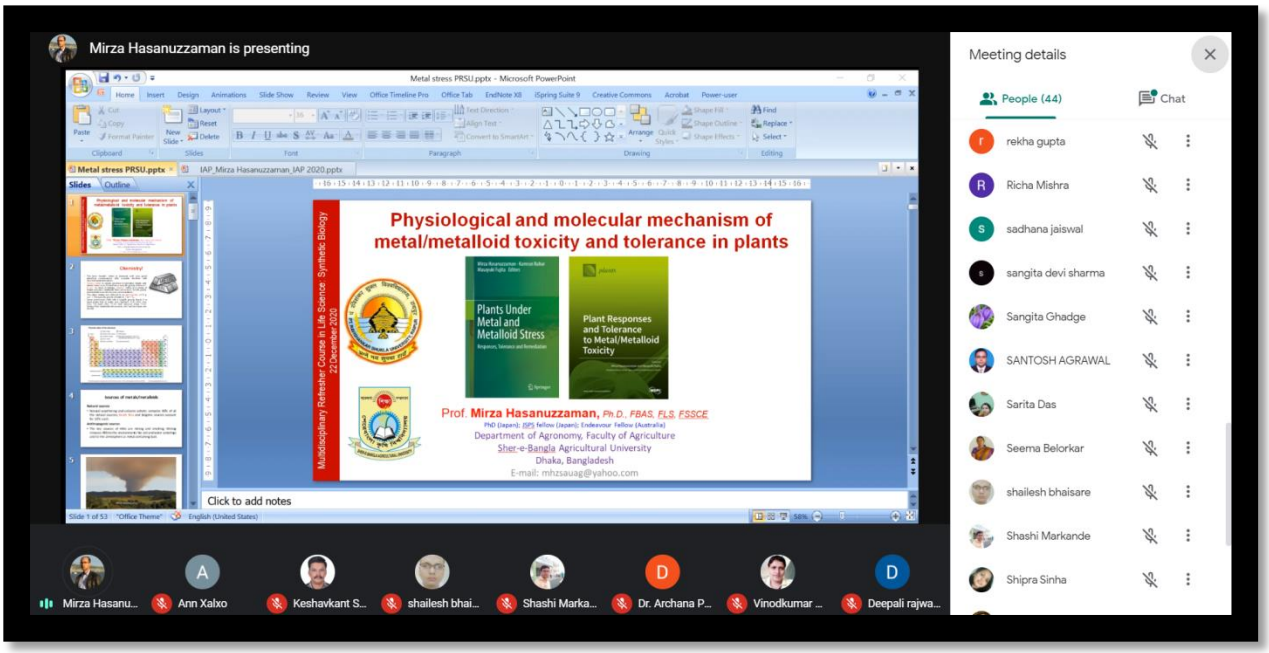
21.12.20 (2nd Session) **Prof. Rizwan Hasan Khan -** Interdisciplinary Biotechnology Unit, Aligarh Muslim University, Aligarh

Title - Gallic Acid-Induced Aggregation with Possible Implication in Metal Based Therapy



22.12.2020 (1st Session) **Prof. Mirza Hasanuzzaman -** Department of Agronomy, Sher-e-Bangla Agricultural University, Dhaka- 1207, Bangladesh

Title - Physiological and Molecular Mechanism of Metal/Metalloid Toxicity and Tolerance in Plants

