ANNUAL REPORT
Department of Biosciences and Bioengineering
(PERIOD: 1st APRIL 2020 – 31st MARCH 2021)

1. **Year of Establishment of the Department /Centre:** 2002
2. **Academic Programmes Offered:** B. Tech., M. Tech., PhD
3. **No. of Laboratories with brief introduction: (Total No: 40)**

i. **MAB (Mechanistic Approcaches to Biology) Lab (Dr. B. Anand):** The current focus of our vibrant research group is directed towards addressing fundamental and important questions in the area of RNA biology by employing an eclectic mix of modus operandi that is drawn from biochemical, biophysical, computational and molecular genetics approaches. Our immediate obsession is to resolve the mechanistic questions pertaining to CRISPR Biology and Ribosome Biogenesis.

ii. **BERL (Bioengineering Research Laborotory) (Prof. Utpal Bora):** The research interests of this laboratory include Biomedical Engineering, Seri-biodiversity, Seri-bioinformatics and Bio-entrepreneurship.

iii. **Molecular Networks and Recombinant Therapeutics (Dr. Biplab Bose):** The lab is interested in understanding the inter-connected cellular communication systems. Particularly, the lab is interested to know the effect of architecture, kinetics and integration of the molecular pathways on vital cellular processes. The lab uses experimental as well as theoretical tools to understand how information is carried and processed in such signaling networks. The lab is also involved in developing molecules that can target particular signal transduction pathway. Such a molecule can be used to modulate an aberrant pathway involved in a particular disease.

iv. **Dr. Pranjal Chandra lab:** The lab is interested to combine biotechnology, nanotechnology, material science, and electroanalytical chemistry, approaches to address problems of biomedical significance, human health, and environmental monitoring. Specifically, the lab is interested to develop novel and commercially viable bioanayltical methods for diagnostics applications. The major research work is focused on: (i) Clinical Diagnostics (Cancer cells, DNA, RNA, bio-markers) using electroanalytical methods such as cyclic voltammetry, chronoamperometry, impedance spectroscopy, (ii) Nano-biosensors (*Aptamer, antibody, enzyme*) based biological phenomenon investigation, (iii) Porous silicon based label free self reporting optical nanosensors, (iv) Microfluidics and Nanomachines.

v. **Plant Tissue Culture & Secondary Metabolite Production Lab (Prof. Rakhi Chaturvedi):** The tree species with long generation cycle are mostly highly heterozygous in nature due to strict cross pollination and are considered to be recalcitrant (difficult to regenerate in vitro). The genetic improvement of these plants and development of homozygous lines (pure) is either very challenging or impossible using the conventional methods, because the cross pollination is a rule. This limitation has completely been overcome by the research group of Dr Chaturvedi while working on two complex tree species, Neem (*Azadirachta indica*) and Tea (*Camellia species*). Prof. Chaturvedi's laboratory has also involved in developing Plant Cell Culture Technology as an alternative to whole plant extraction for the production of secondary metabolites of medicinal and commercial values. Although these compounds can also be isolated from naturally grown whole plants, continued destruction of plants for the purpose may pose a major threat to species getting extinct. Her research group is able to identify, purify and isolate three main categories of bioactive metabolites: essential oils, coumarins and alkylamides, from in vitro elite cell lines of medicinal plants. Some of these compounds are complex triterpenoids which are difficult to synthesize chemically. The focused research work in the laboratory are: (i) Mass multiplication by micropropagation/clonal propagation of medicinally and economically valuable plants, (ii) In vitro haploid and doubled haploid plant production to generate homozygous (pure) lines to produce hybrid vigour for improved plant yield, (iii)

Triploid plant production to develop seedless variety, (iv) Somatic embryogenesis for synthetic seed production, (v) Protoplast isolation and regeneration for single cell cloning and isolation of mutants, (vi) Cytological and Histological studies of in vitro raised cultures to understand their ploidy, development and origin (vii) Cell biomass production in shake-flask for screening, characterization and quantification of medicinally and commercially useful plant metabolites and their scale-up in photo-bioreactors

vi. **Biophysical Chemistry Lab (Dr. Nitin Chaudhary):** The laboratory focuses on understanding the molecular self-assembly and amyloid diseases, protein/peptide membrane interactions, and developing peptide based antibiotics.

vii. **Bioprocess Development Lab (Dr. Debasish Das):** Bioprocess Development Lab majorly focuses on developing and demonstrating sustainable technologies towards renewable fuels. We are currently working on developing sustainable technologies towards biocrude production from microalgal isolates, butanol production from *Clostridium* sp, ethanol fermentation from adapted *Z. mobilis* strains. We have ventured towards plant tissue culture and demonstration on a pilot scale facility with industrial collaboration.

viii. **Prof. V. V. Dasu lab:** The laboratory focuses on Bioprocess development (upstream to downstream), metabolic engineering, and bioenergy.

ix. **Prof. Siddhartha Sankar Ghosh lab:** The laboratory focuses on development of new generation gene therapy vectors. This mainly includes development of suicide gene therapy for cancer. The lab has also set up infrastructure facilities for interdisciplinary collaborative research in the field of nanoscience and nanotechnology supported by extramural funding at the Centre for Nanotechnology, IIT Guwahati. The major area is to develop new nanoparticles, nanocomposites and nanocarriers and evaluate their antimicrobial and anticancer activities. The lab is perusing research to understand molecular mechanisms of nanoparticle mediated cell cytotoxicity. Other areas, such as, bioimaging using C-dots, metal nanoclusters, gene delivery using quantum dot embedded nanocarriers are also being persued. The lab is also interested in understanding the molecular pathways involving drug resistance.

x. **Biosensor and Biofuel Cell Research Lab (Prof. Pranab Goswami):** The lab is involved in the development of novel bio-recognition system and their applications for developing biosensors and biofuel cells. DNA aptamers, catalytic as well as non-catalytic proteins have been investigated as biorecognition elements for some clinical applications targeting to operate in point-of-care and resource limited environments. Focus has been given on the rapid detection of acute myocardial infarction (AMI), cholesterol, alcohol, bilirubin and malaria due to their obvious importance in diagnostic sector.

xi. **Prof. Arun Goyal Lab:** The lab research interests include Molecular Biology, Protein Engineering, Rational Enzyme Engineering, 3-Dimensional Structure (In silico, crystal and solution) and Function analysis of enzymes and their industrial (Biorefinery, therapeutic, food, Pulp and paper) applications.

xii. **Neural Engineering Lab (Dr. Cota Navin Gupta):** Broadly the research lab's current focus is in the areas of brain computer interfaces, imaging genetics for psychiatric disorders, multimodal/multivariate algorithm development and designing wearable medical solutions for patient mobility.

xiii. **Stem Cell and Cancer Biology Group (Dr. Bithiah Grace Jaganathan):** The current focus of the research group is to understand the role of mechanotransduction in stem cell differentiation and cancer metastasis. The group also studies various signaling pathways and microenvironment mediated chemoresistance in leukemia and breast cancer.

xiv. **Structural and Computational Biology Laboratory (Dr. Shankar Prasad Kanaujia):** The lab uses the knowledge of various techniques such as molecular biology, structural biology (X-ray Crystallography) and biophysical and biochemical studies to understand the mechanism of different biological functions. In addition, the lab applies the molecular dynamics simulations to further corroborate the results obtained from various experiments. Currently, the lab is focusing on investigating into the mechanisms involved in protein translation initiation, ABC transporters and their role in multidrug resistance.

xv. **Molecular Microbiology Laboratory (Dr. Manish Kumar):** The research interests of the lab include (i) Molecular interaction of host-pathogen-vector of infectious diseases, (ii) Gene expression analysis of Spirochete, *Leptospira interrrogans* and *Borrelia burgdorferi, (iii)* Development of vaccine against outer membrane protein of *Leptospira interrogans* and *Borrelia burgdorferi*, and (iv) Vector borne diseases of Zoonotic importance.

xvi. **Viral Immunology lab (Dr. Sachin Kumar):** The paramyxoviruses include viruses that are isolated from many species of terrestrial, avian and aquatic animals. The group includes many important pathogens of humans such as measles virus, human respiratory syncytial virus, human parainfluenza viruses, Nipah virus and Hendra virus and animals such as canine distemper virus and Newcastle disease virus. Newcastle disease virus (NDV) is the prototype member of this family and is a leading cause of respiratory disease in avian species. It leads to huge economic losses to the poultry industry in India. The laboratory focuses mainly on understanding the biology of avian paramyxovirus and development of vaccine against them using reverse genetics system.

