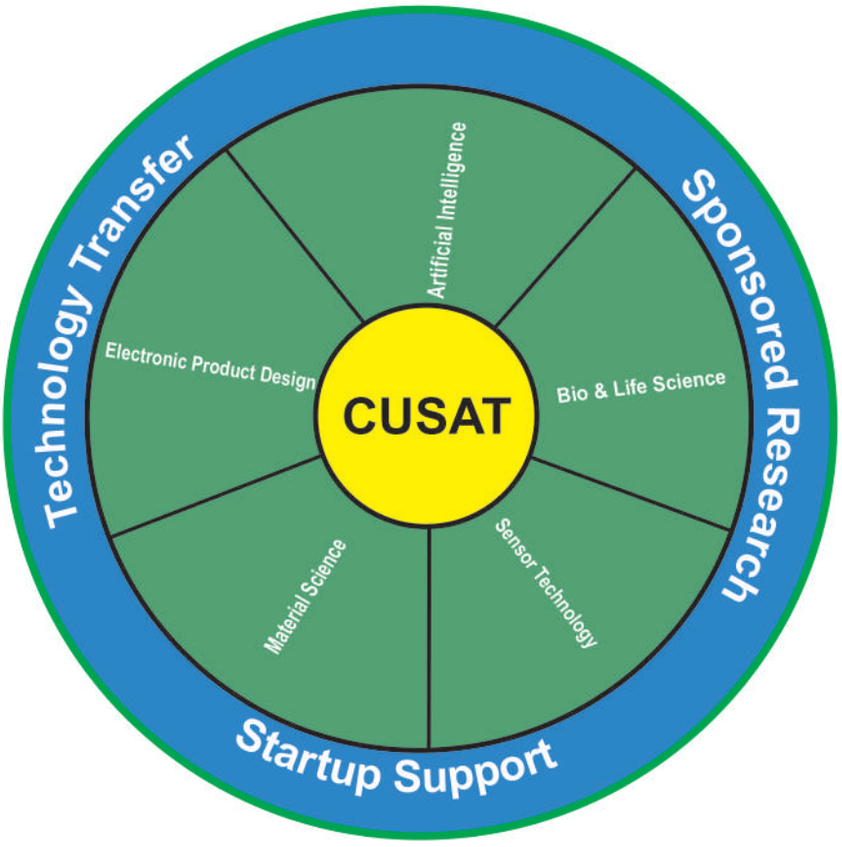
COCHIN UNIVERSITY OF SCIENCE AND TECHNOLOGY

50 YEARS
CELEBRATING KNOWLEDGE

Proposal on

TRANSLATIONAL RESEARCH AND INCUBATION CENTRE



Submitted by

Cochin University of Science and Technology

Proposal for setting up a

TRANSLATIONAL RESEARCH & INCUBATION CENTRE

in CUSAT

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Cochin University of Science and Technology
CUSAT, Cochin 22

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1. Background

India has a wide network of government funded research institutions and universities who produce world class research in many frontier areas of importance to mankind. But in most of the cases, many potential benefits of these breakthroughs are likely to end on the page without a company willing to invest in bringing the invention to marketplace. There seems to be an ever increasing need for establishing avenues of engagement with industry, transfer knowledge and create value.

The Higher Education sector is undergoing drastic changes over the last one decade. Innovation has become the new buzzword in the field of higher education. Innovation thrives when faculty, students and industry professionals interact through various modes of engagement. Both industry and academia stand to benefit from such long-term cooperation. Companies will gain greater access to cutting-edge research and scientific talent. Universities will gain new directions and partners in research. It also provides valuable experience for students in working in real situations. Most importantly, society will benefit from a stream of advances — in life sciences, biomedical engineering, communications, environmental sciences, artificial intelligence, and more — that will vastly improve everyone's life. The fruits of research in the university will reach the society resulting in new jobs and new solutions to society's problems.

Translational research is aimed at converting results in basic research into results that directly benefit society. Scientific discoveries are moved from the laboratory into real-world practice, leading to improved human life. In the last decade, there has been an explosion in the number of engagement among companies and universities across the globe. How University of Oxford's world-class expertise in vaccinology and AstraZeneca's global development, manufacturing and distribution capabilities came together to develop a new coronavirus vaccine has become a popular case study of industry academia collaboration in the recent past. Similarly, Pfizer and University of California San Diego have created teams of university and industry scientists that combine the best academic thinking with the drug development expertise of industry to accelerate the development of new drugs for patients. A collaboration agreement between GlaxoSmithKline

(GSK) and the University of Cambridge puts academic scientists into the laboratories on the GSK campus. India's first university-based research park, IIT Madras Research Park epitomises what can be achieved by a confluence of bringing industry and academia together. Spread across 11.42 acres, the park provides over 1.2 million square feet of workspace. The Applied Science Park for Innovation Research and Entrepreneurship (ASPIRE) of IIT Mumbai and the Research & Innovation Park of IIT Delhi are other examples where premier academic institutions, Industry and Government collaborate with an intent of developing new technology and advancing Knowledge.

Cochin University of Science and Technology (CUSAT), the only Science and Technology University in the state of Kerala, can lead the effort of the Government of Kerala to accelerate translational research in the state. CUSAT has become a top ranked research university in India providing pioneering research in nine Faculties viz. Engineering, Environmental Studies, Humanities, Law, Marine Sciences, Medical Sciences and Technology, Science, Social Sciences and Technology. With 31 teaching departments and 26 centres of excellence in cutting edge technology domains, CUSAT pioneered the interdisciplinary academic and research programs in the state of Kerala through its flagship programs in the domain of Marine Sciences, Engineering Sciences, and Environmental Sciences. The core basic science and technology programs stood as a main pillar of support to these initiatives to achieve critical goals in these programs. CUSAT has research collaboration with many well-established premier research institutions in the country as well as Universities abroad. Over the course of 50 years, CUSAT has accumulated numerous research facilities and has won several funded projects. Departments have built a strong history of implementing funded projects and grants from agencies such as DST, DRDO, DBT, ICMR, MoES, KSCSTE etc. Research Infrastructure was created though infrastructure grants like DST - FIST, DST - PURSE, UGC-SAP, UGC-CAS etc. Recently, Govt. of Kerala has supported CUSAT though KIIFB by way of providing built – up space and modern equipment. It has 8000 students in the campus including 1200 PhD scholars and 2000 PG students. CUSAT has a well developed

campus right on the side of the National Highway in Kochi, the commercial capital of Kerala. CUSAT has two vibrant Technology Business Incubators in the campus hosting 50+ startups in various domains such as Electronics, IT, Ship Technology and Marine science. A FABLAB sponsored by Kerala Startup Mission is also available in the TBI. To foster innovation, CUSAT has set up CUSATECH FOUNDATION, a company under section 8 (1) of the Companies Act, 2013. Winner of the prestigious Chancellor's Award for the best University in the State thrice, CUSAT is a world-ranking university consistently figuring in the Times Higher Education World Ranking and in QS World University Ranking. Computer science research at CUSAT which is a combination of several departments in computing, has been recognized in worldwide rankings. School of Engineering, CUSAT has obtained TEQUIP Phase 3 and most of its divisions have NBA accreditation.