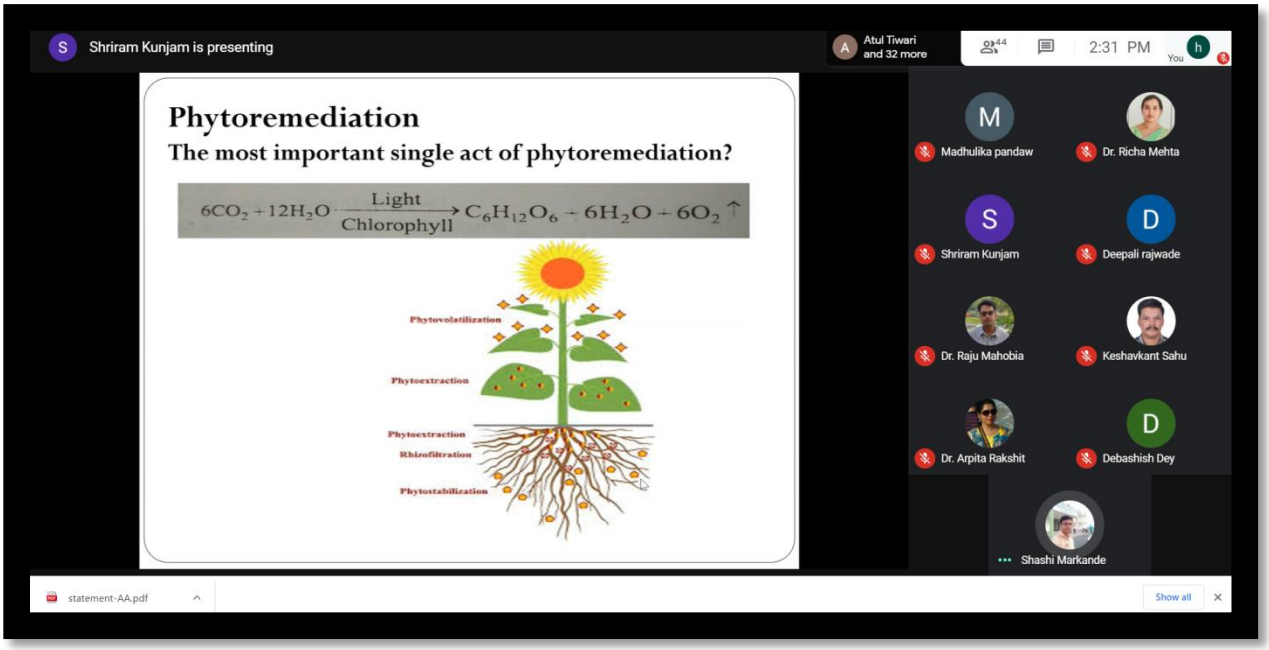


22.12.2020 (2nd Session) **Prof. Satish Kumar Awasthi** - Chemical Biology Laboratory, Department of Chemistry, Delhi University, Delhi

Title - Importance of Chemistry in Life Science

22.12.2020 (3rd & 4th Session) **Prof. Preeti K. Suresh** - University Institute of Pharmacy, Pt. Ravishankar Shukla University, Raipur CG

Title - Evaluation of Seminar

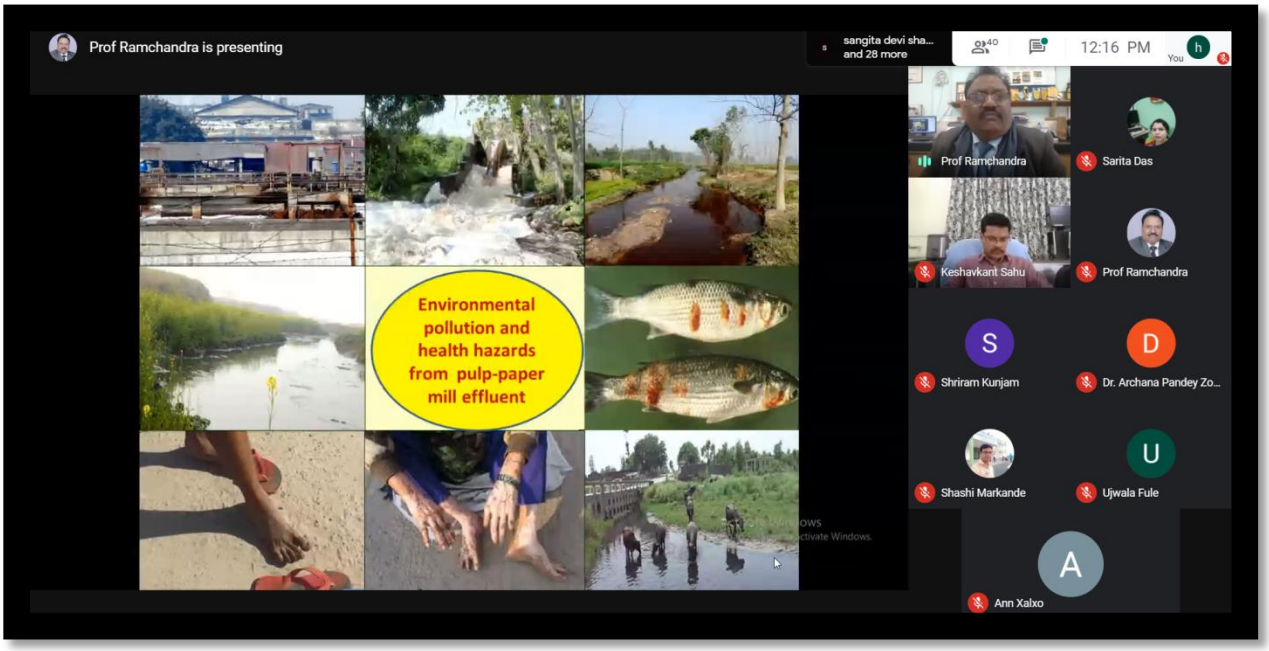


23.12.2020 (1st Session) **Dr. Manoj Prasad -** National Institute of Plant Genome Research, Aruna Asaf Ali Marg, New Delhi