xvii. **Cancer Biology Laboratory (Prof. Ajaikumar B. Kunnumakkara):** The research interests of the lab include (i) Role of inflammatory pathways in cancer development, (ii) Identification of novel biomarkers for cancer diagnosis and prognosis, (iii) Cancer drug discovery, and (iv) Development of transgenic and gene knockout mouse models for biomedical research

xviii. **The Molecular Endocrinology lab (Dr. Anil Mukund Limaye):** The laboratory focuses on the following research themes: (i) Hormone regulation of gene expression, (ii) Role of estrogen in breast tumor invasion and metastasis, (iii) Regulation of cystatin A expression and its role in breast cancer, (iv) HoxB2 in breast cancer, (v) GPR30/GPER-1 biology, (vi)Mechanisms of anticancer activity of EGCG, (vii) Karanjin and its biological effects

xix. **Dr. Soumen Kumar Maiti Laboratory:** The research interests of the lab include Biochemical Engineering, Biofuel, Bioprocess modeling, control, optimization, Metabolic engineering, Downstream processing, Membrane separation, Bioremediation

xx. **Biomaterial and Tissue Engineering laboratory (Prof. Biman B. Mandal):** Tissue engineering has emerged as a potential way to regenerate and treat tissue damage or organ failure as a result of injury or disease. Our laboratory "Biomaterials and Tissue Engineering Laboratory", a DBT-Unit of Excellence, majorly focus on using silk biomaterials for developing affordable lab grown tissue/organ replacements for human transplantation. The lab research is directed towards the following areas of importance i.e. Cell Based Tissue Engineering of Grafts and Implants, Stem Cell Based Regenerative Medicine, Biomaterials, 3D Bioprinting, Drug Delivery Systems, 3D In Vitro Disease Models.

xxi. **Organelle Biology and Cellular Ageing Lab (Dr. Shirisha Nagotu):** The lab focusses on understanding the biogenesis of organelles and the inter-organelle communication within a cell. The lab tries to understand the effect of ageing on organelle biology and the role of organelles in cellular ageing.

xxii. **Prof. Kannan Pakshirajan's laboratory:** The research interests of the lab are Environmental Biotechnology, Biological removal and recovery of inorganic compounds from wastewaters, Biofuels and other Biotechnological Products: production, process design, kinetics and environmental applications.

xxiii. **Bio-interface & Environmental Engineering Lab (Dr. Lalit Mohan Pandey):** The laboratory focuses on the following research aspects: (i) Surface and interfacial science particularly in the area of Bio-interfaces and Biomaterials (Design of Biocompatible surfaces): The surfaces are modified using various Self-Assembled Monolayers (SAMs) and their interactions with water, bio macromolecules i.e. polymers, proteins and cells are studied, (ii) Protein's adsorption and aggregation: The lab investigates the adsorption behavior and properties of various adsorbed proteins on surfaces with different wettabilities by forming mono, mixed and hybrid SAMs. The role of surface chemistry at the nanometer scale on aggregation of

various therapeutic proteins is studied, (iii) Environmental Biotechnology: The lab focuses on 3Rs. Reduce waste generation, recycle the treated waste and reuse waste as by-product or recover energy from the waste.

xxiv. **Enzyme and Microbial Technology Laboratory (Prof. Sanjukta Patra):** The EMT research group studies the microbes and their applications in different spectrums of Metagenomics, Industrial Microbiology, Extremophiles, Environmental Biotechnology, Disease Therapeutics and diagnosis

xxv. **Prof. Aiyagari Ramesh laboratory:** Biocompatible hydroxyapatite-based nanocomposites have been generated using secreted proteins of probiotic lactic acid bacteria (LAB) as biomineralization scaffolds. The antibiotic loaded nanocomposites exhibited bactericidal activity against *Pseudomonas aeruginosa* biofilm. A gastric fluid tolerant bacteriocin-loaded nanocomposite was generated as an antiadhesion agent to reduce *in vitro* colonization of intestinal cells by pathogenic bacteria and support adhesion of beneficial probiotic LAB. In another research endeavor, low molecular weight synthetic amphiphiles having multimodal chemistry have been rationally designed to promote interaction with staphylococcal lipoteichoic acid and facilitate metal sequestration. The amphiphile could render a profound effect on cell growth and metallophore gene expression in methicillin-resistant *Staphylococcus aureus* (MRSA).

xxvi. **Molecular Informatics and Design Group (Prof. Vibin Ramakrishnan):** Molecular Informatics and Design Group integrates diverse disciplines of science and engineering in the design and development of advanced materials. The lab's approach to a research problem is 'idea centric' with a clear emphasis on the design phase, adopting modeling and informatics tools. The lab experiments a reductionist approach in understanding the interaction between molecules resulting in assembled architectures at nano and micro scale, and further employ it in the design of future materials. An information based modeling approach has been employed in the design and generation of tumor homing and cell penetrating molecules to test their efficacy as future drug delivery vehicles.

xxvii. **Applied Biodiversity Laboratory (Prof. Latha Rangan):** The group tries to address the research questions in areas of Applied Biodiversity with special reference to bioresources of Northeast India using an integrative approach. .

xxviii. **Translational Crop Research Laboratory (Prof. Lingaraj Sahoo):** Pathogens, insects and abiotic stresses cause major losses in yield and quality of crops. The discoveries in basic plant research play a vital role in meeting these challenges by developing technologies to improve agriculture by introducing important traits to crop of interest. The lab employs integrated approaches to identify genes with significant agronomic impact in both model (Arabidopsis) and crops (grain legumes and oil seeds), understand the mechanism by which they function and using this knowledge, develop designer crops for diverse plant abiotic (drought, salinity and nutrient deficiency or toxicity) and biotic (viral and insect) stress conditions, useful for growers, industry and consumers. Besides, the lab is working on biofortification in Asiatic grain legumes for healthcare applications and manipulation of key oil biosynthesis genes yield in Jatropha, a tropical perennial biofuel crop to improve oil quality and oil.

xxix. **Prof. Gurvinder Kaur Saini laboratory:** The laboratory works in fungal biotechnology. The various aspects that are studied include (i) secondary metabolite production, (ii) development of hyper virulent strains of Metarhizium anisopliae and Beauveria bassiana using scorpion and spider neurotoxins, (iii) gene stacking in entomopathogenic fungi.

xxx. **Computational Structural Biology laboratory (Dr. Priyadarshi Satpati):** Working in the area of biomolecular interactions using computational methods (e.g, Molecular Dynamics, Electronic Structure Calculations). We are mainly interested in understanding accuracy in biological processes, including ligand binding (MTB selective drug design), protein-protein (DJ-1 dimerization and Parkinson's disease), protein-DNA (DNA recognition by spo0A during transcription) and Protein-RNA (release factor binding to mRNA), RNA-RNA (Group II introns) interactions, viral RNA recognition by RIG-I etc.

xxxi. **Bio Process Analytical Technology (BioPAT) Laboratory (Dr. Senthilkumar Sivaprakasam):** The lab develops PAT technology for recombinant therapeutic proteins and value added compounds such as biopolymers, organic acids etc. PAT is defined as 'System for designing (process development), analysing and controlling manufacturing process, based on timely measurements of critical quality and performance attributes of raw material, in process materials and processes with the goal of ensuring final product quality'. PAT methodology envisages the identification of Critical Process Parameters (CPPs) and Critical Quality Attributes (CQAs) for every process. The CPPs are the indication of the overall reliability that a process proceed in the desired direction. Therefore, their monitoring and control establishes the uniform product quality. 'Quality by design' in the PAT emphasizes that monitoring to be accomplished not only during the process, but should begin from raw material characterization, its processing, upstream process, product recovery, downstream process and till the polishing step. Therefore, this reduces the much effort emphasized by regulatory authorities on ensuring quality.

