List of Equipments for the financial year 2024-25

	Name of the equipment	Justification	Quantity
1	CD spectrometer	Circular dichroism is one of the most heavily used techniques in understanding the changes in structures of biomolecules at low resolution. This method is used to rapidly detect changes or content of secondary structures in protein and nucleic acids. It can also be used to investigate charge transfer or electronic transfer processes. It can also inform about large changes in tertiary structures of proteins. There are multiple users for the same in BI. We have also witnessed rush of users for the CD instrument from adjoining institutes/universities in the city.	1
2	Peptide synthesizer	Peptides are important tools in different aspects of life science research. They can be used as antimicrobial agents, can be used as drugs, may be used as model systems to study fibril formation etc. To achieve such goals, researchers need to synthesize many different variants of peptides, often with unnatural amino acids or containing unnatural linkages. There are multiple users from the institute as well as from other organisations in the region.	1
3	Tip-Enhanced Raman Spectroscopy (TERS)	TERS is a state-of-the-art Raman facility for label-free super-resolution physical and chemical imaging of nanomaterials and biological samples.The new facility will provide a platform for interfacial research on nanobiology.This will be a unique facility at Bose Institute.This new facility will be used by the scientists of physical, chemical and biological sciences in Bose Institute.	1
4	Water Bath Sonicator for Genomic DNA Shearing	The specialized sonicator is used for shearing genomic DNA, chromatin etc in a controlled manner to produce desire length of ds DNA and is useful for many laboratories in the institute. Thus, the equipment will be immensely useful	1

		for the entire bioscience research community.	
5	Live Cell Imaging & Analysis Instrument	A live cell imaging cum analysis instrument combines age old lab tested protocols and reagents with powerful automatic imaging and analysis. These instruments have the capability of imaging live cells for differential times ranging from hours to weeks, while inside the incubator. Data acquired is usually saved remotely in a computer. Various cell based assays are possible - kinetic studies in cell migration, apoptosis induction, proliferation, neuronal activity, chemotaxis etc. Both fluorescent and non-fluorescent imaging and analysis are possible. Presently, BI does not have such a facility, and hence would need this instrument which will cater to all scientists carrying out cell biology related studies.	1
6	Mass photometer	The equipment is useful for 1) Sample characterization 2) Protein oligomerization 3) Biomolecular interactions 4) Macromolecular assemblies. This equipment is a new innovation and would be useful for any biological laboratory.	1
7	Automated Microbial Colony Counter	Almost all scientists of Biology at Bose Institute work with microorganisms for various purposes, ranging from purely microbiological researches to those using microbes as tools for biochemistry, biophysics, molecular biology and genetics. In all these workflows counting microbial colonies during growth is a routine job that is currently rendered via tedious, time-consuming and intellectually less-productive human labour. Use of an Automated Microbial Colony Counter in such endeavours can not only expedite our experimental procedures but also help us get much more accurate, and hence reliable, data.	1
8	Hybrid detectors for SP8 confocal	The older generation detectors on the SP8 confocal limit the use of the microscope as most users are no longer satisfied with the quality of images this system produces, compared to those of	1

		the newer Stellaris 5 confocal. The main impediment to desired imaging quality is the low quantum efficiency of the detectors. Upgrading to the HyD detectors, which have considerably more quantum efficiency, will make the two platforms (SP8 and Stellaris 5) equally useful. This will extend the life of both confocal microscopes. Two detectors are needed as most researches do colocalization experiments where two fluorophores are imaged simultaneously. List of in-house users: Frequently used by Pallob Kundu, Shubho Chaudhuri, Anupama Ghosh, Anirban Bhunia, Kaushik Biswas, Atin Mandal and Srimonti Sarkar; other faculty members also use on an infrequent basis Possible revenue generation: Many external users, including those from IACS, SINP, Jadavpur University, NIT Durgapur, Calcutta University, Kalyani University etc.	
9	Z galvo stage	Provides fast and accurate z-scanning. This will enable the current confocal system to generate more precise 3D imaging. 3D imaging is fast emerging as a powerful tool to understand cellular processes and many events and subcellular features cannot be deciphered without 3D imaging. The Z galvo stage will enable more accurate 3D image acquisition and help our researchers make even more meaningful contributions to science.	1
10	UltraHigh Resolution FESEM with EBL, EDS & Other Accessories.	For study of surface morphology of nanostructured materials, biological samples. Chemical composition of the materials, Nanofabrications	1
11	X-ray Crystallography Screening Facility	Crystallization of proteins require high throughput screening. Robotics for preparation of screens, setting up crystallization trials using nanolitre volumes and automated monitoring of the drops therefore becomes an indispensable necessity for difficult	1