Title - Millet Genomics for Food and Nutritional Security

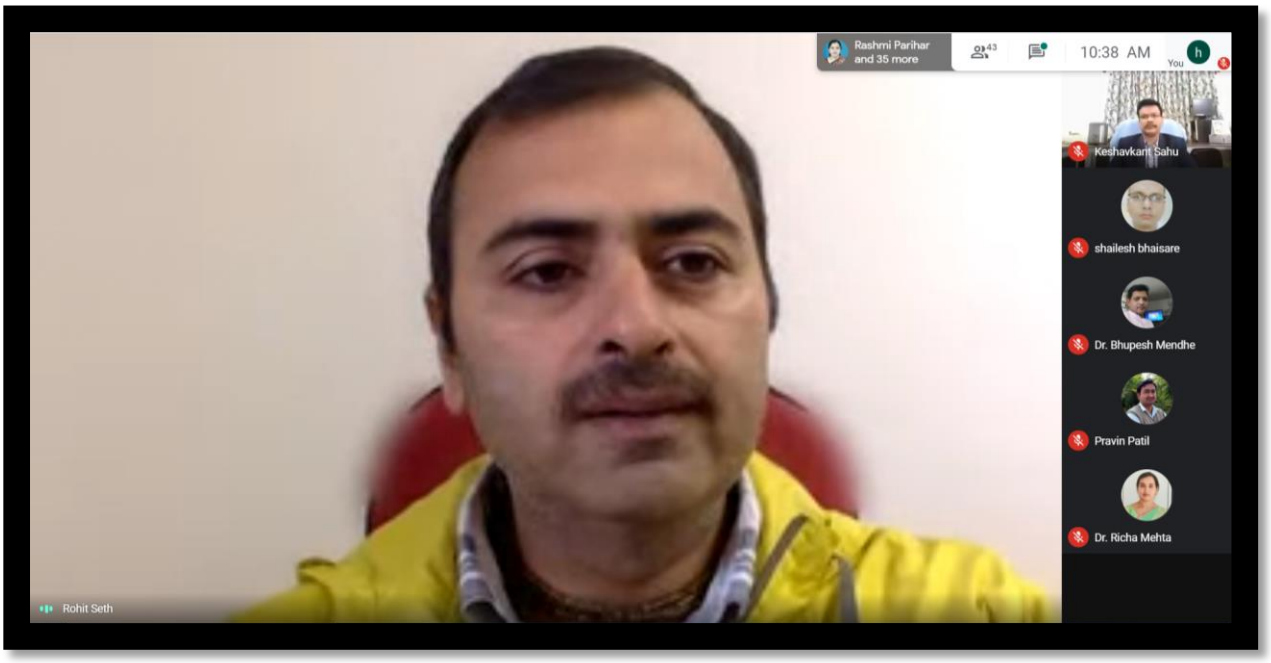
23.12.2020 (2nd Session) **Prof. Ram Chandra -** Department of Microbiology, Babasaheb Bhimrao Ambedkar University, Lucknow UP

Title - Health Hazards of Distillery Waste and its Biodegradation for Environmental Safety