This proposal outlines the details of CUSAT TRANSLATIONAL RESEARCH CENTRE which will serve as a base for technology businesses to set up and grow leveraging on the strengths of CUSAT and other academic institutions and research centres in the state.

2. CUSAT Translational Research Centre Details

The CUSAT Translational Research Centre will contribute to the promotion of state of the art research and development by offering a range of collaborative partnership models with industry fostering the growth of new ventures, and promoting economic development. The Centre will offer a collaborative environment between industry and academia through joint research projects, consulting, student internships etc. The proposed Research Centre is a win-win for all - to CUSAT community, to industry, to entrepreneurs, to other universities and research centres of Kerala and to the general public. The Centre will have avenues for our students and faculty to interact more closely with industry and bring to market technological breakthroughs through incubation. The Centre will also have supporting infrastructure such as utility services, restaurants, seminar halls and recreation facilities.

The Centre is proposed to be set up in phases. The phase 1 envisages setting up translational research facilities in five domains namely Bio and Life Sciences, Material Sciences, Sensor Technology, Electronic Product Design and AI & ML. The proposed 30000 sq ft building will also have common amenities including general measurement lab, Fablab, Wetlab, computing lab, Startup space, discussion rooms, conference rooms and cafeteria.

Under The phase II, another 40000 sq ft will be added to provide translational facilities in new domains like Agritech, Fintech, Transportation & Mobility, Medical Technology, Climatic Studies and will provide additional facilities for domains in Phase I. Phase II also proposes providing R & D space for companies planning to set up a unit inside the campus for joint research with CUSAT. The companies get facilities to work closely with the research departments of CUSAT on areas of interest to the firms. The advantages to the companies would be (a) Exclusive research space in a vibrant ecosystem (b) Access to state of the art facilities in the CUSAT campus (c) Access to high quality human resources including faculty and students (d) Access to the research output by the doctoral scholars and initiate technology transfer and commercialization process.

2.1 Objectives

The Translational Research Centre strives to advance the basic philosophy and goals of CUSAT to be a source of enlightenment to all the stakeholders.

VISION

To be a nodal centre for translating the fruits of academic research into products and services for the benefit of the society.

The objectives

1. To engage with Industry on through sponsored R & D for the development of new products and services.
2. To facilitate the protection and transfer of university created discoveries into new products and services.
3. To actively facilitate formation of university-connected start-up companies through an array of support resources and services.
4. To be the nodal centre for translating the research efforts of other universities and public institutions in Kerala.
5. *To provide a base for technology businesses to set up their R & D centres and grow leveraging on the expertise of CUSAT and other academia across the globe.(phase 2)*

2.2 Operating Models supported

The Centre will provide a range of options to the industry to work in collaboration with CUSAT. Some of them are listed below

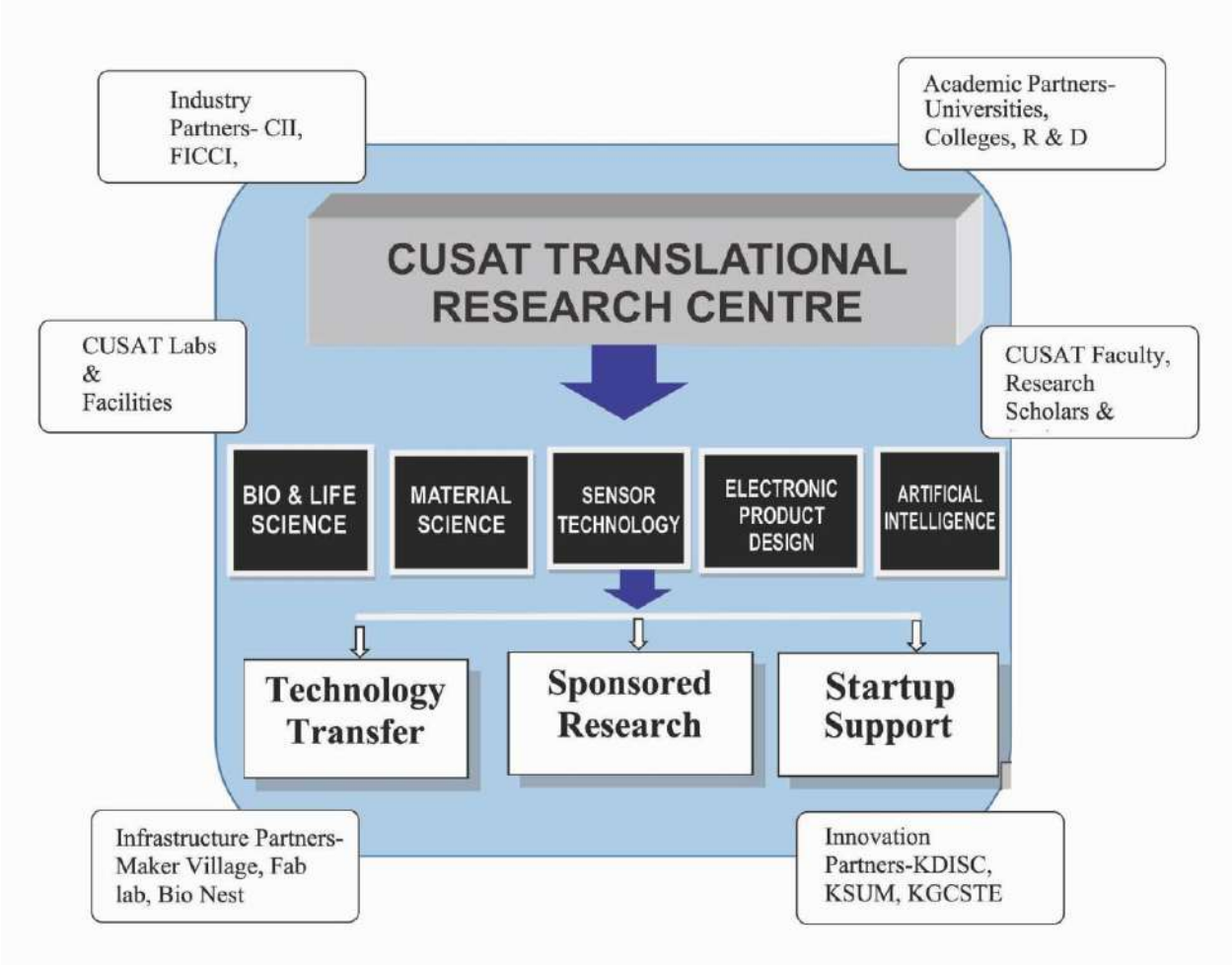
1. Technology transfer: A new or existing company takes up the technology developed by CUSAT for commercialization.
2. Sponsored research: A company wants to improve upon an existing technology or a new idea (product / process). It wants to work closely with the university through a customized sponsored research.
3. New start up assistance: A new start up is looking for assistance in setting up the firm. They need assistance including technical guidance, prototype development and business advisory support.