xxxii. **RNA Binding Proteins Laboratory:** The laboratory focuses on the RNA-binding proteins that are involved in the splicing machinery. During splicing of premature mRNA, the spliceosome deposits a multiprotein complex termed exon-junction complex (EJC) onto the mRNAs. The subunits that form the core EJC are eukaryotic translation initiation factor 4A3 (eIF4A3), Y14, MAGOH and barentsz (BTZ, CASC3, and MLN51). Many proteins interact with the core EJC and our focus of study is a protein complex termed as Apoptosis- and Splicing-Associated Protein (ASAP). Components of both ASAP and EJC have been found to function in a wide range of activities pertaining to RNA metabolism including splicing, translation, nonsense-mediated mRNA decay (NMD) and apoptosis. We are currently focusing on the following research areas: Understanding the functions of ASAP with respect to EJC in mRNA metabolism. Elucidating the molecular involvement of RNA-binding proteins (RBPs) in various human diseases such as cancers, neurodevelopmental disorders. Exploring the post-transcriptional gene regulations of different RBPs.

xxxiii. **Protein Biophysics Lab (Prof. R. Swaminathan)**: The main research focus in this lab is to investigate the structure, function and dynamics of proteins using spectroscopic techniques like UV-Visible spectroscopy and Fluorescence spectroscopy. Intrinsic electronic absorption and luminescence spectra in proteins originating from photoinduced electron transfer and charge recombination, respectively are actively studied. These novel spectra discovered in our lab are employed to monitor events like protein folding or aggregation in a label-free approach.

xxxiv. **Calcium signaling laboratory (Dr. Ranjan Tamuli):** We are interested to understand the molecular mechanism of calcium signaling pathway using the model filamentous fungus Neurospora crassa. Calcium ion is a universal second messenger molecule that impacts almost all cell processes in eukaryotes. We hope to extend our research to understand the role of calcium signaling in memory, learning, and other related areas in future

xxxv. **Laboratory for Stem Cell Engineering and Regenerative Medicine (Dr. Rajkumar P. Thummer):** Autologous cell-based therapy is a promising alternative to achieve repair or regenerate damaged cells and/or tissue without any immune rejection. Our laboratory “Stem Cell Engineering and Regenerative Medicine”, mainly focuses on generation of human cells using safe, integration-free reprogramming approaches to derive clinical-grade cells for transplantation. The outcome of our research will bring patient-specific cell therapy closer to clinic for treatment of various debilitating.

xxxvi. **Malaria Research Group (Prof. Vishal Trivedi):** The research interests of the lab include Anti-malarial Drug Discovery, Immunotoxcity studies in Macrophages, Regulation of Innate Immune Response, Endothelial Cells-RBC cytoadherence during Cerebral Malaria, Designing immunostimulatory and Anticancer agents.

xxxvii. **Dr. Selvaraju Narayanasamy Lab:** The research interest of the lab include Environmental Biotechnology, Bioprocess Engineering, and Biochemical Engineering.

xxxviii. **Biomechanics and Simulations lab (Dr. Souptick Chanda)**: The Lab is primarily engaged in design and optimization of various orthopaedic implants based on in vitro and in silico biomechanical testing/validations. Simulations for surgery and patient examinations training are also being envisaged at this laboratory.

xxxix. **Computational lab:** The computational lab is used for carrying out the Bioinformatics and Computational Biology Lab, a lab courses of the B. Tech. curriculum.

xl. **Experimental Teaching laboratory:** The laboratory is used to conduct the experimental course of the B. Tech. and M.Tech. curriculam.

4. **Major Equipment and Facilities acquired during 1st April 2020 – 31st March 2021:**

   SynopsysTM Simpleware Medical Imaging Software, Peristaltic pump

5. **Major Areas of Research and Development:**

   Cell signaling, Systems Biology, Plant Tissue Culture & Secondary Metabolites Production, Protein Biochemistry, Molecular Biology, Immuno Prasitology, Biofuel, Biochemical Engineering, Tissue Engineering and Biomaterials, Stem Cell Biology, Cell Therapy & Regenerative Medicine, Organelle Biology, Inter-organelle Communications, Cellular Ageing, Bio-interfaces and Biomaterials, Environmental Biotechnology, Nanobiotechnology, Chemistry-Biology Interface for Developing Antibacterials and Sensors, Stem cell engineering and regenerative medicine, Molecular Parasitology, Computational Biology, Plant Biotechnology, RNA Biology, Structural Biology, Fungal Biotechnology, Molecular Endocrinology, Enzyme and Microbial Technology, Metagenomics, Environmental Biotechnology, Biosensors,Systems Biology, Bioprocess Engineering, Cancer Biology, Bio/Physio Sensors and Nanobioengineering, Biosensors and bio-fuel cells, Neural Engineering. Network medicine, Bio-Nano catalysis, Drug delivery vehicles, Preparation of polypyrrole embedded nanocellulose and surfactant (CTAB) modified carbon adsorbent for efficient elimination of azo-anionic dyes. Elimination of pharmaceutical wastes viz. antibiotics using carbon and grass based nanocellulose adsorbents. Phyto, microbial and fish toxicity studies for ecotoxicological assessment of the prepared adsorbents to understand its significance in eliminating pollutants from aqueous bodies, Biomechanics, Soft computing, Artificial intelligence, Machine learning, Implant design

6. **Major initiatives and breakthrough in Research and Development during 1st April 2020 – 31st March 2021:**

   1. ***Initiatives of DBT programme Support***: Faculty members (Professors Ghosh, Goswami, Bose, Sahoo and Ramesh) involved in DBT Program Support Phase –II project at the Department of Biosciences and Bioengineering, received another major project support from the DBT India on "Translation research programme for developing diagnostics and nano-based sensors". This multidisciplinary programme was formulated based on the major leads of the existing DBT Programme Support project. Besides manpower training and basic research, this new project is aimed to develop sensors and Transfer of Technology (ToT) to the Start-Up companies.

   2. **Prof. S. S Ghosh**: Our group has demonstrated the signaling events in co-targeting triple negative breast cancer cells, movement of hydrogel in constricted microchannel and drug resistant behavior of EMT cells during deformation. In addition, quercetin loaded luminescent hydroxyapatite nanoparticles have been developed in cancer therapeutics. In device front, our collaborative work on development of FET-based POC devices are being persuaded. Our group was actively involved in developing and supplying COVID-19 testing kits to the Government of Assam. The transfer of Technology for a sensor device, and establishment of "SPLID Health Care" start-up at the Research Park of IITG, were also done.

   3. **Prof. Arun Goyal:** Breakthrough:

- Achieved computationally guided drug repurposing for targeting 2'-O-ribose methyltransferase (2′OMTase) of SARS-CoV-2 to combat the COVID-19 infection. The redocking and MD simulation analysis of the best 5 FDA approved drugs revealed that these drugs form a stable conformation with the 2′OMTase. The results suggested that these drugs may be used as potential inhibitors for 2′OMTase for combating the SARS-CoV-2 infection.
- Established the multifunctionality with high activity of endoglucanase, RfGH5_4 from Ruminococcus flavefaciens using TLC and MALDI-TOF MS that makes it a perfect candidate for biomass deconstruction and bioethanol production.
- Improved enzymatic digestibility of Sugarcane bagasse using cocktail of Chimera (CtGH1-L1-CtGH5-F194A) and Cellobiohydrolase (CtCBH5A) for bioethanol production.

Initiatives:

i. SAXS based structure, modelling and molecular dynamics analyses of family 43 glycoside hydrolase α-L-arabinofuranosidase (CtAraf43) from Clostridium thermocellum.

ii. ii. Structure and dynamics analysis of multi-domain putative β-1,4-glucosidase of Family 3 Glycoside Hydrolase (PsGH3) from Pseudopedobacter saltans

4. **Dr. Sachin Kumar**:

- Signed an agreement with Hester Biosciences Pvt Ltd to develop vaccine against COVID-19 using recombinant Newcastle disease virus as a vector.
- Signed an agreement with *Hester Biosciences Pvt Ltd* to develop ELISA basaed diagnostics plateform for various poultry viral diseases.
- Signed a research agreement with *Dalhousie University* to develop viral vector for cancer immununotherpay.
- DBT grant sanctioned for the development of vaccine against African Swine fever virus
- DHR grant sanctioned for the development of diagnostics and biomarker against Japanese encephalitis virus

5. **Prof. Biman B Mandal**: Technology Licensed to Industry:

- Antimicrobial formulation as hand sanitizer: Successfully licensed to Industry i.e. M/S Stanvac Med in 2020.
- (b)Antimicrobial formulation as disinfectant: Successfully licensed to Industry i.e. M/S Berger Paints India Ltd. in 2020.
- (c)Silk based gel for wound healing: Successfully licensed to Industry i.e. M/S Stanvac Med in 2020.