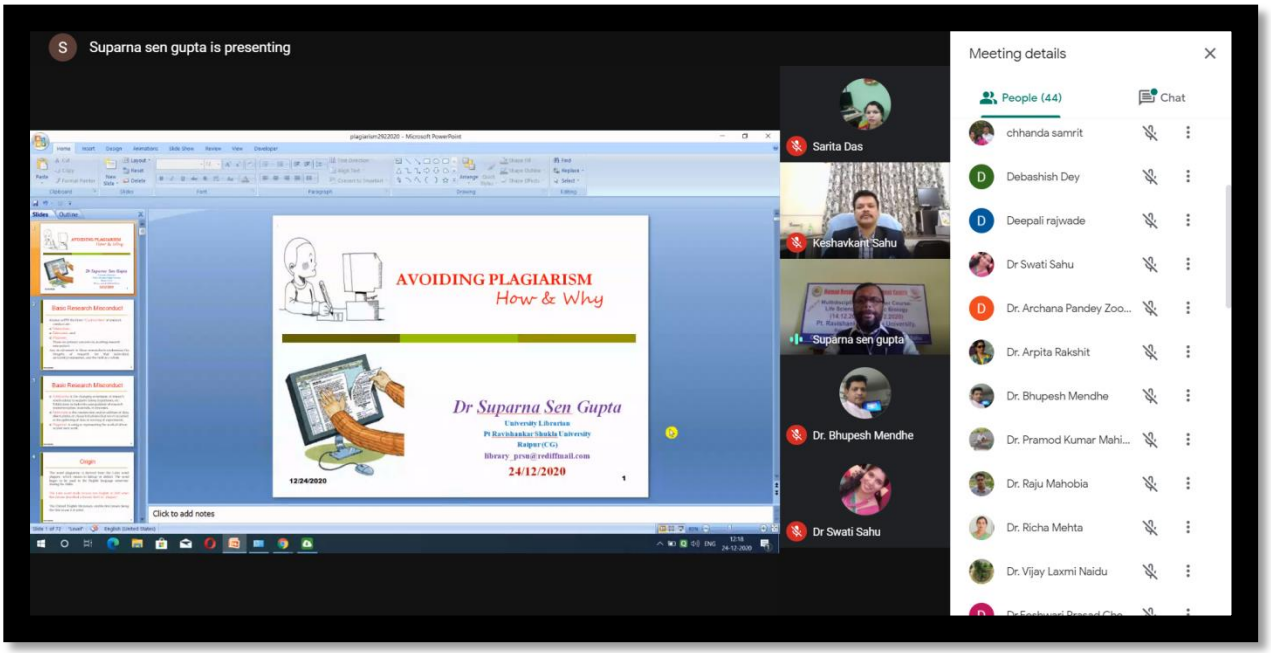
24.12.2020 (1st Session) **Dr. Rohit Seth -** Department of Zoology, Guru Ghasidas Vishwavidyalaya, Bilaspur CG

Title - Obesity Regulation in Connection with Gut and Brain



24.12.2020 (2nd Session) **Dr. Suparna Sen Gupta -** Pt. Sundarlal Sharma Library, Pt. Ravishankar Shukla University, Raipur CG

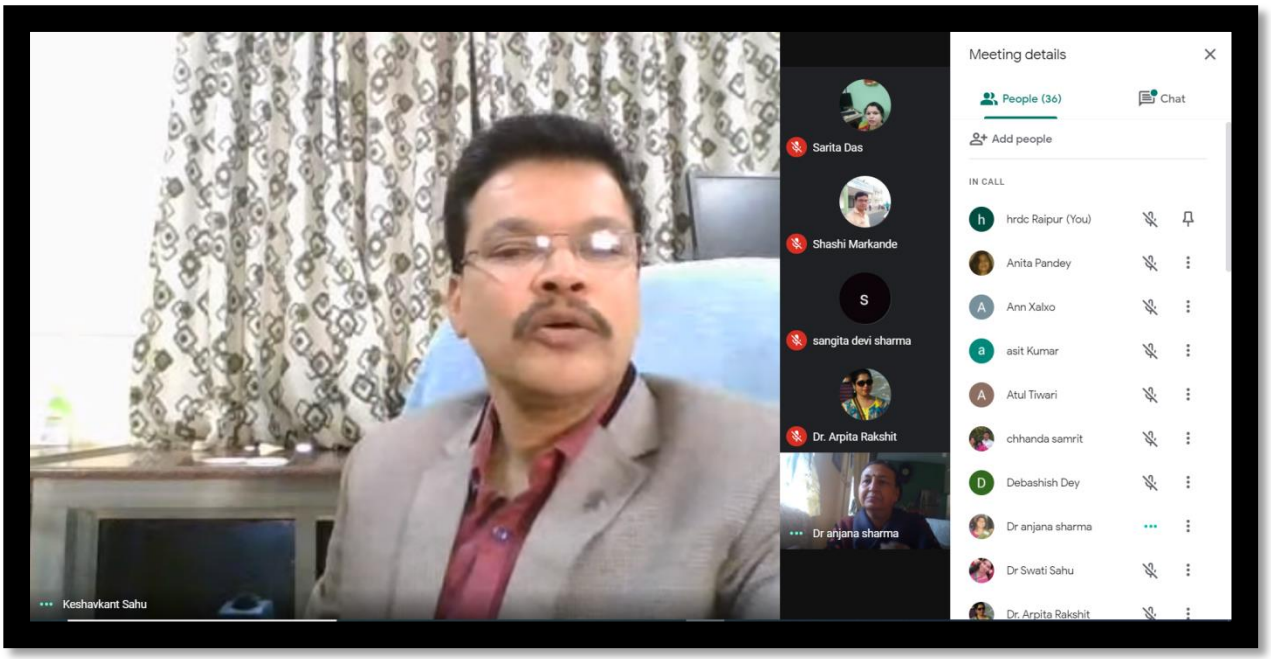
Title - Understanding, Detecting and Avoiding PLAGIARISM