4. Built up R & D space: A new or existing company is looking for a built up rental space to set by its unit collaborating with CUSAT to utilize its state of the facilities and qualified manpower (Phase 2)

2.3 The Proposed Structure of the CUSAT translational research Centre

CUSAT translational research Centre is conceptualized as a separate and independent campus managed by a governing council headed by the Vice Chancellor of CUSAT. The governing council will consistent of eminent academicians, industrialists and representatives from facilitating government agencies. There will be Faculty in charge under whom a professional CEO and his team will be running the Centre.

The three major constituents of CUSAT translational research Centre would be **(a) TECHNOLOGY TRANSFER (b) RESEARCH SUPPORT and (c) STARTUP SUPPORT**



The **Technology Transfer Support unit** of the Centre will have the mandate of taking the technologies developed inside the university to the industry. It is the major interface between research facilities of CUSAT and industries outside. It will coordinate the translational efforts of the university through technology transfer, startups facilitation and sponsored research. This centre will work closely with the researchers of the university in order to understand the novel aspects and potential applications of their research. This will help to understand the uses and applications of the invention, likely markets, and companies active in the field that might be interested in licensing. If the invention is seen to be of core discovery with future implications or has tremendous use and commercial interest, centre will support patenting. Technology Transfer Support Centre will have the mandate to approach firms who may the potential candidates for technology transfer. It has the final responsibility of choosing the right partners and also of negotiating a technology transfer / license agreement. The centre is responsible for the future of the licensing relationship including monitoring the licensee's performance, receiving reports and royalty payments. Centre with the concerned research department may negotiate the entire lifecycle of sponsored research from proposal submission through award closeout.

The Startup Support Centre (TBI) will take the role accelerating the successful development of entrepreneurial companies through an array of support resources and services. University is an ideal space for new young startups to set up shops and grow. Technology Business Incubators will be functional in domains of expertise of CUSAT. When normal TBIs focus more providing physical space and business support to startups, CUSAT TBI hub will focus more on research and mentoring support in addition to office space. The focus will be on startups setup in the areas of our expertise like Marine science, Electronics, Polymer science, Bio technology, Ship Technology etc where traditional Incubators are at a disadvantage. They can make the best use of the faculty and research facilities in the campus. It will permit the startups to use CUSAT facilities for clinical and field trials and technology proving prototype development.

The Sponsored Research Support Centre will strive to provide R & D support for companies with a research focus. The companies can have their R&D requirement met through the centre. It permits the companies leverage on the expertise available in the campus. Companies working in the identified domains will work closely with the translational research centres on areas of interest to the firms. Through the research support centre, the companies can use facilities in the

departments on a need basis. The advantages to the companies would be (a) Technology Customization (b) Joint Product Development (c) Access to state of the art facilities in the CUSAT campus (d) Access to high quality human resources including faculty and students. The companies in the Centre an leverage the specialized expertise of the faculty; utilize their research facilities, while providing part time employment and experience to the students.

3. Focus Areas of CUSAT Translational Research Centre in Phase I

3.1 CENTRE FOR TRANSLATIONAL RESEARCH IN LIFE SCIENCES AND BIOTECHNOLOGY

The translational research in the domain 'Life Sciences and Biotechnology' at the Cochin University of Science and Technology will act as platform to transfer the novel products and processes developed by the Life Science Departments of the University to Industry and Society.

3.1.1. Aim of the Centre

1. To build and provide an infrastructure to the end users to translate the novel products and processes in life science and biotechnology to address specific problems pertaining to humans and the environment.
2. To transfer the innovative products and processes developed in the domain of life sciences and biotechnology to Industry and Society

3.2.1 Expected outcomes

In the first phase, it is envisaged to develop the infrastructure for scaling - up the production of 'translation - ready - products and processes' developed by the Departments in the domain of life sciences and biotechnology along with the translation of the products to industries. The specific outcomes are:

1. Large fermentation facility for mass production of probiotics required for aquaculture
2. Facility for packing and forwarding the products to aquaculture sector
3. Facility for the large-scale production of anti - viral and anti-*Vibrio* formulations for aquatic animal health management.
4. Marine microalgal bio-mass production facility and transfer of microalgal paste for feed applications to aquaculture industry sector
5. Marine derived terrusinone analogues as UV quencher with improved photostability for use in sunscreen lotions
6. Cold active enzymes for industrial applications
7. Natural organic foliar formulations from shrimp shell wastes

3.2.2 Strength of the University in the Domain Area

Cochin University of Science and Technology has two Departments, two Schools and a National Centre with inter-disciplinary academic and research programmes covering all domains in Life Sciences; from Marine Biology to Human Genetics having state of the art infrastructure distributed over two campuses separated by 15 Km, but well connected through road and metro rail. Having the strength of around 42 faculty members altogether in the domain, the labs of all these Department/Schools are reasonably well equipped having UGC -SAP, DST - FIST supports and generous funding from the Government of Kerala, and the Department of Biotechnology, Department of Science and Technology and Ministry of Earth Science. Precisely, the system has the highest level of capability to address most difficult problems in Life Science and to arrive at solutions. Two start-up companies in Life Sciences, M/s Microbzymes Pvt. Ltd. and M/s Oceanus Biopolymers are incubated at National Centre for Aquatic Animal Health of the University, under CUSATECH foundation.