6. **Dr. Lalit Mohan Pandey**:

- Design of Engineered Surfaces for the detection and protection against novel coronavirus SARS CoV-2
- Mechanistic insights of the effect of the thermomechanical process on unfolding and fibrillation of proteins
- Design of engineered nanomaterials for nano-antibiotic and hyperthermia applications
- Experimental demonstration of molasses as a sole nutrient for the production of an alternative metabolite biosurfactant
- Design of multifunctional bio-sorbent beads filter for the treatment of sewage wastewater

7. **Prof. Vibin Ramakrishnan: Mapping drug-target interactions and synergy in multi-molecular therapeutics for pressure-overload cardiac hypertrophy**: Study published in ‘Systems biology and applications’ of nature publishing group, under the guidance of Professor Vibin Ramakrishnan of IIT

Guwahati and Professor C. C. Kartha of Academy of Cardiovascular Sciences, points to the possibility of integrating both systems of medicine. In this study, they presented, probably for the first time, a comprehensive effort to re-invent an Ayurvedic preparation through the scientific protocols of modern medicine, by systematically verifying its efficacy and synergy employing state of the art tools and techniques of drug discovery. Amalaki Rasayana, a commonly made ayurvedic rejuvenate was examined for its efficacy in treating cardiovascular diseases, employing in-vivo studies, gene-expression and proteomics analysis, informatics tools and techniques of systems medicine. Long term oral intake of AR was found to improve cardiac function, and their focus on 'how it works in human system' is explained in the published work

8. **Prof Aiyagari Ramesh:** Multifunctional synthetic amphiphiles were designed to have translational potential as a therapeutic for implant-associated methicillin-resistant Staphylococcus aureus (MRSA) infections and skin wound healing.

9. **Dr. Souptick Chanda**: Double Oblique Device for Osteosynthesis (DODO) of hip: Novel design of proximal femur implant based on the morphometrics of the Northeast (NE) Indian population (Patent filing under process).

10. **Prof. Sanjukta Patra**: Patent granted on a process for application of Xanthine as a scaffold for synthesis of new compounds

International Projects: Strategic planning for water resources and Implementation of novel biotechnical treatment solutions and good practices (SPRING) – Indo EU – H2020 project. 2020-2023 – 9 crores

11. **Dr. Selvaraju Narayanasamy:**

- Preparation of polypyrrole embedded nanocellulose and surfactant (CTAB) modified carbon adsorbent for efficient elimination of azo-anionic dyes.
- Elimination of pharmaceutical wastes viz. antibiotics using carbon and grass based nanocellulose adsorbents.
- Phyto, microbial and fish toxicity studies for ecotoxicological assessment of the prepared adsorbents to understand its significance in eliminating pollutants from aqueous bodies.

7. Conferences/Workshops/Symposia Attended: International, National

S.No	Name of Faculty	Name of Conf./Workshop	Place	Date	International/ National
1	Manish Kumar	Biotechnological approaches in animal research and disease diagnostics	GADVASU, Panjab, India (Virtual)	1-12 February 2021	International
2	Manish Kumar	COVID-19 disease control-opertunities and challeneges for vaccines, bio-therapeutics and diagnostics	VIT, Vellore, India (Virtual)	9-10 July 2020	International
3	Manish Kumar	Modern analytical tools for Bio-medical research and teaching	IIT Guwahati	22-26th Feb 2021	National
4	Kannan Pakshirajan	7th International Conference on Research Frontiers in Chalcogen Cycle Science & Technology	Online mode	10/11/2020-11/12/2020	International
5	Dr. Lalit Pandey	28th International Conference on Processing and Fabrication of Advanced Materials (PFAM28)	VIT Chennai (online)	07/12/2020	International
6	Dr. Lalit Pandey	7th Asian Conference on Mechanics of Functional	Tohoku University, Japan (Online)	13-15/03/2021	International

		Materials and Structures (ACMFMS2020+1)			
7	Prof. Vibin Ramakrishnan	Heart failure conflux	SCTIMST Thiruvananthapuram (virtual)	05/02/2021 – 07/02/2021	International
8	Prof. Vibin Ramakrishnan	Biophysical Society Annual Meeting 2021	Virtual	22/02/2021 – 26/02/2021	International
9	Prof. Lingaraj Sahoo	International Symposium on Advances in Plant Biotechnology and Genome Editing -2021 (APBGE-2021) and 42nd Annual Meeting of Plant Tissue Culture Association (India)	ICAR-Indian Institute of Agricultural Biotechnology, Ranchi	April 8-10, 2021	International
10	Prof. Rajaram Swaminathan	BPS2021: 65th Biophysical Society Annual Meeting	Virtual	Feb 22-26, 2021	International
11	Prof. Sanjukta Patra	Webinar on Nano - Advance Biosensing and Diagnostic Technologies [Deployable Nanobioengineered Sensing Technologies	Indian Institute of Technology (BHU) in collaboration with Nano @ Springer Nature	23/01/2021	International
12	Prof. Sanjukta Patra	Shastri Indo-Canadian Institute sponsored Indo-Canada online workshop on Nano-Bioengineering	Department of Biotechnology, Indian Institute of Technology Roorkee and Centre for Biomedical Research, University of Victoria, Canada	13/03/2021	International
13	Prof. Sanjukta Patra	Flow Cytometry Techniques & Applications	IIT Guwahati	21 /12/2020 &22/12/2020	National
14	Prof. Sanjukta Patra	Intellectual Property Rights and Intellectual Property Facilitation Centre	IIT Guwahati	16/03/2021	National

8. Invited Lectures of Faculty: In India, Abroad (Please do not repeat entries from Sl. No. 10)

S.No	Name of Faculty	Name of Lecture	Name of Inst./Org.	Place	Date
1.	Dr. B. Anand	CRISPR-Cas System: From Genome Defence To Genetic Scissors	Institute of Advanced Study in Science and Technology	Guwahati	28 February 2021
2.	Prof Utpal Bora	STI for Sustainable Food Security	Jorhat Kendriya Mahavidyalaya, Assam	Jorhat	28/02/2021
3.	Prof Utpal Bora	Food Security	Gauhati University	Guwahati	16/03/2021
4.	Prof Utpal Bora	Scope of Biodesign in North-East India: The Way Ahead	Srimanta Sankaradeva University of Health Sciences, Assam	Guwahati	22/01/2021
5.	Dr. Biplab Bose	Percolation in Planar Cell Polarity	The Institute of Mathematical Sciences	Chennai (online talk)	24 September 2020

6.	Prof. Rakhi Chaturvedi	National Seminar on Contemporary Research in Biotechnology	North-Eastern Hill University, Shillong, Meghalaya	live, (virtual event)	March 25, 2021
7.	Prof. Rakhi Chaturvedi	Webinar on Life Sciences	Gauhati University, Guwahati, Assam, India	live, (virtual event)	March 22, 2021
8.	Prof. Rakhi Chaturvedi	TEQUIP Lecture- Plant tissue Culture and its Applications.	IIT Guwahati, Assam, India	live, (virtual event)	February 22 - 26, 2021
9.	Prof. Rakhi Chaturvedi	Webinar on Research Methodology in Sciences-Research & Innovation Ecosystem	Panjab University, Chandigarh, India	live, (virtual event)	Feb 13, 2021
10	Prof. Rakhi Chaturvedi	Webinar on Plant-Environment Interactions and Sustainable Production	Manipal Academy of Higher Education (MAHE), Manipal, Karnataka, India	live, (virtual event)	Feb 10, 2021
11	Prof. Rakhi Chaturvedi	Webinar on Life Sciences and Biotechnology: Recent Trends, Advances and Challenges	University of Delhi, Delhi India	live, (virtual event)	Jan 25-Feb 8, 2021
12	Prof. Rakhi Chaturvedi	International Joint Symposium - Plant Cell and Organ Culture: Value Addition to the Bioresources of NE Region of India	Jointly by Gifu University, Gifu, Japan and IIT Guwahati, Guwahati, India	live, (virtual event)	Dec 8-10, 2020
13	Prof. Rakhi Chaturvedi	Webinar Series -Trends in life sciences	Bangalore University, Bangalore, Karnataka, India	live, (virtual event)	July 27-August 5, 2020
14	Prof. Rakhi Chaturvedi	National Lecture Series-Biotechnology and its Applications	CMP College, Prayagraj, Uttar Pradesh, India	live, (virtual event)	July 18, 2020
15	Prof. Siddhartha Sankar Ghosh	Developing Nanotheranostic Devices and COVID Detection Kits	Emerging Trends in Biotechnological Advancements: Challenges and Prospects in Tackling Human Diseases. NIT Warangal	NIT Warangal (An Online Faculty Development Programme)	17/07/2020
16	Prof. Siddhartha Sankar Ghosh	Translational Research on Theranostic Devices	Recent Advances in Biomedical Engineering, IIT Roorkee	IIT Roorkee (Online)	02/12/2020
17	Prof. Siddhartha Sankar Ghosh	Translational Research on Cancer Theranostics	On World Cancer Day-2021. IASST Guwahati	Institute of Advanced Study in Science and Technology (IASST), Guwahati	04/02/2021
18	Prof. Siddhartha Sankar Ghosh	Biologic Microfluidic Devices in Cancer Research	TEQIP Sponsored Two-day Symposium on “Biomicrofluidics”, IIT Guwahati	IIT Guwahati (Online)	20/02/2021