24.12.2020 (2nd Session) **Dr. Suparna Sen Gupta -** Pt. Sundarlal Sharma Library, Pt. Ravishankar Shukla University, Raipur CG

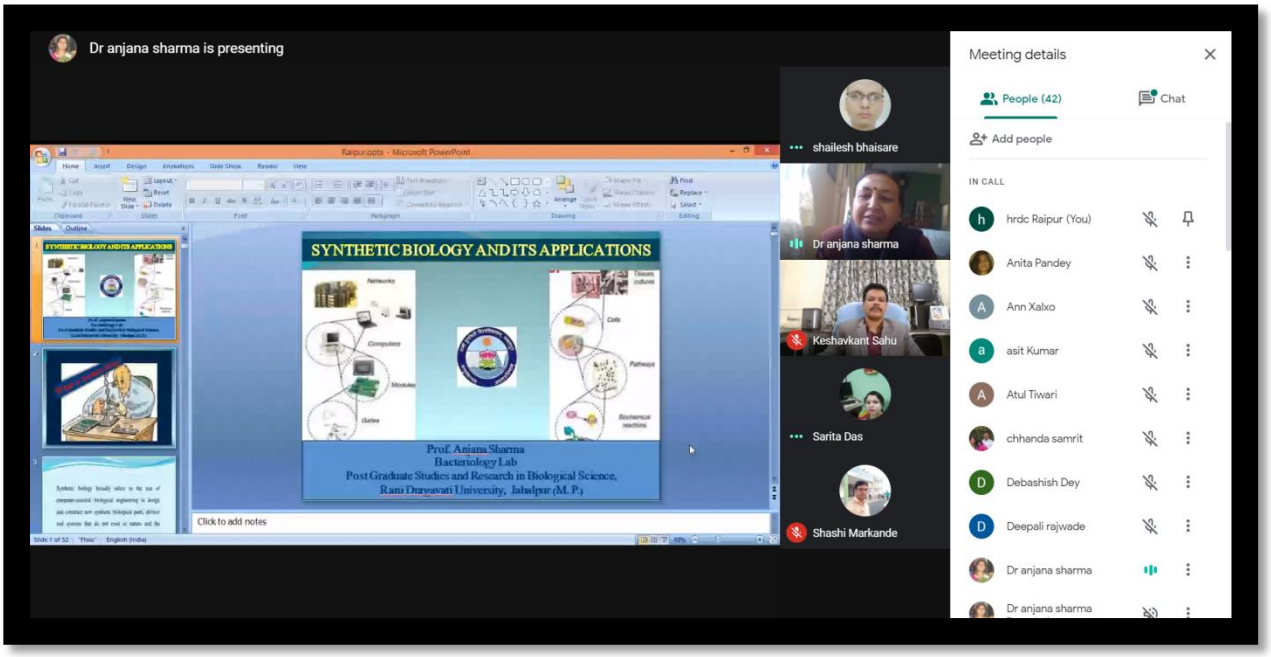
Title - Understanding, Detecting and Avoiding PLAGIARISM

26.12.20 (1st Session) **Disscution with Course Coordinator (Keshav Kant Sahu)**



26.12.20 (1st Session) **Prof. Anjana Sharma -** Department of Biological Sciences, RD University, Jabalpur MP