		targets. As mentioned above, such a cutting-edge facility is unavailable in this part of the country. Thus, BI can allow users from academia and industry on pay-per-use basis which will make it financially self-sustainable and help the institute earn revenue.	
13	Green house with climate control system	Studying plants for multiple generations is essential for obtaining meaningful data regarding its properties. Many model crops and plants undertaken in this WP have specific climatic condition requirements for their growth and reproduction. Requirements to follow these plants for multiple generations necessitate creating thoroughly-controlled artificial environment that can only be achieved by high precision greenhouse with automatic control of climatic condition set up.	
14	Portable photosynthesis system	Comparison of physiological parameters between a healthy and stressed plant, as well as wild type and transgenics are essential component of WP1. Such an advanced instrument to screen a large number of plants currently is not available in our institute. Due to the lack of a suitable instrument we now rely on visual assessments and crude measurements of plant growth parameters, which are not acceptable for publication in standard journals. This instrument is capable of precisely measuring multiple physiological parameters, including photosynthetic efficiency and transpiration rate. Such facility is not available in the region and will be an invaluable addition in the plant research community.	1
15	Facility for Quantitative Imaging	The existing high-resolution imaging facility at Bose has efficiently catered to the needs of in-house researchers and those from the greater scientific community for close to 20 years. This has been possible as newer instruments, which kept pace with the changing needs of researchers, have been procured to augment existing	

		capabilities. With the recent advances in quantitative imaging, there is a need for further augmentation as the existing microscopes fall short. To address this lacuna, an assembly of microscopes is being proposed that will satisfy various quantitative imaging needs, including samples of various thicknesses and light sensitivity. The following instruments will be needed: a) Inverted, mechanical fluorescence (5 filters) microscope with phase contrast b) High-resolution, fully automated wide-field, fluorescence microscope with high quantum efficiency camera and capable of real-time 3D de-convolution, along with TIRF and live cell imaging capability c) Confocal microscope with live cell imaging capability and with pulsed laser source(s) capable of exciting dyes that fall within the entire visible spectrum for performing lifetime fluorescence experiments. Should be capable of imaging of the far-red dyes and must have at least 5 high quantum efficiency detectors of which at least two will be capable of supporting FLIM application d) Quantitative image analysis workstation (2 nos.) e) Data storage system with data backup (24 TB)	
16	Droplet digital PCR system	Bose Institute presently carries out frontier research in diverse areas of cell and molecular biology in multiple prokaryotic and eukaryotic systems. These include organisms such as Mycobacteria, Archaea, diverse animal cell lines, plants such as Arabidopsis, tobacco, rice, tomato, lentils, etc. Accurate quantification of gene expression is required on a routine basis for molecular biology studies, and forms the foundation for understanding the diverse pathways of development, stress tolerance, disease progression, etc. Traditional qPCR-based	1