19	Prof. Siddhartha Sankar Ghosh	Theranostic Applications of Nanostructured Materials	National Conference on "Chemistry of Chalcogenides" (NC3-2021), Pune	Department of Applied Chemistry, Defence Institute of Advanced Technology, Pune (Online)	24/03/2021
20	Dr. Cota Navin Gupta	Futuristic Trends in neurotechnology	Online https://www.youtube.com/watch?v=LK-eR3MBt4w	17/10/2020	International
21	Manish Kumar	Basics of Immunological assay system and ELISA	IIT Guwahati	Guwahati	23/02/2021
22	Manish Kumar	The burgeoning CRISPR-Cas applications	GADVASU	Ludhiana	06/02/21
23	Sachin Kumar	Brief overview on the blood borne pathogens	Sri Venkateswara College of Engineering Pennalur, Sriperumbudur tk, Tamil Nadu-602117	Online	26/03/2021
24	Sachin Kumar	"Discovery of Hepatitis C Virus"	INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY (IASST) Govt. of India, Guwahati.	Guwahati	28/02/2021
25	Sachin Kumar	Understanding the biology of avian paramyxovirus for the development of recombinant vaccine	College of Animal Biotechnology Guru Angad Dev Veterinary and Animal Sciences University	Online	12/2/2021
26	Sachin Kumar	Prospects of viral vectored vaccines	College of Animal Biotechnology Guru Angad Dev Veterinary and Animal Sciences University	Online	11/1/2021
27	Sachin Kumar	Current understanding of SARS-COV-2 biology	School of life sciences and biotechnology, Adamas University	Online	21/05/2020
28	Sachin Kumar	Understanding the biology of Avian Paramyxovirus for the development of recombinant vaccine with special reference to COVID-19	Assam Don Bosco University	Guwahati	27/11/2021
29	Sachin Kumar	Understanding the biology of avian paramyxovirus for the development of recombinant vaccine	IITG	Online	2/8/2020
30	Sachin Kumar	Nanostructured Materials and their Applications in Nanotechnology	IITG	Online	28/10/2020
31	Sachin Kumar	Nobel Prize 2020 in medicine	IITG	Online	20/10/2020

32	Prof. Biman B Mandal	Bioengineered human organs and tissues: The way forward	Society of Polymer Science India, Mumbai Chapter	Online	27/3/2021
33	Prof. Biman B Mandal	Science, Technology and Innovations for SDGs in India and Japan	Yokohama National University, Japan	Online	28/12/2020
34	Prof. Biman B Mandal	Nanostructured Materials and their Applications in Nanotechnology	IIT Guwahati	Online	28/10/2020
35	Dr. Shirisha Nagotu	"Seeing is believing?: the impact of microscopy on biological research"	TEQIP short term course entitled Modern analytical tools for Bio-medical research and teaching, IIT Guwahati	Online	23/02/21
36	Dr. Shirisha Nagotu	"Seeing is believing: the impact of Confocal microscopy on biological research"	Online Training on "Biotechnological Approaches in Animal Research and Disease Diagnosis" College of Animal Biotechnology Guru Angad Dev Veterinary and Animal Sciences University	Online	1/02/2021
37	Kannan Pakshirajan	Challenges in metal bio-recovery from wastewater by sulfide precipitation	National University of Ireland Galway	Online	11/12/2020
38	Kannan Pakshirajan	Bioenergy and nano biochar from biomass gasification waste: a biorefinery approach	Coimbatore Institute of Technology	Online	21/10/2020
39	Kannan Pakshirajan	Treatment and value addition of refinery wastewater using Rhodococcus opacus	National Institute of Technology Warangal	Online	11/09/2020
40	Kannan Pakshirajan	Microbial synthesis and characterisation of metal nanoparticles from contaminating metal ions in wastewater	Coimbatore Institute of Technology	Online	24/08/2020
41	Kannan Pakshirajan	Recent trends in biohydrogen production	National Institute of Technology Andhra Pradesh	Online	06/07/2020
42	Dr. Lalit Pandey	Design of Engineered Surfaces for Prospective Detection of SARS-CoV-2	One Day Virtual Outreach Programme, IIT Guwahati	Guwahati (Online)	18/12/2020
43	Prof. Vibin Ramakrishnan	Systems biology applications for cardiovascular drug discovery	SCTIMST Thiruvananthapuram	Thiruvananthapuram	05/02/2021
44	Latha Rangan	Flow Mining for Genome Size Estimation	Indo US Cytometry Workshop	Virtual	26/02/ 2021
45	Latha Rangan	Homeopathy & Traditional Medicine	Sukul Institute of Homeopathic Research	Virtual	20/1/2021
46	Latha Rangan	Role of biotechnology in understanding the impact of climate change on plants	IIT Guwahati	Guwahati	8/12/2020

47	Latha Rangan	Bio-economy Research & Innovation for Post COVID World	5th NE Summit	Virtual	16-18/11/ 2020
48	Latha Rangan	Mining *Pongamia* alias 'Karanj'- Journey So Far	Tripura University	Virtual	7/11/2020
49	Latha Rangan	Herbal therapeutic product development	IIT Guwahati	Guwahati	16/11/2020
50	Latha Rangan	Zingiberaceae: Ethno-medicinal usage and Genome variation	Mizoram University	Virtual	7/9/2020
51	Latha Rangan	GM Seeds and IPR: Two opposite sides of the same coin.	NERIST, Arunachal Pradesh	Virtual	4/8/2020
52	Prof. Lingaraj Sahoo	Field trial of RNAi-transgenic cowpea exhibiting resistance to MYMIV	ICAR-Indian Institute of Agricultural Biotechnology	Ranchi	08/04/2021
53	Prof. Lingaraj Sahoo	Small RNA on the move	Refresher Course on "Life Sciences" at Gauhati University	Guwahati	15/03/2021
54	Prof. Lingaraj Sahoo	Gene discovery – Understanding Gene Function	Refresher Course on "Life Sciences" at Gauhati University	Guwahati	16/03/2021
55	Prof. Lingaraj Sahoo	RNA interference-based resistance in Cowpea against Geminivirus	National Webinar on "Advances in Biotechnology for Sustainable development at Gangadhar Meher University	Sambalpur	12/09/2020
56	Prof. Lingaraj Sahoo	Sustainable Utilization of Bioresources of Northeast India –Indo-Japan Cooperation	Webinar of Centre of Excellence of North East India Studies (under RUSA 2.0) Utkal University	Bhubaneswar	10/08/2020
57	Prof. Lingaraj Sahoo	Sustainable Management of Natural Resources in Northeast India – Experience from Indo-Japan Cooperation	Royal University, Guwahati	Guwahati	20/06/2020
58	Dr. Priyadarshi Satpati	Classical Molecular Dynamics Simulation and Biomolecular Recognition	Chemical Society Department of Chemistry, IIT Jodhpur.	Virtual mode	19/03/2021
59	Dr. Priyadarshi Satpati	Biomolecular Recognition - Insight from Molecular Dynamics Simulations	International workshop: Tools and techniques to perform molecular modelling and computer-aided drug design. (MMTT-2021, Virtual mode), January 11th-17th, 2021, Department of	Virtual mode	14/01/2021