Title - Synthetic Biology and its Applications

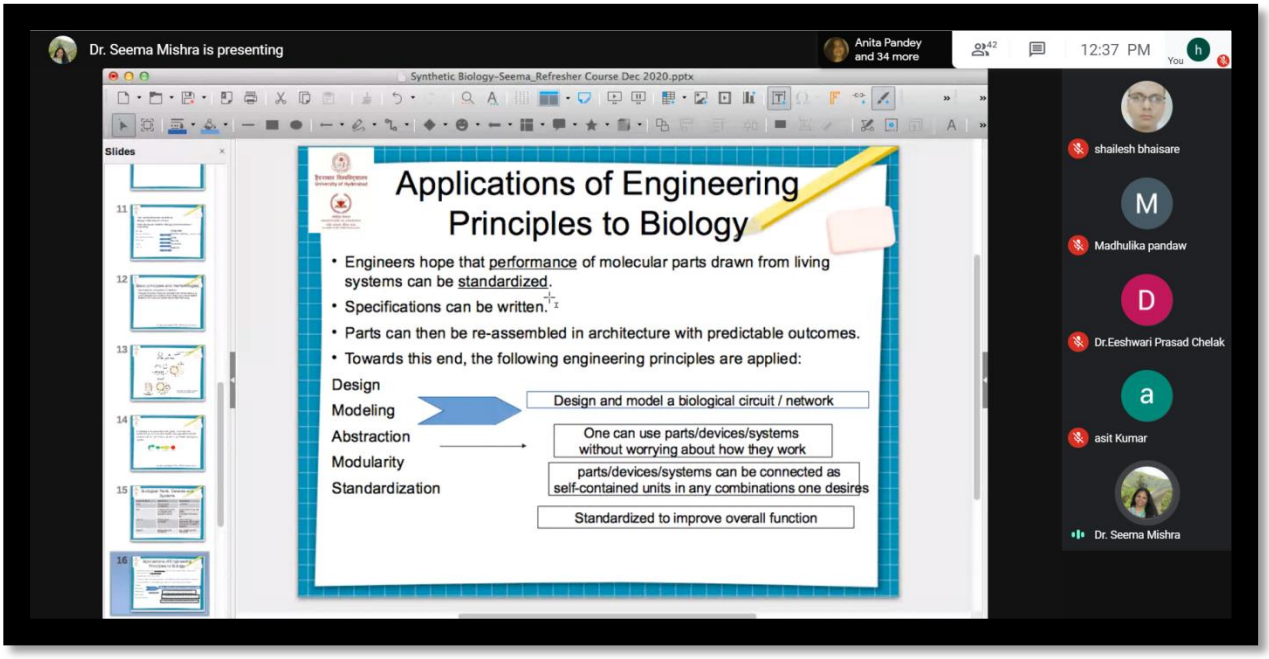


26.12.20 (1st Session) **Prof. Anjana Sharma -** Department of Biological Sciences, RD University, Jabalpur MP

Title - Synthetic Biology and its Applications

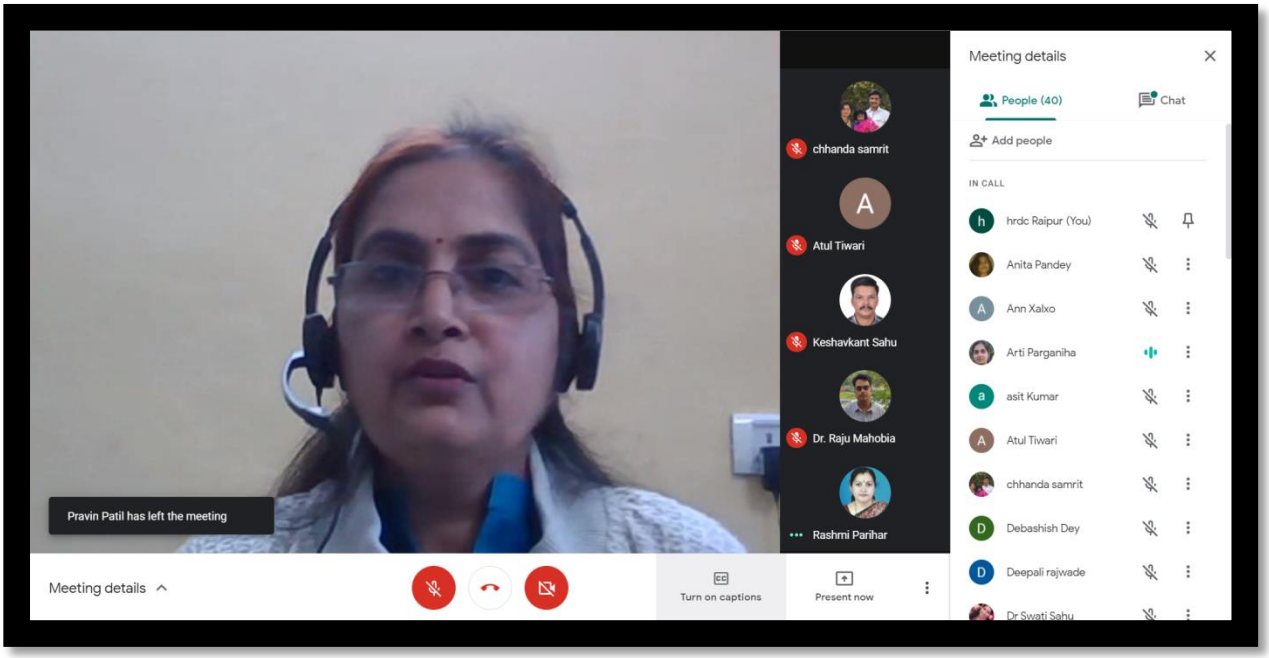
26.12.20 (2nd Session) **Dr Seema Mishra -** School of Life Sciences, University of Hyderabad, Hyderabad