		quantification of gene expression is a laborious method and requires extensive optimisation to understand the absolute gene expression level. Next-generation sequencing data is a viable option but is prohibitively expensive and cannot be utilised on a regular basis. Under such a scenario, the digital droplet PCR system can be a beneficial, cost-efficient, and robust alternative to undertake absolute gene quantification on a regular basis. The system performs parallel PCR reaction in thousands of nanoliter-sized PCR droplets thereby quantifying absolute gene expression levels utilising the Poisson statistics and proprietary algorithms. It eliminates the need for calibration standards or keeping endogenous housekeeping genes for quantification. Consumable and equipment costs are lower than chip-based digital PCR systems. Therefore, the purchase of this instrument is recommended on an urgent basis to accelerate progress of research in the institute.	
17	Institutional facility for Software	Database access and software for genome, proteome, transcriptome analysis, molecular dynamics and docking studies, electron microscopy, analysis of images and pathways.	
18	Flow cytometer (analyser and sorter)	Flow cytometer utilizes immunological principles to differentially assess cell populations, broadly on the basis of size and granularity, and more specifically on the basis of expression of cell surface markers. This enables quantitative analysis of not only differential cell populations in a milieu of heterogeneous cell types, but also is widely used to quantify expression of specific proteins in the concerned cell population. A wide variety of assays including but not limited to quantifying apoptosis, cell cycle, marker analysis, cell proliferation and stemness characteristics etc are possible with this instrument. The present flow cytometer is more than 10	1

		years old and is near the end of its life expectancy, both mechanically as well as technologically. Hence, the immediate need for procurement of a flow cytometer keeping in mind the wide range of applications from various areas of biological science.	
19	Small Animal whole body imager (PET/CT)	The current proposal requires the translation of experiments into in vivo system, which involves experimentation with small animals like mice, rat, hamster etc. For such in vivo studies, a small animal whole body imager (PET/CT) is essential.	1
21	Instrument system for mechanical and electronics facility	To design, build, repair the mechanical and electronic instruments by the researchers themselves. It will save time and resources for customized mechanical and electronic devices.	
22	Ageing measurement facility fully equipped with DAQ	This set-up will be necessary for ageing measurements of gaseous detectors that we will be used in heavy ion experiments. There will be facility for accelerated charge accumulation in shorter time using high rate of radiation but in a controlled environment. This will be a national facility of any kind of gaseous detector in India. At present such ageing facility is available only at CERN, Switzerland; GSI, Germany and Amsterdam. Since India is one of the countries in the world producing different gaseous detectors for different particle physics experiments, so this system will be useful for other collaborating institutes and the system can generate revenue for the institute.	
23	System for GEM foil production using photolithographic technique	Instrument system for GEM foil production is one of the main components of the proposed WP. In eastern part of India there is no GEM foil production system. Once it is set up, we can build the GEM foils needed to build GEM detectors. Successful production of GEM foil will enable the institute supply GEM foils to other institutes for research and earn revenue.	
24	Nuclear astrophysics	The facility at Bose Institute is essential to complement nuclear astrophysics	

	facility:	studies carried out at accelerators like CERN-ISOLDE and GANIL. The response of the detectors is to be studied at the facility to complement experiments in the accelerators. The facility would also be useful to study beta-gamma coincidence.	
25	Single Particle Soot Photometer	For real-time monitoring of the black carbon or soot particles portioned into aged or coated soot and freshly emitted soot particles. This would help us to understand the contributions from the local emissions as well as the contributions from the long-range transport.	1
26	Aerosol Chemical Speciation Monitor	For determining the real-time mass of major inorganic and organic compounds of aerosols in order to understand the effect of aerosol chemistry on the formation of cloud, as well as the effect of aerosol chemical compounds in the modification of cloud microphysical properties.	1
27	Cloud Droplet Probe	For real-time monitoring of cloud microphysics, like cloud droplet size and number to understand the role of aerosols on microphysical changes of clouds. Isotope analyser would be used to better understand the cloud water isotopic fractionation process. Instruments are not available locally. The data generated will be of national importance.	1
28	Wideband integrated bio-aerosol sensors	For determination of bioaerosol concentrations on real time basis. Eastern Himalaya is a good emitter of bio-aerosols because of its huge biosphere cover. Instruments are not available locally. The data generated will be of national importance.	1
29	Ion Chromatograph and accessories	Aerosol samples collected from various sites or ecosystems could be analysed in terms of water-soluble inorganic and organic species using ion chromatograph. Ion chromatograph could also be used to detect and quantify the market compounds associated with various emission sources of aerosols.	1