			Medicinal Chemistry, NIPER Guwahati.		
60	Dr. Priyadarshi Satpati	How Biomolecules Recognize Right from Wrong - Insight from Molecular Dynamics Simulations	Faculty Development Program on "Recent Trends in Computer Simulations for Applications in Biotechnology: Teaching and Learning Strategies". Department of Biotechnology in association with the Teaching Learning Centre (TLC), NIT Warangal.	Virtual mode	20/08/2020
61	Dr. Selvaraju Narayanasamy	Water Purification from Lab scale to Pilot Scale	NITK Surathkal	Mangalore	19.03.2021
62	Dr. Selvaraju Narayanasamy	Experimental and Mathematical modeling of environmental engineering problems	SRM University	Chennai	20.09.2020
63	Dr. Souptick Chanda	Finite Element (FE) Based in silico Assessment of Orthopaedic Implants	1st National Conference on Materials, Mechanics & Modelling, NIT Jamshedpur	NIT Jamshedpur	29/08/2020
64	Dr. Rajkumar P. Thummer	Reimagining Education System for Health Care Professionals: Innovations; From an Indian Perspective	Asian Institute of Nursing Education (AINE)	Guwahati	17/07/2020
65	Dr. Rajkumar P. Thummer	Transfection and visualization of cell	Department of Biosciences and Bioengineering, Indian Institute of Technology Guwahati	Guwahati	24/02/2021
66	Dr. Rajkumar P. Thummer	Stem Cells for Biomedical Applications	Department of Biosciences and Bioengineering, Indian Institute of Technology Guwahati	Guwahati	25/02/2021
67	Prof. Sanjukta Patra	Algae in environmental restoration and biomass valorization: An ecofriendly sustainable process	Indo-Sri Lanka International Webinar, 8th- 9th March, 2021 (ISW-21)- "Global trends in Algal Research: Environmental Restoration, Biomass Valorization and Sustainability, IIT Delhi	IIT Delhi	08/03/2021
68	Prof. Pranab Goswami	Bioelectronics of Bioelectrodes involved in Amperometric and Biofuel cell Biosensors	Tezpur University	Tezpur	27th February, 2021

69	Prof. Pranab Goswami	Biofuel Cell: An emerging Sensing Device for Advance Healthcare Applications	Maharaja Ranjit Singh Punjab Technical University	Punjab	24th February, 2021
70	Prof. Pranab Goswami	Biofuel Cell: A Smart Sensing Device for Advance Healthcare Applications	GEMS Arts and Science College, Kerala	Kerala	17th September, 2020
71	Prof. Pranab Goswami	Biofuel Cell: A smart Sensing Device for Advance Healthcare Applications	Assam Science and Technology University (ASTU)	Guwahati	10th September, 2020
72	Prof. Pranab Goswami	Application of Advance materials for efficient signal transduction in electrochemical biosensors	School of Mechanical Engineering, KIIT, Bhubaneswar	Bhubaneswar	25th July, 2020
73	Prof. Ranjan Tamuli	Real Time-Polymerase Chain Reaction	TE-QIP-3 short term course on "Modern analytical tools for Bio-medical research and teaching", IIT Guwahati.	Department of Biosciences and Bioengineering, IIT Guwahati	22nd February 2021

9. Visitors from Other Institutes / Universities / Organisations / Invited Lectures
(**Only distinguished visitors invited by appropriate authority**)

S.No	Name	Name of Inst./Univ./Org.	Purpose/ Name of Lecture	Date	Remarks
1	Dr. Athi N Naganathan	IIT Madras	Understanding the Design Principles of a Protein Sensor	9/10/20	
2	Prof. Niels H Gehring	University of Cologne, Germany	Maintenance and Quality Control of Mammalian Gene Expression	16/10/20	
3	Dr. Namrata Jain	HORIBA India Scientific	Follow Nanoparticle Size, Count & Kinetics using Advanced Multi-laser Nano-tracking Analyzer	6/11/20	
4	Dr. Rama Akondy	Emory University, Atlanta, USA	Human memory CD8 T cell responses	13/11/20	
5	Dr. Ravi Manjithaya	JNCASR, Bangalore	Insights into mechanisms of autophagy flux by chemical genetic approaches	20/11/20	
6	Prof. Thorsten Wohland	National University of Singapore, Singapore	Four Lectures on Fluorescence Correlation Spectroscopy (FCS) for students of BT624 course: Fluorescence Techniques in Biotechnology.	2, 6, 9 and 10 Nov 2020	Prof. Wohland is a world renowned expert in FCS.

10. Seminars/Workshops/Conferences/Short-Term Courses Organised

Sl. No.	Name of Faculty (Convener/ Co-ordinator, etc.)	Name of Sem./Wor./Con.	Funded By	Date	International/ National	No. of participants
1	Dr. Biplab Bose	Course on Measuring and Modeling the Epithelial/Mesenchymal Plasticity (EMP) Spectrum.	Online (organized jointly by IISc, Bangalore and Queensland University of Technology	16 Oct 2020	International	
2	Dr. Bithiah Grace Jaganathan Prof. G. Krishnamoorthy	Workshop on Flow Cytometry Techniques & Applications	IIT Guwahati (Online)	21 to 22.12.2020	National	100+
3	Prof. Biman B. Mandal and Dr. Uttam Manna	6th National Workshop on "NEMS/MEMS and Theranostic Devices" NWNTD 2020 (Online Mode)	Ministry of Electronics and Information Technology (MeitY), Govt. of India	December 1-3, 2020	National	280+
4	Prof. Biman B Mandal (Co-convener) jointly with IITD, IISC	30th SBAOI Annual Meeting, 12th STERMI Annual Meeting & International Virtual Conference on Biomedical Materials Innovation ICBMI-2020 (Online Mode).	SBAOI	December 06-09, 2020	International	400+

A brief report on the major NATIONAL and INTERNATIONAL events with photographs may also be given separately in addition to the format given above.

11. Patents:

No. of Patents Applied with details: 14

No. of Patents Granted with details: 02

Sl. No.	Name of Faculty and co researcher	Name	Date Applied/Granted	Application No.	Remarks
1.	**Prof. Sanjukta Patra**; Nivedita Singh	Xanthine as a scaffold for synthesis of novel compounds	26/02/2021	359847	Granted
2.	**Prof. Pranab Goswami**, Priyanki Das,	Graphite paste ink with sericin for enhancing the conductivity and stability	07/10/2020 (Granted)	201631022633	The patent has been granted to the patentee

	Mallesh Santhosh, Phurpa Dema Thungon				PROF. PRANAB GOSWAMI for the term of 20 years from the 1st day of July 2016 in accordance with the provisions of the Patents Act,1970
3.	**Sachin Kumar**, Rajiv Gandhi, Shankar Chinchkar	A recombinant vaccine for covid-19	May 20, 2020	202031023926	Applied
4.	Uttam Manna, Avijit Das, **Sachin Kumar**	Method of preparing disposable water-repellent mask and a product thereof.	APRIL 03, 2020	202031014922	Applied
5.	Vimal Katiyar, Doli Hazarika, Amit Kumar, **Sachin Kumar**	A process of preparing an antiviral nanofabric and an antiviral nanofabric thereof	21st April 2021	202131013654	Applied
6.	**Prof. Biman B Mandal** and Bibhas K. Bhunia	Antimicrobial coatings and preparation process thereof	3/4/2020	202031014932	Filed
7.	**Prof. Biman B Mandal**, Saptarshi Biswas and Bibhas K. Bhunia	Hemostatic silk fibroin composite powder	28/11/2020	202031051948	Filed
8.	**Prof. Biman B. Mandal** and Janani G	Silk-Liver ECM composite for bioartificial liver	24/12/2020	202031056432	Filed
9.	**Prof. Vibin Ramakrishnan**, Dr. Aparna Rai	Amalaki Rasayana constituents for the treatment of cardiac hypertrophy	22/06/2021	TEMP/E1/28937/ 2020-KOL	Applied
10	**Prof. Vibin Ramakrishnan**, Dr. Aparna Rai	Repositioning of Existing Drug Molecules for Treatment of Cardiac Hypertrophy	22/06/2021	TEMP/E1/28939/ 2020-KOL	Applied
11	Sanjana Senthilkumar, Sadokpam Shreekant, Manish Kumar Gupta, Heeramoni Boro, Prof. Rajaram Swaminathan, **Prof. Latha Rangan**	Device for evaporation and recovery of organic solvents using simple labwares	06/02/2021	202131005168	Provisional patent application applied
12	Puneet Talesara, Aditya Kochar, Senthilmurugan Subbiah, **Selvaraju Narayanasamy,** Rohan Sharma	Disinfectant Tunnel	03.11.2020	202011030617	Applied