The University has been translating several products to aquaculture industry and aquafarmers to support zero water exchange culture system with integrated disease management through bioremediation of detritus (Detrodigest), ammonia (Nitrifying Bacterial Consortia) and hydrogen sulphide (Photosynthetic Sulphur bacteria). As part of the recirculating aquaculture system, Nitrifying Bioreactor technology has been developed, patented and commercialized through Oriental Aquamarine Biotech India Private Ltd., Coimbatore. A gut probiotic preparation 'Entertrophotic' has been developed and are being provided to farmers on nominal cost for the management of gut microflora towards preventive health care. A marine yeast, *Candida* sp. MCCF 101 has been developed as feed additive for both finfish and shellfishes. A preparation of *Pseudomonas aeruginosa* (PS -1) is available for the management of *Vibrio* in culture systems. Four anti-viral plant preparations have been developed to protect shrimp from WSSV, IHHNV and MBV, besides having anti Vibrio properties. To speed up the composting of municipal solid waste, a microbial inoculum named Garbactum has been developed, and is being provided to both public and private sector enterprises. The National Centre for Aquatic Animal Health of the University is offering Animal Quarantine and Certification Services to various companies under the Animal Quarantine and Certification Services of Ministry of Agriculture and Farmers Welfare, Government of India. The High-Density Fish Culture under RAS mode Integrated with Vegetable

Cultivation developed by the Centre has been taken over by National Fisheries Development Board under their backyard RAS programme and earmarked subsidy to its takers and there are 100 units established in Kerala with the objective of nutritional security, women empowerment, and rural livelihood expansion. As part of a research project funded by Kerala Biotechnology Commission under industry linked biotechnology scheme, a 50L photobiotector for marine microalgal mass production has been developed for aquaculture application, which is now scaled upto 500L with the financial support of Department of Biotechnology.

As part of a DBT sponsored project a marine natural product, which is a dipyrrolo benzoquinone derivative (Terrusinone) with UV absorption properties as similar to avobenzone, a commercial UV protecting agent used in many cosmetics, has been isolated from marine derived fungus (*Aspergillus sp.*). It is envisaged to investigate the UV quenching potential of terrusinone for developing as a key ingredient in sunscreen lotions, and to explore the possible industrial applications. A microbial culture collection from the Polar Regions, established in the Department of Marine Biology, Microbiology and Biochemistry holds potential species producing several industrial enzymes, which needs to be scaled up further. In addition, two innovative natural foliar formations as market ready products could be developed by the School of Industrials Fisheries from the shrimp processing wastes for superior yield, nutritious vegetables and crops with less pest attacks and diseases.

Patents in the Domain

1. Bioreactors for nitrifying water in closed system hatcheries of penaeid and non-penaeid prawns - Patent Application No. : 828/DEL/2000 dated 13.9.2000. Patent no. 241648.
2. Process of extracting anti – white spot syndrome virus molecules from mangrove plants – Patent application # 2607/DEL/2006 dated 5.12.2006. Patent no. 254984.

Technology Transfer

1. Nitrifying bioreactor technology for recirculating aquaculture systems developed by National Centre for Aquatic Animal Health e has been licensed to M/s Oriental Aquamarine Biotech India Pvt. Ltd., Coimbatore for commercialization.

2. High density GIFT culture under Recirculating Aquaculture System Mode integrated with vegetable cultivation- A technology package developed by the Centre for land based aquaculture in high density has been transferred to field level operations (100 units in Kerala to 56 beneficiaries, 32 units in Teleganga to 16 beneficiaries of SC/ST population, 2 demonstration units in NFDB and NIRD, Hyderabad)

Externally Funded Research Projects during the last 5 years

Sl. No.	Title of project	Funding agency	Sanctioned Budget (Lakhs)	PI/Co-PI/Co-I
1.	Marine Bio-resource and Biotechnology Network Cell and Developmental Biology of Marine Organisms: Cell and Developmental Biology of selected Marine Organisms for Biomedical and Environmental Applications, Period: 2/9/2021 1/9/2024	Department of Biotechnology	301.22560	Coordinator: Prof. I.S. Bright Singh; PI: Dr. Valsamma Joseph Dr. Jayesh Puthumana Co-PI: Prof. Rosamma Philip Collaborating Co-PIs Dr. Jose Sebastian Department of Biological Sciences IISER Berhampur and Dr. Sunil K. George, Wafeforest Re
2.	Marine Bio-resource and Biotechnology Network Integrated genomic and metabolomic approach for the discovery of novel small molecules with anticancer activity from marine microorganisms, Period:28/10/2021 27/10/2024	Department of Biotechnology	83.0416	Dr.Sajeevan T.P, NCAAH Dr.NarenderTadigoppul a, Centtal Drug research Institute Lucknow
3.	Establishment of Bioinformatics Centre (BIC) for Marine Bio-resource Conservation and Sustainable Utilization, Period: 22/2/2021 21/2/2026	Department of Biotechnology	74.992	Principal Investigator & Project CoordinatorDr. Valsamma Joseph Co -Principal Investigators Dr. Sajeevan T.P., Dr. Jayesh Puthumana, Dr. Rosamma Philip, Dr. M.V. Judy, Dr. Jereesh, A.S., Dr. Sanjeev C. Ghadi, , Goa University, Co - Investigator Shibin S.P., Mentors: Prof. Achuthsankar S. Nair Prof. I.S.Bright Singh,
4.	Establishment of Functional Genomics and Metabolomics Platform for Augmented Production of Aquatic Bio-	Performance Linked Encouragement for Academic Studies and	372.43000	Dr.Valsamma Joseph, Coordinator