30	RH controlled Nephelometer	Provides real-time spectral values of scattering coefficients in micro-scale with a very high-resolution time interval (1-min), which are prime natural quantum scattering processes under WP3. It is a very sophisticated modern instrument that provides the scattering within entire visible radiation. Combination of Aethalometer and Nephelometer provides a great opportunity to investigate perturbation in Earth's radiation budget.	1
31	Close cycle cryostat (2 K)	For the study of temperature dependent electronic, vibrational and optical properties. Study of quantum phenomena at low temperature.	1
32	Maskless lithography setup	For fabrication of quantum devices, photodetectors, IR sensors, energy storage devices, photon harvesting devices and Bio sensors.	1
33	Optical and Electron beam lithography facility	For the nanofabrication, all the instruments listed here are essential. Some of the instruments are available in the nearby institutes, but nanofabrication recipe is extremely sensitive to the environmental conditions. The recipe will change in different laboratory. To get an optimum recipe, a lot of standardizations are required. Therefore, all the instruments are needed in one clean room. Dedicated cluster is essential to carry out the numerical simulation and data analysis for each of the mentioned work plan	1
34	Probe station	For transport characteristics of materials, photo sensing measurements, I-V characteristics of quantum devices.	1
35	Wire bonder	For electrical connection of quantum devices, photodetectors, IR sensors, energy storage devices, photon harvesting devices and Bio sensors.	1
36	Chemical vapour deposition system	Fabrication of 2D, 1 D quantum materials for the fabrication of devices	1
37	Atomic force microscope (AFM)	For Contact, Semi-Contact, Non-Contact, Lateral Force Microscopy (LFM), Piezo Force Microscopy (PFM), Phase contrast, Magnetic Force	1

		Microscopy (MFM), Single-Pass MFM, Electrostatic Force Microscopy (EFM), Single-Pass EFM, Scanning Kelvin Probe Microscopy (SKM), Scanning Capacitance Microscopy (SCM).	
38	2D transfer system	The instrument will be used to transfer and manipulate 2D layer materials, fabrication of heterostructures.	1
39	**Electronics modules, plastic scintillators, PMT**	Presently Bose Institute is contributing to the research program of up-gradation of the ALICE Time Projection Chamber (TPC) with Gas Electron Multiplier (GEM) at CERN, Geneva and on the Muon Chamber (CBM-MUCH) of CBM experiment at FAIR, Germany. The goal of the ALICE experiment is to study the physics of Quark-Gluon Plasma (QGP) at low baryonic density and high temperature, whereas that of CBM is to study the QGP physics at low temperature and moderate to high baryon densities. ALICE is currently using Gas Electron Multiplier (GEM) as the readout chamber in its TPC. India is fully responsible for the Muon Chamber (MuCh) of CBM experiment. In the Muon Chamber (MuCh) of the CBM experiment at FAIR triple GEM detector will be used in the first two stations and Resistive Plate Chambers (RPCs) will be used in the 3^{rd} and 4^{th} stations. At Bose Institute, we are doing extensive R&D on these detectors. We have also started research and development on the RPC detector using indigenous materials for the muon system of the future ALICE3 experiment. We also have interest to join the future International Linear Collider experiment. An array of seven plastic scintillator detectors is operational at an altitude of about 2200 m above the sea level in the Himalayas at the Centre for Astroparticle Physics & Space Sciences, Darjeeling campus of Bose Institute, for detection of cosmic ray air showers	