13	Puneet Talesara, Harish Vyas, Senthilmurugan Subbiah, **Selvaraju Narayanasamy**	A Smart Conveyor System for Disinfecting Belongings & Hands And Predicting Viral Infections	02.11.2020	202011027891	Applied
14	Puneet Talesara, Harish Vyas, Senthilmurugan Subbiah**, Selvaraju Narayanasamy**	A smart checkin system and method for disinfecting hands & belongings and predicting viral infection	02.11.2020	202011024053	Applied
15	**Prof. Rakhi Chaturvedi** Ruchira Bajpai and Vijay Kumar Mishra	A method for in vitro production of pure line haploids and doubled haploids in *Camellia* ssp.	09/09/2020	201931024739	Applied
16	**Prof. Rakhi Chaturvedi** Ruchira Bajpai and Priyanka Srivastava	A method for in vitro production of haploids and doubled haploids in *Azadirachta indica* A. Juss.	11/03/2021	201931033189	Applied

12. Awards and honours (Only awards/honours at national/international level from reputed organisations)

1. **Prof Utpal Bora**: Top Cited Paper Award, 2020' as an author of one of the top 1% most-cited papers in materials published over the period of 2017-2019 for the publication "Electrospun silk-polyaniline conduits for functional nerve regeneration in rat sciatic nerve injury model, Suradip Das *et al* 2017 Biomed. Mater." by IOP publishing.
2. **Dr. Sachin Kumar:** ICMR- Dr. J. B. Srivastav Oration Award. ICMR Virology Research Citation/Cash.
3. **Prof. Biman B Mandal:** SWARNAJAYANTI Fellowship 2020 in Life Science Department of Science and Technology (DST), Govt of India Scientific excellence. Cash award and citation.
4. **Prof. Biman B Mandal**: S. Ramachandran NATIONAL BIOSCIENCE AWARD for Career Development 2021

   Department of Biotechnology (DBT), Govt of India Scientific excellence Cash award and citation. Dd
5. **Dr. Lalit M Pandey**: Shastri Covid-19 Pandemic Response Grant (SCPRG) Shastri Indo-Canadian Institute Innovative Solutions titled "Nanoengineered Medicines for Treatment of COVID-19"
6. **Prof. Latha Rangan** Elected Fellow Biotech Research Soceity of India (BRSI) Contribution in area of Plant Biotechnology Citation- Plaque
7. **Prof Latha Rangan**: Council Member The Inter-Academy Panel for Women in STEMM 2021-2025
8. **Prof. Latha Rangan:** Elected member Board of Governors BRSI 2021-2023

13. Students' Achievements:

a. Mr. Rajib Shome: Best Poster Award Defence Institute of Advanced Technology (DIAT), Pune Poster Title: D-penicillamine templated Au-Cu bimetallic nanocluster containing nanocomposite inhibits metastatic property of triple negative breast cancer] CitationMr. Pratik Nag (PhD student) got selected for 'DBT sponsored BIRAC-National Biopharma Mission in association with Biotech Consortium India Limited Training program' for a hands-on training in 'Medical Device Prototyping' held at IIT, Kanpur from 13th – 17th January, 2020.

b. Kedar Sharma: COVID-19 Grand Challenge, May 2020 Cash prize of Rs. 10,000.00 for his idea on "Repurposing of FDA approved drug for targeting NEDD8 activating enzyme (NAE) of ubiquitination pathways to combat SARS-CoV-2 infection" in COVID-19 Grand Challenge organized by Indian Institute of Technology Guwahati jointly with IIT Guwahati Research Park.

c. Ms Tanmayee Samantaray: Poster presentation: Meta-Analysis of clinical Symptoms and Data driven Subtyping Approaches in Parkinson's Diseases The Brain Conference, Organizing Country: London, UK Type: International Conference Participant

d. Mr Kamal Shokeen "Deepika Phukan Oncology Research Grant Award" Dr. B. Barooah Cancer Institute Cancer Research Citation, Medal and Cash.

e. Sudhir Morla: COVID-19 Grand Challenge, May 2020 Cash prize of Rs. 10,000.00 for his idea on "Detection of SARS-CoV-2 using Ultrasensitive Magnetic nanoparticle DNA probe-based PCR assay" in COVID-19 Grand Challenge organized by Indian Institute of Technology Guwahati jointly with IIT Guwahati Research Park.

f. Shambhavi Pandey: COVID-19 Grand Challenge, May 2020 Cash prize of Rs. 10,000.00 for her idea on "Possible therapeutic targets of SARS-CoV-2 Infection Cycle." in COVID-19 Grand Challenge organized by Indian Institute of Technology Guwahati jointly with IIT Guwahati Research Park.

g. Dr. Dimple Chouhan INYAS National Award 2020 for Research Excellence Indian National Young Academy of Science (INYAS) jointly supported by Indian National Science Academy (INSA). Best research with societal impact Cash award and citation.

h. Poulami Datta: Best Paper 5th International Conference on Bioenergy, Environmental and Sustainable Technologies" (virtual mode) organized by Arunai Engineering College, Tamil Nadu, India, January 29 – 30, 2021 "Suitability Evaluation of Surfactin Produced by Bacillus tequilensis MK 729017 for Enhanced Oil Recovery Applications" Certificate

i. Aman Bhardwaj International cooperative exchange program National institute of materials science MOU research proposal Fellowship

j. Mr. Vivek Prakash: Among Top 20 ideas for Covid 19 Grand Idea Challenge IIT Guwahati with IIT Guwahati Research Park Research Idea

k. Ms. Tasrin Shahnaz Best Poster SRM Institute of Science Technology Best Poster presentation Citation

l. Mr. Vishnu Priyan V Best Poster SRM Institute of Science Technology Best Poster presentation Citation

m. Dr. Lightson Ngashangva BIRAC-BIG grant (NE region) BIRAC, DBT, Govt. Of India For the proposal: Paper-based kits for onsite detection of methanol and formaldehyde Rs. 25 lakhs approved

n. Dr. Sudarshan Gogoi BIRAC-BIG grant (NE region) BIRAC, DBT, Govt. Of India For the proposal: A paper-based point of care test kit or detection of Pan Malaria and Plasmodium Falciparum Species in Human Blood Serum Rs. 25 lakhs approved

o. Ms. Priyanki Das Fourth prize in Talent Search Contest 2021 Guwahati Biotech Park and Assam Science Society Selected as fourth best Research proposal Trophy and Certificate with 30,000/- cash prize01

14. Any Other (Special Mention)

1. Prof Biman B Mandal:

- Inducted as Editorial Board member of prestigious journal "Biofabrication" published by Institute of Physics (IOP) Publishing, UK with impact factor 8.2
- Inducted as Editorial Board member of journal "In Vitro Models" published by Springer Nature, USA.
- Inducted as Editorial Board member of journal "Frontiers in Bioengineering and Biotechnology, Biomaterials" (Associate Editor) with impact factor 3.64
- Inducted as Editorial Board member of journal "Frontiers in Materials" (Associate Editor) with impact factor 2.70
- Inducted as Editorial Board member of journal "Frontiers in Molecular Biosciences" (Associate Editor) with impact factor 4.1
- Elected "President" of STERMI (Society for Tissue Engineering and Regenerative Medicine, India) for a 03-year period.