	Resources and Discovery of Novel Molecules of Biomedical Importance" Period:16/2/2022 to 15/2/2024.	Endeavour (PLEASE) Scheme of Higher Education Department, Government of Kerala		PI: Dr.Sajeevan T,.P, Dr.Jayesh Puthumana, Co-PI: Prof.I.S.Bright Singh,Dr.Manoj N, Dr.Sindu Mathai,Mr.Shibin S.P
5.	Innovative project on High-density fish culture under RAS mode integrated with vegetable culture, (Period. November 2018- Ongoing)	NFDB, Govt. of India	240.51	PI: Prof. I.S. Bright Singh; Co-PI: Dr. Jayesh Puthumana
6.	National Network programme in 'Molecular screening, cell culture based isolation and characterization of finfish and shellfish viruses and establishment of National Repository, Period: 11-07-2017 10-07-2021	Department of Biotechnology	118.663	National Coordinator: Prof. I.S. Bright Singh, PI: Dr. Sajeevan TP, Co-PI: Dr. Rosamma Philip, Co-PI: Dr. Valsamma Joseph
7.	Marine Synthetic biology: building national capacity and human resource, Period: 28-2-2017 27-2-2020	Department of Biotechnology	51.4	PI: Prof.I.S.Bright Singh, Co-PI: Dr.Valsamma Joseph, Co-I: Dr. Sajeevan T.P
8.	Development of induced pluripotent stem cells (iPSC) from *Daphnia pulex* and neural tissue engineering for identification of genetic and epigenetic factors responsible for differentiation and neural-degeneration., Period: 6-3-2017 5-3-2020	Department of Biotechnology, Government of India	70.20	PI: Dr. Jayesh Puthumana
9.	Development of CRISPR/Cas9 engineering platform for genome editing in *Danio rerio* and generation of *mstn*-knock-out lines, Period: 27-3-2019 26-3-2021	UGC, Govt. of India	10	PI: Dr. Jayesh Puthumana
10.	Optimization of Genome Editing for Loss-of-function study in *Danio rerio*-DRE/DRF cell line using RNA-guided Cas9 nuclease,, Period: 14-11-2018 13-11-2020	UGC-SMNRE	3	PI: Dr. Jayesh Puthumana
11.	Bioprospecting for Neuroprotective compounds from an endosymbiotic fungi *Aspergillus* sp. MCCF102 isolated form a marine sponge as potential drug candidates against neurodegenerative disorders Period: 22-02-2019,-21-02-2022"	Department of Biotechnology	53.886	PI: Dr. Sajeevan TP
12.	Nutritional evaluation, segregation and production optimization of novel marine microalgae for establishment as live feeds in fish and shellfish culture	Department of biotechnology, Government of India	70.912	.PI: Dr. Valsamma Joseph, Co-I: Dr. Sajeevan T.P.
13.	Microbiome of Glaciomarine system of Svalbard; diversity and its variability: Period: 14-3-2018 to 13-3-2021	National Centre for Polar and Ocean	40.843	Co-PI; Sajeevan T.P,

		Research, Ministry of Earth Sciences.		
14.	Development of Shrimp anti-WSSV-IgY Antibody Therapeutics (WSSV-IgY-T) from immunoglobulin Y (IgY) using WSSV Antigens and Synthetic Peptides and their Commercial Applications in Aquaculture Industries, Period: 19-11-2019 18-11-2021.	Science and Engineering Research Board, Department of Science and Technology	27.94550	PI: Dr. Jayesh Puthumana
15.	Indo-US initiatives on innovative reforms in marine biotechnology education and research and development of sustainable aquaculture production systems for inclusive economic growth and sustainable development. Period:19-11-2019 18-11-2021	UGC, Govt. of India	125.9	Prof. IS Bright Singh
16.	Evaluating costs and benefits of prophylactic health products and novel alternatives on smallholder aquaculture farmers in Asia and Africa (IMAQualate). Period 2016-2020	DBT - BBSRC - DFID Scheme of DBT	55.232	Prof. IS Bright Singh
17.	Aquaclinics & Aquapreneurship Development programme (AC & DP) (2018,2019)	National Institute of Agriculture Extension Management (MANAGE), Hyderabad, sponsored by National Fisheries development Board, Government of India	1800000	Prof. IS Bright Singh

Extension and Consultancy Services during the last five years

National Centre for Aquatic Animal Health, Consultant Faculty: Prof. IS Bright Singh, University Emeritus Professor

Name of consultancy project	Consulting/Sponsoring agency	Year	Revenue generated (INR in Lakhs)
High Density Fish Culture Under Recirculating Aquaculture System Model integrated with Vegetable Farming	National Fisheries Development Board	2017	89.11
Aquatic Animal Health Management	Aquaculture Industries and Farmers	2016-2017	13.75259
Aquatic Animal Quarantine Services under the Ministry of Fisheries, Animal Husbandry & Dairying as the recongozied Diagnostic Laboratory under Aquatic Animal Quarantine Services	Seafood Exporting Industries	2017	2.4648
High Density Fish Culture Under Recirculating Aquaculture System Model	National Fisheries Development Board	2018	93.8

integrated with Vegetable Farming			
Aquatic Animal Health Management, inclusive of RAS	Aquauclture Industries and Farmers	2017-2018	134.6872
Aquatic Animal Quarantine Services under the Ministry of Fisheries, Animal Husbandry & Dairying as the recongozied Diagnostic Laboratory under Aquatic Animal Quarantine Services	Seafood Exporting Industries	2018	2.1178
High Density Fish Culture Under Recirculating Aquaculture System Model integrated with Vegetable Farming	National Fisheries Development Board	2019	196.98
Aquatic Animal Health Management	Aquauclture Industries and Farmers	2018-2019	45.31537
Aquatic Animal Quarantine Services under the Ministry of Fisheries, Animal Husbandry & Dairying as the recongozied Diagnostic Laboratory under Aquatic Animal Quarantine Services	Seafood Exporting Industries	2020	2.96715
High Density Fish Culture Under Recirculating Aquaculture System Model integrated with Vegetable Farming (Rs. 4.96 lakhs per unit for 32 units has been given as subsidy in kind to farmers as per the instructions of NFDB)	National Fisheries Development Board	2020-2021	158.72
Aquatic Animal Health Management	Aquaculture Industries and Farmers	2019-2020	21.66141
Aquatic Animal Quarantine Services under the Ministry of Fisheries, Animal Husbandry & Dairying as the recongozied Diagnostic Laboratory under Aquatic Animal Quarantine Services	Seafood Exporting Industries	2021	0.97762

Publications:

There are around 280 publications by Faculty members in the domain of life sciences and biotechnology during the last five years.

Specific Proposal

Research has been under way under the domain Life Science and Biotechnology aimed at developing precise products and processes for aquatic animal health management. For the full-

fledged commercialization of these products an inter-phase is required for translational research as described below.

A. Expansion of the Production Unit of Aquaculture Medicines

Right now, five discrete products are generated in the NCAAH Aquaculture Medicine Production Unit which in no way are adequate in quantity to support the requirements of aquaculture systems in Kerala. This warrants expansion of the existing aquaculture medicine production unit for manufacturing 5 gut probiotics such as a) Detrodigest, 2. Enterotrophotic, 3. Ps - Series, 4. My -1 and 5. PSB to have production capacity for 100L per probiotic at a time. To attain the objective 100L fermentors (4 nos) along with accessories such as in situ sterilization unit and facility for autoclaving the bottles, filing, sealing, packing and transportation are required.

B. Production of Plant Derived Formulations in the Management of White Spot Syndrome Virus (WSSV), Infectious Hypodermal Haematopitic Necrosis Virus, Monodon Baculovirus, and Vibrio in Shrimp Culture

Recent research resulted in the development of four such formulations which can be applied against WSSV, IHHNV, MBV and Vibrio sp. As the next phase, technology for their commercial production has to be developed for making them available to the industry. Product Names**: a**) *Rm* Extract -1 (Anti - IHHNV and ant - *Vibrio*), 2. *St* - Extract -1 (Anti - IHHNV and Anti- *Vibrio*), 3. *Ns* - Extract -1 (Anti- WSSV and Anti- *Vibrio*), 4. *Cb* - Extract -1 (Anti- MBV).