		since the end of January 2018. Our group is also involved on the research of such scintillation detectors. Our R&D program includes research on Resistive Plate Chamber (RPC), Gas Electron Multiplier (GEM), Straw tube detector, Multi Wire Proportional Chamber (MWPC) and Scintillation detector (for cosmic ray study). Very recently in the lab we also started R&D of semiconductor detectors. At Bose institute we would like to build a national detector laboratory facility where all kind of advanced radiation detectors can be built and characterized. We also have plan for production of large size real detectors for future experiments. To build such a facility we need (i) Electronics modules, plastic scintillators, PMT (ii) dedicated gas distribution system (iii) setup for ageing measurement, mainly for different characterization of the detectors. In the lab our students and scientists can work and make them suitable to work in the advanced experiments worldwide.	
40	List of equipments for radioactive facility	List of equipments needed for radioactive usage room (Annexure I)	
41	Mammalian cell culture facility and one dust free room	Mammalian cell culture facility is needed for everyday maintenance, growth and culture of mammalian cell, cancer cells, both adherent and suspension, as well as isolation and culture of cells from primary cancer tissues. Individual facility is needed for 10 scientist of the institute. Presently no such facility is available at Unified academic campus. One dust free room will be used for sophisticated experiments of physics	10
42	Biosafety level 2 lab facility (BSL-2)	Several researchers of Bose Institute need a dedicated Biosafety Level 2 lab (BSL-2) facility for their research. BSL-2 lab is a must requirement for working	1

		with human samples (like sputum, blood, tissues), risk category level –II microbes, and environmental samples (air/water). There is an assigned P-2 lab in room no. 642 (sixth floor). To make this room a BSL-2 lab, a few equipment are required like a Biosafety cabinet, cold centrifuge, sonicator, refrigerator, pipettes sets, dustbins. The BSL-2 lab also requires a sink for handwashing, bench tops, lab furniture (like chairs, benches, and cabinets), proper lights and ventilation	
43	Inverted Fluorescence Microscope	Inverted microscope will be used in my laboratory for regular research works to study live cell imaging from cultured plates, estimation of transfection efficiency, visualization and localization of expressed fluorescent proteins etc.	3
44	Stereo Zoom Microscope with Imaging System	This microscope will be used to visualize micromolecular crystals.	1
45	Miltimode Reader machine	Multimode Reader will be used in my laboratory regularly to measure luminescence, fluorescence, absorbance required for assays involving DNA/RNA/Protein/biomolecules from various biological samples.	3
46	Real Time PCR	Real Time PCR will be used in my laboratory regularly to check quantity and quality of gene expression of DNA/RNA from various biological samples.	3
47	**-80 Refrigerator**	-80 refrigerator will be used in my laboratory regularly to stock human cells, RNA, frozen animal and patient tissues, Bacterial competence cells and fine chemicals etc.	7
48	**CO_2 incubator**	CO2 incubator will be used for cell culture laboratory regularly to keep live human cells, mouse cells for different experiment purpose.	4
49	**Chemidoc**	Chemi dock will be used to detect and analyze proteins and nucleic acids. It will be used in various applications,	2

		including protein and DNA gel electrophoresis, western blotting, DNA sequencing, microarray analysis, etc.	
50	**Rotary evaporator**	Rotary evaporators are an integral part of a chemistry lab. We will need a rotary evaporator for chemical synthesis and purification every day. Rotary evaporators will be required to remove solvents from a mixture and drying samples. Apart from solvent removal, solvent distillation and purification can also be performed in a rotary evaporator.	1
51	**Nano Drop Spectrophotometer**	Nanodrop will be used for protein, DNA, and RNA quantification. Alongside this, it will be used for bacterial growth measurement. Various enzymatic assays and sequencing sample preparation will require a nanodrop.	1
52	**High-Resolution Mass Spectrometry (HRMS) System/Nano-LC couples with orbitrap technology**	High-resolution Mass Spectrometry/Orbitrap system is state-of-the-art equipment for performing label-free proteomics and metabolomics research using complex biological samples. Faculties of the Department of Biological Sciences and the Department of Chemical Sciences of Bose Institute are working intensely on proteomics and metabolomics urgently need a Nano LC-MS system instrument capable of operating in tandem mass analyzers (quadrupole and ion mobility) with mass accuracy of less than 1 ppm. This instrument should equipped with a software system, including Label-free proteomics, metabolomics, glycan analysis, and third-party software like MASCOT. A high-end workstation PC for data processing is required for data storage and analysis. One such complete system will help Bose Institute scientists generate high-quality research data and solve complex biological problems.	1
53	200 kV HRTEM with sample preparation setup.	High resolution imaging of the nanostructured materials, biological samples, Elemental analysis, cross sectional view, imaging at low temp and	1