2. **Prof. Arun Goyal:**

- Invited for evaluation of research proposals for GYTI 2021 Awards. Feb 2021
- Invited for evaluation of research proposals for SITARE-GYTI Awards by BIRAC, Department of Biotechnology, Govt. of India, Jan 2021
- Invited as member of Assessment Committee Meeting at Center of Innovative and Applied Bioprocessing, CIAB, Mohali for regularization of Scientist, Dec 15, 2020.
- Invited to evaluate proposals for BIRAC's (Biotechnology Ignition Grant) Scheme Sep. 2020.
- Invited to evaluate applications for Shastri Indo-Canadian Institute Grants and Fellowships, Sep 2020.
- Invited as selection committee member for selection of faculty members at Depertment of Biotechnology, IIT Hyderabad, 20th Aug 2020

15. Faculty Members (In alphabetical order according to <u>surname</u>)

Sl. No.	Name	Name of the University/Institute/Org PhD degree received from	Designation	Areas of Interest	Date of joining (Not Internal Promotion) for the faculty members who joined during the reporting year
1	B. Anand	Indian Institute of Technology Kanpur, Kanpur	Associate Professor	RNA Biology, CRISPR Biology, Ribosome Biogenesis	25-02-2010
2	Bora Utpal	Institute of Genomics and Integrative Biology, Delhi	Professor	Biomedical Engineering, Biodiversity and Bio-entrepreneurship	22-12-2004
3	Bose Biplab	All India Institute of Medical Sciences	Associate Professor	Systems Biology, Cell signaling, Recombinant therapeutics	30-06-2006
4	Chanda Souptick	Indian Institute of Technology Kharagpur, India	Assistant Professor	Biomechanics, implant design and optimization, surgical simulations and soft computing	02-05-2017
5	Chandra Pranjal	Pusan National University, Busan, South Korea	Assistant Professor and Ramanujan Fellow	Clinical Bio-sensors, Paper-based bio-sensors, Nano-medicine, Material engineering, Microfluidics and Nanomachines.	21-07-2015
6	Chaturvedi Rakhi	University of Delhi, Delhi	Professor and Dean, Alumni and External Relations (AER)	Plant Cell, Tissue & Organ Culture, Protoplast Isolation and Regeneration, Isolation, Purification and Characterization of Plant Secondary Metabolites	17-06-2004
7	Chaudhary Nitin	CSIR-Centre for the cellular and Molecular	Associate Professor	Peptide self-assembly and amyloid aggregates, Peptide-membrane	28-03-2011

		Biology, Hyderabad		interactions Curvature inducing proteins	
8	Das Debasish	Indian Institute of Technology Bombay	Professor	Metabolic engineering, Biochemical engineering, Modelling of fermentation process, Biofuel	17-02-2010
9	Dasu V. Venkata	Indian Institute of Technology Madras	Professor	Bioprocess Development, Metabolic Engineering	22-07-2004
10	Ghosh Siddhartha S.	Indian Institute of Chemical Biology (IICB), Kolkata	Professor	Cancer Gene Therapy, Nanobiotechnology, Molecular Pathways Involving Drug Resistance	10-03-2003
11	Goswami Pranab	Gauhati University	Professor (HAG)	Biosensors and Biofuel cells	16-12-2002
12	Goyal Arun	Indian Institute of Technology Kanpur, Kanpur, India	Professor and Former Head	Molecular Biology, Protein Engineering, Rational Enzyme Engineering, 3-Dimensional Structure (In silico, crystal and solution) and Function analysis of enzymes and their industrial (Biorefinery, therapeutic, food, Pulp and paper) applications	25-08-2003
13	Gupta Navin	Brain Computer Interfaces and Neural Engineering (BCI-NE) Group, University of Essex	Assistant Professor	Imaging Genetics, Biomedical Signal/Image Processing, Multimodal Analysis,Computer Aided Diagnosis, Biomedical Instrumentation	23-01-2017
14	Jaganathan Bithiah G.	Johann Wolfgang Goethe University, Frankfurt, Germany	Associate Professor	Stem Cell Biology, Cancer signaling	15-01-2009
15	Kanaujia Shankar Prasad	Indian Institute of Science Bangalore	Associate Professor	Structural Biology and Bioinformatics Studies	23-04-2012
16	Kumar Manish	University of Maryland, College Park, USA	Associate Professor	Molecular interaction of host-pathogen-vector of infectious diseases	25-06-2012
17	Kumar Sachin	University of Maryland, College Park, USA	Associate Professor	Molecular biology of paramyxoviruses	24-04-2012
18	Kunnumakkara A. B.	University of Calicut, Kerala	Professor	Role of inflammatory pathways in cancer development, Identification of novel biomarkers for cancer diagnosis and prognosis, Cancer drug discovery.	01-08-2012
19	Limaye Anil Mukund	Indian Institute of Science Bangalore	Associate Professor	Hormonal regulation of gene expression	17-11-2008

20	Maiti Soumen Kumar	Indian Institute of Technology Bombay	Assistant Professor	Bioprocess Engg, biofuel	18-03-2014
21	Mandal Biman B	Indian Institute of Technology Kharagpur	Professor	Regenerative Medicine, Biomaterials, Tissue Engineering, Stem Cells	31-05-2011
22	Nagotu Shirisha	University of Groningen, Groningen, The Netherlands	Assistant Professor	Organelle biology and Inter-organelle communication, Cellular Ageing, Membrane fission and fusion	23-07-2015
23	Pakshirajan Kannan	Indian Institute of Technology Madras	Professor	Environemental Technology	12-07-2004
24	Pandey Lalit Mohan	Indian Institute of Technology Delhi	Associate Professor	Bio-interfaces and Biomaterials, Protein's adsorption and aggregation, Nanomaterials and composites for Biomedical applications, Environmental Chemical Engineering	19-03-2014
25	Patra Sanjukta	Central Food Technological Research Institute, Mysore	Professor	Enzyme and microbial technology, Metagenomics, Biosensors, Environmental Biotechnology	01-10-2007
26	Ramesh Aiyagari	CFTRI, Mysore (Degree awarded by Mysore University)	Professor	Nanobiotechnology, Chemistry-Biology Interface for Developing Antibacterials and Sensors	06-01-2003
27	Ramakrishnan Vibin	Indian Institute of Technology Bombay	Professor	Computational Biology, Bioinformatics, Biophysics, Bio-Organic Chemistry, Bio-nanotechnology	12-07-2011
28	Rangan Latha	University of Madras (Research work carried at IRRI, Manila)	Professor and HOD	Molecular systematics, Biofuel, IPR	29-11-2004
29	Sahoo Lingaraj	Maharshi Dayanand University, Rohtak, India	Professor	Genetic engineering and functional genomics of plants	23-12-2002
30	Saini Gurvinder Kaur	Andhra University, Visakhapatnam	Professor	Fungal Biotechnology, Biological Control, DNA fingerprinting and Transformation studies, Studies on extracellular enzymes and toxic metabolite production, Development of a potent biopesticide	17-12-2002
31	Satpati Priyadarshi	Indian Institute of Science Bangalore	Assistant Professor	Classical molecular dynamics (MD) free energy simulation, Electronic Structure calculations that predict the structure, properties, reactivity, bonding etc. of small molecules	01-06-2015
32	Selvaraju Narayanasamy	Indian Institute of Technology Madras, India	Assistant Professor	Environmental Biotechnology, Bioprocess Engineering, Biochemical Engineering	24-04-2017

33	Senthilkumar S	Central Leather Research Institute, Chennai	Associate Professor	Biocalorimetry, BioPAT, Real-time monitoring and control of bioprocess systems	15-06-2011
34	Singh Kusum K	Institute of Molecular Medicine, Heinrich-Heine University of Duesseldorf, Germany	Assistant Professor	Post-transcriptional gene regulation by RNA binding Proteins	13-07-2015
35	Swaminathan Rajaram	Tata Institute of Fundamental Research, Mumbai	Professor	Protein Structure and Function; Protein Charge Transfer Spectra.	16-04-1999
36	Tamuli Ranjan	CSIR-Centre for the cellular and Molecular Biology, Hyderabad	Professor	Calcium signaling, Genetics, DNA repair	26-12-2008
37	Rajkumar P. Thummer	University of Groningen, Groningen, The Netherlands	Assistant Professor	Stem Cell Engineering and Regenerative Medicine	23-07-2015
38	Trivedi Vishal	Central Drug Research Institute, Lucknow	Professor	Intracellular Signaling in Plasmodium falciparum	13-07-2009