C. Production of Marine Microalgae Paste to Suppport Nutrition in Aquaculture

Marine microalgae stand out as the promise to be used as single cell protein to cater to the nutritional requirements of the aquatic animals being cultured**.** As a significant research outcome, photo-bioreactors have been designed and fabricated and standardized for mass production of the algae which needs to have downstream process, packing and determination of shelf life to facilitate commercialization.

D; Development of Marine Derived Terrusinone Analogues as UV Quencher with Improved Photostability in Sunscreen Lotions through Green Chemistry Approach

The UV quenching potential of dipyrrolo benzoquinone (Terrusinone) isolated from the marine fungi can be developed as a key ingredient in sunscreen lotions.

E: Production of Cold Active Industrial Enzymes and Biosurfactant Using Molecular Approaches

The microbial strains producing cold active lipases and beta galactosidases and L-asparaginase available in the polar microbial culture collection are quite potent for further scale up / use in the industry.

F. Natural Organic Foliar Formulations from Shrimp Shell Wastes

1.CUSAT-ORGANIC VEG-1: A natural organic foliar formulation for vegetable crops developed from a chitosan derivative (chitosan, a natural biopolymer isolated from the shrimp shell wastes) and found successful through the repeated field trials at the research and farm facilities of Kerala Agricultural University, Trissur.

2. CUSAT-ORGANIC VEG-2: A second natural organic foliar formulation for leafy vegetables developed by utilizing the shrimp head silage and chitosan derivative components. This second product has also satisfied the requirements of Kerala Agricultural University protocols for commercialization.

List of equipment to be procured in the current phase

Sl. No	Name of the Equipment	Quantity	Cost R.s
1.	100L Fermenter and accessories	3	750000 x 3= 2,25,000.0
2.	Autoclaving facility 178L and 95L with accessories	2	173881.0
3.	Laminar flow	5	76020x5= 380100.0
4.	Sealing Unit	1	25000.0
5.	Packing and forwarding Unit	2	70000.0
6.	Raw material drying and storage	1	500000.0
7.	Solvent extraction unit (100Kg biomass)	1	500000.0
8.	Solvent recovery unit	1	500000.0
9.	Powdering unit	1	1 00000.0
10.	Microalgae seed culture facility	1	2 00000.0

11.	Hot air oven	1	50000.0
12.	1000L photobioreactors	2	@1000000.0 Rs. 2000000.0
13.	Continuous centrifugation	1	1000000.0
14.	Automatic packing machine	1	500000.0
15.	Storage facility: (Walk in cooler)	1	2500000.0
	High vacuum pump with Schlenk line	1	500000.0
16.	Laboratory fume hood	1	600000.00
17.	Dehydrating drier	1	100000.0
18.	Spectrophotometer	1	500000.0
	Grand Total		**1,01,23,981.00**

3.2 CENTRE FOR TRANSLATIONAL RESEARCH IN SENSOR TECHNOLOGY

3.2.1 Aim

This project proposes the establishment of an Translational Research Centre in SENSOR TECHNOLOGY' at Cochin University of Science and Technology (CUSAT), Kochi, Kerala, India. The vision for this centre has been framed through a collaborative process that involved faculty members, research associates, post-doctoral fellows and research scholars from various departments of CUSAT - Department of Applied Chemistry, Biotechnology, Photonics and Environmental Sciences. The initial aim of the Centre is to develop low-cost portable sensor devices for early detection of diseases including fatal infectious diseases, health conditions of human beings and monitoring hazardous environmental contaminants in India. In future, the centre aims to collaborate with different industries and state of art centres to further scale up and market sensors in the field ofdisease diagnosis, agriculture, environmental monitoring and defence technology.

This proposal provides the rationale for establishment of this Centre. The research group behind this proposal is actively involved in the fabrication ofsensors and sensor devices. Recently, a prototype device "Dopameter" was invented under theguidance of Prof. K. Girish Kumar. Patent for this invention has already been filed and application is accepted. Our research group was also awarded with the PLEASE (Performance Linked Encouragement for Academic Studies and Endeavour) of Government of Kerala in which a quantum of money is earmarked for the purchase of various equipments for sensor fabrication. The goals set forth for the Centre for Sensor Systems and Technology will be achieved through research on sensor development based on various technologies like electrochemical, fluorescence, triboelectric, optical resonance etc.

3.2.2 Sustainability of the Centre

Sustainable income generation is essential for the existence of the Centre. This can beachieved through four ways:

1. Technology transfer
2. Analysis charges for the use of instruments in the centre by outsiders
3. Consultancy works
4. Combined interdisciplinary research proposals funded by various agencies

3.2.3 Expected Outcomes

The purpose of this proposal is the establishment of a centre of interdisciplinary naturededicated for the development of sensor devices with the following specific outcomes:

- Strengthen the existing sensor fabrication technologies
- Already extensive research on developing various types of sensors exist in various departments of the university. By having a centre exclusively for the development ofsensors, research in this area spread across various approaches can be brought together to a common umbrella and can be intensified.
- Develop low-cost portable prototype sensor devices for clinical analysis, crop analysisand environmental monitoring. Thus academic research can be made socially useful
- Promote start-ups for sensor device fabrication
- Collaborate with different industries and state of art centres to further scale up and achieve industry 4.0 and market sensors in healthcare, agriculture and other challenges in human ecosystem. This will enable the commercialisation of the devicesdeveloped.
- International Collaborations with advanced centres and research organisations There exists research collaboration between the faculty members of this group withvarious foreign universities and national institutes. With the establishment of the centre, this collaboration can be strengthened and faculty/student exchange programmes can be mooted up.