		site preparation for commissioning	
54	**Bio-safety cabinet BSL2**	The instrument will be used for culturing mammalian cells , viruses and primary cells in a sterile environment	3
55	**M.Sc PhD Life Sciences and Physical Science**	List of equipments for M.Sc.PhD Annexure II	
56	**Central Facility for High end computing**	List of equipments and Justification Annexure III	
57	Rotary Vaccum Evaporator	To evaporate different solvents used in organic chemical synthesis during workup and several column purifications. This equipment is required in multiple numbers to evaporate solvents having different boiling points simultaneously in our laboratory at different temperatures below the boiling point regularly.	3
58	Microwave Synthesizer	The **microwave synthesizer** is required to set up a synthetic organic and medicinal chemistry laboratory at the Department of Chemical Sciences. The instrument is very much essential for doing organic synthesis. It is suitable for performing of all types chemical reactions; it is also able to perform synthetic reactions under pressurized conditions. It is also capable of handling several specific types of reactions such as organo-metallic reactions, nanomaterial synthesis, fluorination, catalytic reaction, and routine organic synthesis. We do not have such an instrument device in our department. Therefore, we need to procure this item on a priority basis.	1
59	**FTIR**	Analysis & Characterization of small molecule, metal organic framework, functional group identification, detection of conformational change of protein, for absorption or emission of a solid, liquid state. Requirement of simultaneous collection of high-resolution spectral data over a wide spectral range.	1
60	**NMR 600 MHz Dual Probe**	This Instrument facility required for identification and characterization of	1

		small molecule, metabolites; to assign stereo-chemical configuration of known organic and bio-molecules & other macromolecules, to confirm structural integrity & purity of active pharmaceutical ingredients & also to perform solid state NMR spectroscopy, This Instrument facility of Bose Institute will serve to many research community of not only Bose institute but also other institutes in an around Kolkata. However, the existing facility is incapable of doing solid-state NMR. Our institute faculty members are now interested in dual-probe NMR spectroscopy.	
61	**Modular customised fume hood**	The 8 fit bench top fume hood with nitrogen and chilled water inlet and temperature control is required to set up synthetic organic and medicinal chemistry laboratory. The fume hood is essential for organic synthesis and handling of hazardous chemical and solvents, handling of chemical having foul smell and harmful fumes. The specification is as per the earlier purchased Chemical hood in our Institute. We do not have such hood in our department. This is an urgent requirement to resume our research activities.	2
62	**Ice Flake Making Machine**	Ice flake machine will be used for ice requirement for doing routine biological experiments	7
63	**Procurement of GI Cloud service (for hosting DNS Web Intenet)**	Hosting of physical servers	1
64	Office Furniture's		
65	NIM & VME Combine Crate (NV8020A)	There have been three major data acquisition standards used in modern nuclear physics. The earliest (NIM) and the latest (VME) data acquisition standards co-exist in present day nuclear physics labs and at accelerators. The NIM and VME combine crate	1

		1) allows one to use both NIM and VME electronic modules in it and is thus very convenient 2) it is economical 3) it saves space by using a single crate instead of two types of crates	
66	Fully automated fluorescence imaging system for real time 3D imaging	Decode 3D Biology in Real Time* An organoid approximately 150 μm in diameter mounted onto a depression slide for Model Organism. The system will image Model for the 3D exploration of whole organisms used for developmental or molecular biology research, Imager will removes the out-of-focus blur that comes with three-dimensional samples through Computational Clearing, an exclusive new breakthrough technology. The system will benefit from the imaging speed, maximum fluorescence efficiency, and ease-of-use common to widefield microscopes. Rapid acquisition of blur-free images showing fine details, even from 500 μm deep within thick organisms, Keep even large model organisms under excellent physiological conditions during imaging, Simplify your organism handling for a more efficient imaging and analysis workflow	1
67	Next Generation Aethalometer	The 'Next Generation' Aethalometer continuously analyses a sample air stream for the Black Carbon (BC) and brown carbon, components of aerosol particulate Matter (PM). The analysis is performed by the measurement of optical absorption, simultaneously at 7 wavelengths from 370 nm to 950 nm on a time base of 1 second or 1 minute. The instrument is self-contained with an internal pump and graphical touch-screen interface to the full-featured computer providing measurement, analysis, network communications, internal diagnostics and data storage. No such instrument is available at Bose	1