Title - Synthetic Biology: Basics and Applications



28.12.20 (3rd & 4th Session) **Prof. Zenu Jha -** Department of Plant Molecular Biology and Biotechnology, Indira Gandhi Agriculture University, Raipur CG

Title - Evaluation of Project Presentation

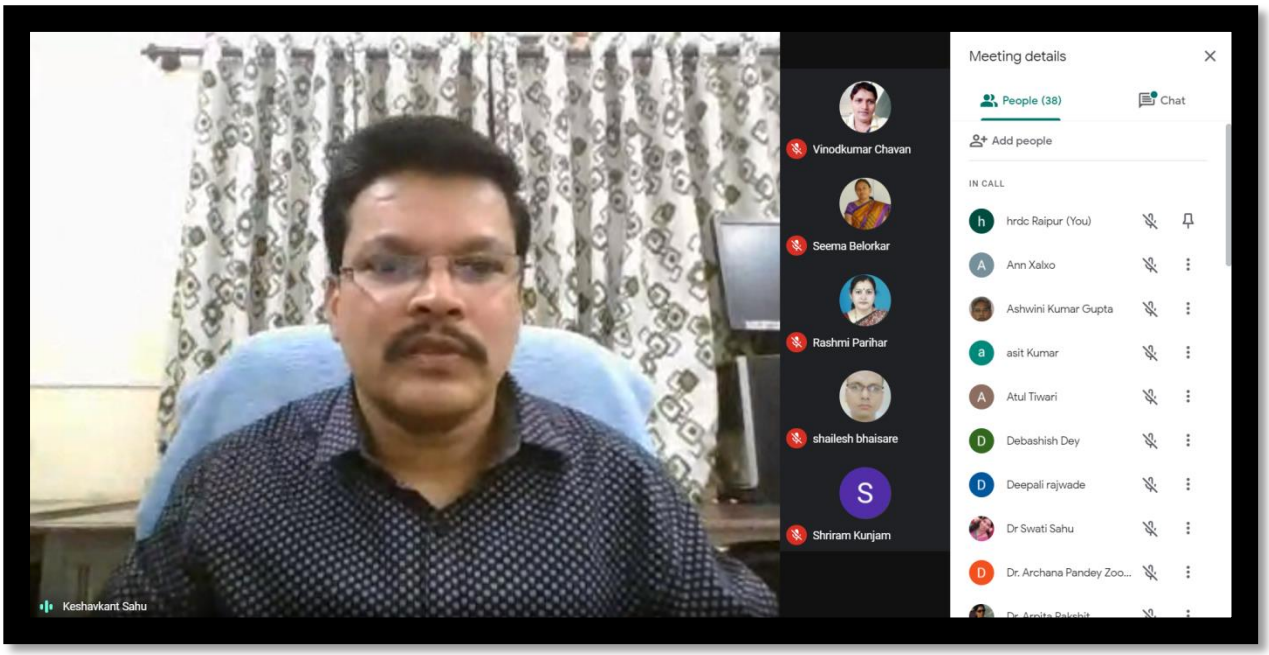


28.12.20 (3rd & 4th Session) **Prof. Zenu Jha -** Department of Plant Molecular Biology and Biotechnology, Indira Gandhi Agriculture University, Raipur CG