3.2.4 List of projects executed by the faculty members of the group

Sl.No.	Amount/in Lakhs	Name of the investigator	Funding Agency	Duration
1	22.82	Dr. K. Girish Kumar	DRDO	2003-2007
2	5.30	Dr. K. Girish Kumar	DST- Indo-Polish S&T Programme	2006-2008

3	14.87	Dr. K. Girish Kumar	DRDO	2006-2009
4	12.50	Dr. K. Girish Kumar	KSCSTE	2010-2013
5	24.93	Dr. K. Girish Kumar	DRDO	2011-2014
6	7.00	Dr. K. Girish Kumar	UGC–One time research grant	2014
7	32.46	Dr. K. Girish Kumar	KSCSTE	2016-2019
8	12.36	Dr. K. Girish Kumar	DST- Indo-Polish S&T Programme	2017-2019
9	125.0	Dr. Usha K Aravind	UGC Under Obama-Singh 21st Century Knowledge Initiative	2012-2015
10	26.0	Dr. Usha K Aravind	KSCSTE	2014
11	32.0	Dr. Usha K Aravind	DST	2017-2020
12	25.0	Dr. Usha K Aravind (Co PI)	KSCSTE	2018-2021
13	Partnership programme (Budget maintained by Danish govt.)	Dr. Usha K Aravind Collaborator	Danish Research Council	2016-2017

3.2.5 Consultancy work

Department of Applied Chemistry undertakes the qualitative and quantitative Chemical analysis for various types of samples from academic as well as R & D institution, industries etc. using the following instrumental techniques

- FTIR analysis
- UV – visible analysis

- GCMS analysis
- CV analysis
- LCMS analysis
- Fluorescence – steady state and lifetime Analysis

3.2.6 List of equipment proposed

S.No:	Equipment	Approximate price (Rs)
1	Chemical vapour deposition equipment	40,00,000
2	Thermal vapour depositor	5,00,000
3	2 A booster	2,72,000
4	Upgradation of Electrochemical workstation	13,00,000
	Total	**60,72,000**

3.3 CENTRE FOR TRANSLATIONAL RESEARCH IN ELECTRONIC PRODUCT DESIGN

3.3.1 Aim of the Centre

Universities across the globe have played a major role in transferring technologies through commercialization and encouraging the formation of high quality university centric startups. The objective to set up a state-of-the-art Translational Research Centre (TLC) will be to lead the efforts to convert the fruits of academic research into products and services for the benefit of the society. It will try to accelerate the successful development of entrepreneurial companies through an array of business support resources and services (physical infrastructure, technology support, business management, financial assistance). This will include the following goals:

- To facilitate the protection and transfer of university created discoveries into new products and services
- To actively facilitate formation of university-connected start-up companies.
- To Provide a base for technology businesses to set up and grow leveraging on the expertise of CUSAT

TLC in Electronic Product Design will act as an interface between academic research and industry. There has been significant efforts done in the startup ecosystem of Kalamassery where CUSAT is located in EPD. Maker Village and its Fablab is renowned for enabling hardware related manufacturing at Kalamassery. The vast engineering college ecosystem can generate UG students who possess basic engineering skills in Electronics. But Electronic Product Design requires knowledge of a domain which is not available at UG level. CUSAT with its prowess in the field of Electronics, specifically in areas such as VLSI Chip design, RF communication, Robotics, etc. is the right host for advanced centre in translational research. There has been several projects done in underwater technology, antenna design, circuit design for funding agencies and private companies from individual faculty. These skill capabilities and infrastructure present at CUSAT can be shared using the TLC and will attract startups to collaborate with TLC on EPD at CUSAT.

3.3.2 Strength of the University in Electronic Product Design

The strength of CUSAT in the field of Electronic Product Design is focussed on three subareas

- **Signal Processing:** Department of Electronics has been collaborating with SONY Corporation on consulting basis on signal processing in underwater acoustics. Acoustic Sensor Network For Monitoring Marine Habitats using AI supporting boards from SONY is being executed right now. CUSAT hosts a UGC approved Centre for Ocean Electronics supported by MHRD. Under this centre several projects in the area of underwater research, defence etc. has been executed. There are facilities such as a transducer testing tank facility, acoustic microphone arrays, underwater imaging and audio equipment etc, which are not available to startups or even established companies. DRDO projects have been executed in the areas of naval research and patents have been filed in this area.
- **Communication:** Research into RF communication, microwave and antenna has been a strongpoint in Electronics for decades. A well established research and training laboratory in Microwave Electronics and Antennas has been set up in this Department with financial assistance from MHRD, UGC, DST (Govt. of India) and DoE (Govt. of India). The Laboratory is equipped with most modern and sophisticated equipment like Vector Network Analyzers, Agilent Network Analyser up to 67 GHz, Agilent Field Fox Network Analyser, Cascade Probe Station, Microwave Power Meter and different antenna and RCS standards. The laboratory is having a Microwave Anechoic Chamber for simulating free space environment for antenna and RCS measurements. The Chamber has instrumentation set-up attached to it with provision for fully automatic measurement based on Network Analyzer and Antenna Positioner. The Department has developed an indigenous software which is used for quick and precise antenna measurements and analysis. The major areas of research now being pursued are microstrip antennas and transmission lines, super-conducting microwave transmission lines, integrated circuits and antennas, reduction of radar cross section, microwave non-destructive testing, leaky wave antennas, microwave horn antenna, material studies in microwave region etc. Highly specialized companies in this field who want to recruit from CUSAT and they will now get an option to house their lab at this TLC. Our RF and antenna testing facilities at department can also be made available to them.
- **Hardware Design:** The design of product, manufacturing of components and their final assembly is done in countries such as China, Taiwan, Korea, etc. MEITY has started India

Indigenous processor programme with Shakti processor (from IIT Madras & Incore semiconductor) and Vega processor (from CDAC). There are multiple industry trained faculty in CUSAT who possess this unique skill that is needed in industry. CUSAT has been participating in the Shakti processor program through Dept of Electronics and Dept of Computer Science. Faculty of CUSAT has been engaged in electronic product design for healthcare domain. "Portable Device for Preliminary Diagnosis of Preeclampsia" is a joint DST project by Electronics and Chemistry department.

3.3.3 Projects undertaken in this field in past 5 years

Sl No.	Name of Project	PI & Co-PI	Funding Agency	Amount in INR Lakhs	Start year & Duration
1.	Development of Biomimetic Approaches for Sonar Systems	Dr. Supriya M.H.	NPOL-CARS	19.99	2021 (1 year)
2.	Portable device for the Preliminary Diagnosis of Preeclampsia	Dr. Tripti S Warrier(PI), Dr. Nalesh S (Co-Pi), Dr. Usha K (CoPI), Dr. Leena R (CO-PI), Dr. Kala Ramakrishnan (CoPI), Dr. Girish Kumar (CO-PI)	DST	24.44	2021 (1 year)
3.	Development of Biomimetic Approaches for Sonar Systems	Dr. Supriya M H	NPOL	19.99	2021 (1 year)
4.	Intelligent Passive Acoustic Sensor Network For	Dr. Supriya M H	SONY Corporation	17.01	2021 (1 year)