		Institute while procurement of this instrument will be helpful to all the scientists who are working on carbonaceous particle (black Carbon and brown carbon), global warming, air pollution, climate change, air quality and health.	
68	Micro-Pulse lader	From enhancing research ability on aerosol-cloud interactions and weather forecasts to monitoring air quality, Micro-Pulse LiDAR (MPL) is a remote atmospheric monitoring, which provides data in real time and the sophisticated laser remote sensing system uses the most advanced single-photon-counting detectors trusted by NASA. It is the fastest and most accurate decision based on the reliable information from the MPL's continuous and autonomous monitoring the vertical structure of atmosphere. Most importantly, if it is installed at Bose Institute, Kolkata in near future, then it will be the first lidar in Eastern India and help doing research on 'Asian Haze', air quality and its effects on health, and forecasting of occurrences of fog and monsoonal rain. No such instrument is available at Bose Institute while procurement of this instrument will be helpful to all the scientists who are working on atmospheric sciences.	1
69	Ceilometer	Ceilometer measures cloud height and vertical visibility for meteorological and aviation applications. The instrument transmits fast, low-power laser pulses into the atmosphere and detects back-scattered returns from clouds and aerosols above the instrument. It can be used the investigation of cloud properties. No such instrument is available over Eastern India while procurement of this instrument will be helpful to all the scientists who are working on atmospheric physics, electronics, and remote sensing techniques. This instrument can also be used in Integrated MSc courses.	1
70	Upright Fluorescence	The fluorescent microscope helps in counting the living particles in three	1

	microscope	different wavelengths (blue, green and red). It contains high efficiency camera. It gives an opportunity to fluoresce the cells using DAPI method to count total cells (Blue), using FITC to count living cells (Green), and using propidium iodide to count dead cells (Red). It is useful for many research works related to Environmental Microbiology in our institute.	
71	OC-EC analyser	Lab-based Organic Carbon coming living and non-living organisms can measure very accurately (0.2-600 microgram/cm2) to understand their role in cloud formation. This instrument has been used to analyse a wide variety of sample types, including: ambient urban and rural areas, forest fire plumes, Himalayan forest emitted organic material, marine organic material. No such instrument is available at Bose Institute while procurement of this instrument will be helpful to all the scientists who are working on atmospheric sciences. This instrument can be used in different branches of Physical Sciences, Physical Optics, Earth and Climate Change, and part of Integrated MSc courses too. There is a possibility to be part of revenue generation for providing sample analysis of outside of our institute.	1
72	Fluoresce Scanner cum Phosphor Imager	Our existing instrument is more than 5 Years old and one part is not working. Many scientists and scholars are heavily dependent on this instrument for their assay. Any downtime hampers the experiments as it involves the use of radioisotopes which have a very short half-life. We need an immediate standby instrument which can eventually replace the old equipment.	1