Title - Evaluation of Project Presentation

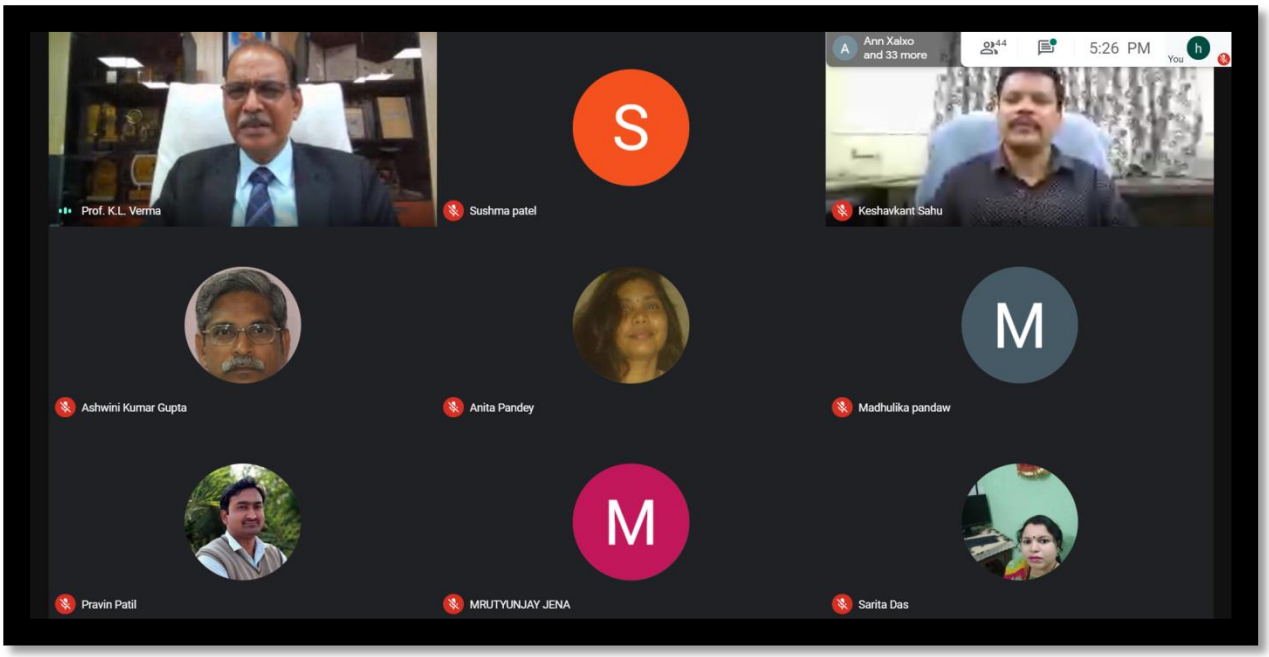
Valedictory : - Vice Chancellor of Pt. RSU – Prof. K.L. Verma

Valedictory : - Course Coordinator – Prof. Keshav Kant Sahu

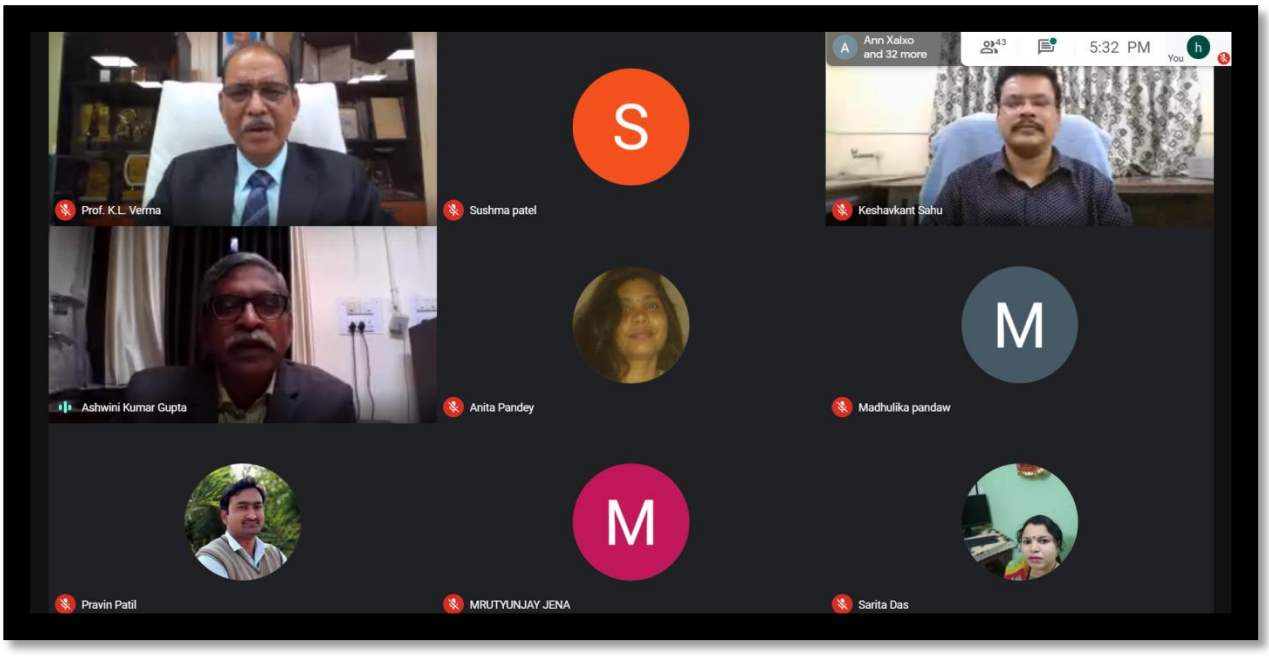


Valedictory : - Director of HRDC – Prof. A.K. Gupta

Valedictory : -



Valedictory : -



Valedictory : -