73	Whole Body Plethysmograph (WBP) for mice + associated software	WBP will allow monitoring of the pulmonary functions (Force expiratory volume of the ung), heart rate, and blood pressure of live mice in a non-invasive way. This instrument is essential for studying animal models in respiratory diseases like asthma, COPD and lung cancer. This instrument will also be useful for drug screening against diseases like lung cancer, asthama and COPD.	1
74	Mice inhalation exposure unit with computer-controlled system for 12 mice + associated software	This instrument is the industry standard for developing respiratory disease-specific models like asthma and COPD. The allergens and ovalbumin are exposed to mice using the computercontrolled system to make sure that all the animals were equally exposed to the foreign particles. This instrument is essential for the animal model study of asthma research.	1
75	Trans Epithelial Electrical Resistance (TEER) instrument	TEER measures the electrical resistance in epithelial cell lines after exposure to small chemicals including metabolites, environmental pollutants, and smoke. This instrument will be useful in studying the perturbation effect of small chemicals on the epithelial cells and thus will be used in vitro screening.	1

Annexure I

List of equipment required for the radioisotopes-usage room

Sl	Particular of Assets	Qty
1	Scintillation counter	1
2	table top centrifuge (refrigerated)	1
3	table top centrifuge (non-refrigerated)	1
4	Thermal Cycler PCR	1
5	Dry bath	4
6	20C Freezer	2
7	Refregerator	2
8	Vertical gel running system	2
9	GM counter 2 nos	2
10	High voltage power supply	1
11	Gel Dryer	1
12	Hybridization oven	1

Annexure II

List of equipment required for M.Sc-PhD Life Science and Physical Science

Particular of Assets	Qty
Desktop PC Windows and UPS	26
Bio-Safesty	1
Ionization chamber based spectrometer with accessories	An ionization chamber based spectrometer is required to perform various nuclear physics experiments at the Int. MSc-PhD lab.
Single channel Alpha Spectrometry System	A Single channel Alpha Spectrometry System is required to perform experiments at the Int. MSc-PhD lab

Annexure III

Central Facility for High end computing

In modern research, high-end computing facility is indispensable not only for focussed theoretical and computational researchers, but for most researchers working in various branches of science nowadays. Only a well-planned centre for computation and data of appropriate scale can support this. Bose Institute is yet to have any central facility for all the faculty and scholars of this institute. So far only select project-based facilities have been available that could only serve a few faculty. However, in the current age of digitization and AI based technologies, such facilities are too insufficient and primitive. Further, high-end computers get outdated and cannot compete with newer computers in terms of speed and capacity of data handling. This is because after 5-7 years older machines frequently malfunction and parts become obsolete and unavailable. Most the existing computing servers are suffering from such old age issues so they have become mostly useless for current research, not to speak of future needs.

Therefore, we urgently need to have a central facility to cater for various requirements. The components, namely processors, GPUs, memories, communication channels *etc*. of modern high-end servers and clusters are customized. They are chosen based on the kind of end-user applications and computations that users require. So we propose this facility in modular form so that each component could be optimally chosen for that particular type of research and thus would be highly thrifty and cost effective.

Sl.	Component name	Purpose	Justification
1.	Complete system for Computational Facility (customised for Department of Physical Sciences)	Studies on strong interactions, relativistic nuclear collisions, astro-particle physics, early universe studies, complex systems, statistical physics, information theory, networks, game theory, quantum physics and quantum information, condensed matter, mathematical modelling, atmospheric modelling *etc.*	The earlier system (functioning since 2011) has become outdated and is barely functional for quite some time now. A new system is urgently needed to support the existing and future needs of 10+ faculty members.
2.	Computing server/cluster [GPU enriched system for computational Biology]	Dedicated for full time Computational Biology research for Molecular dynamics simulations, drug design, big data analysis, machine learning, etc.	The existing small setup, used by the Bioinformatics groups, is almost outdated. Their scholars will be in trouble unless a new facility is immediately installed.
3.	Computing system to complement with CryoEM National facility with at least 4 GPU	Large scale data processing and analysis for CryoEM facility, structure prediction in Chemistry and Biology, for internal and external users.	There is no such facility as of now. Also, the CryoEM will serve external and internal users. Therefore the computing facility must be large enough to handle

	(professional)		that requirement.
4	Large Scale (~petabyte) data storage for the CryoEM facility	To store data for the users in house and from the rest of the country	Right now there is no such facility at BI, but it is mandatory for the CryoEM National facility.