	Monitoring Marine Habitats				
5.	Machine Learning Models for Underwater Image Enhancement And content Analysis	Dr. Supriya M H (PI), Arun A Balakrishnan (CoPI), Mithun Haridas T. P. (CoPI)	Naval Research Board	48.79	2020 (2 years)
6.	RRMR-Reliable Reconfigurable Memristive Radio Frequency Devices	Dr. Deepti Das Krishna (PI) & Dr. Babita R Jose	KSCSTE	2.1	2020 (1 year)
8.	Algorithm for Image Enhancement, Object Detection and Tracking	Dr. Supriya M.H (PI) & Arun A Balakrishnan (CoPI)	Naval Research Board	30.6	2017 (2 years)
9.	Optimization for Virtualized Mobile Computing	Dr. Bijoy Antony Jose	DST	17.12	2016 (3 years)

3.3.4 Industry consulting taken in past five years

1) Sensing Solution University Joint Development, SONY Semiconductors
Dr. Supriya M H 17.016 Lakhs
From Aug 2021 for 1 year

2) Detection and classification of punch in Amateur Boxing using IoT sensors and Machine Learning. Bagmo Pvt. Ltd., Maker Village
Mithun Haridas T.P from August 2020 Rs 10,000

3) Design of Human Machine Interface for Bharath Electronics project, Pumex Infotech
Dr Bijoy A Jose from 2018-21. Rs 4,80,000

4) Machine Learning for Remote monitoring of ATMs, Vuelogix Technologies
Dr Bijoy A Jose from 2020. Rs 30,000

3.3.5 Expected outcomes in Electronic Product Design

These are the expected outcomes in the field of Electronic Product Design.

- **Increased student startups:** As part of the student technology business incubator of CUSAT named CITTIC, there has been several student startups who have used guidance from faculty for building their product. While this has been a UG centric effort initially, there has been a shift towards PG and PhD scholars recently. A TLC would be ideal in promoting more core technology startups from student side.

- **From Industry consulting into product development:** Industry consulting has been provided as a service by CUSAT faculty in this area. A TLC will invite companies who require the infrastructure being provided at the university to create a unit here; thus utilizing our research scholars as manpower and creating products where CUSAT has shared intellectual property.

- Faculty startups: CUSAT is the first state university in Kerala to sanction a faculty startup policy. Faculty will now be able to convert their research output into products and TLC is the right centre for this incubation.

3.3.6 List of equipment to be procured in Electronic Product Design

Sl No.	Item	Amount
1	Cadence for Hardware Design (30 license, 15 systems)	Rs 30,00,000
2	Turtlebot Pi4 robot (2nos) and accessories	Rs 5,50,000
3	CST Design Suite (1 license)	Rs 20,00,000
4	Siemens NX academic Suite	Rs 10,00,000
5	Xilinx FPGA Prototyping boards	Rs 20,00,000
6	Electronic workbench	Rs 5,00,000
7	UPS power backup for lab	Rs 7,50,000
	Total	Rs 1,00,00,000

3.4 CENTRE FOR TRANSLATIONAL RESEARCH IN ARTIFICIAL INTELLIGENCE & MACHINE LEARNING

Artificial intelligence (AI) allows computers and machines to correctly interpret external data, to learn from such data, and to use those learning to achieve specific goals and tasks through flexible adaptation. One of the essential purposes of AI is to automate tasks that previously would have required human intelligence. Today, AI is being used across numerous industries, from finance to healthcare, and has resulted in a high demand for dedicated AI research translation, consulting, and expertise. AI is becoming the mainstay of most interdisciplinary research, and focusing on AI helps other focus areas as well.

3.4.1 Objectives

- To conduct educational and outreach activities aimed at promoting the AI methodology and culture in non-specific audiences.
- To create structured AI use cases, defining and highlighting real-world challenges potentially solvable by AI.
- To grow an ecosystem, facilitated by professional societies, industry, and government agencies, that will allow robust collaborations between practicing clinicians and AI researchers to advance foundational and translational research relevant to medical imaging.
- To establish methods to encourage data sharing for training and testing AI algorithms to promote generalizability to widespread clinical practice and mitigate unintended bias.
- To develop standards and common data elements for seamless integration of AI tools into existing clinical workflows.
- To establish tools for validation and performance monitoring of AI algorithms to facilitate regulatory approval.

3.4.2 Domain Expertise

The Department of Computer Science has an extensive expertise in the field of AI and ML. Several faculty members are doing active funded research in this area. Post-graduate level AI courses are offered and PhDs produced in this area. Some of the existing projects include AI Video consulting project with *Vuelogix Technologies Pvt. Ltd., Kochi* for monitoring ATMs of Banks in Kerala and *Chief Minister's Nava Kerala fellowship* for AI based detection of people during landslides.

The *Artificial Intelligence & Computer Vision (AICV) Laboratory* at the Department of Computer Science mainly focuses on designing and developing artificial intelligence algorithms

dedicated to computer vision. The AICV Lab aims to advance the knowledge frontiers, develop smarter computer vision technology, and improve the lives of people through cutting-edge research in artificial intelligence and computer aided image analysis. The recent research works undertaken in the AICV Lab have made significant contributions to the field of medicine, remote sensing, and surveillance.

In medicine, AI and ML techniques were successfully utilized for:

- Detection and segmentation of mitosis in breast histopathology images
- Classification of prostate cancer grade groups from MRI images
- Reducing Rician noise in MRI images
- Detecting malaria parasite from peripheral blood smear images
- Detection and delineation of cell nuclei
- Segmenting human intestinal parasites from microscopy images
- Automated grading of nuclear pleomorphism in breast cancer.

The research will assist doctors in diagnosing and finding the sources of diseases, to suggest various ways of treatment, and also to predict if the illness is life-threatening. This also has the potential to make health care much more accessible and more affordable to the common people. The AICV Lab has also undertaken research for speckle reduction and contrast enhancement of ultrasound Images, understanding semantics in change patterns of remote sensing images, and ship detection from SAR (Synthetic Aperture Radar) images. Other contributions include automatic image description generation, video classification and retrieval, and direction estimation of crowd flow in surveillance videos.

The *Cyber-Physical Systems Lab* at the Department of Computer Science is involved in a host of research activities and funded projects in the cross-cutting areas of Internet of Things (IoT), Edge Computing, Distributed Learning, Smart City Applications, Embedded Systems, Image processing, and Data Analysis. The research focuses on developing CPS-based models for the IoT applications and has utilized state-of-the-art modeling theory to establish a resilient and scalable architecture for Smart City-based IoT applications. The Lab has existing collaborations with the Kochi City Smart City Initiative (Smart City project of the Government of India). Smart transportation and waste management are some areas where this research can play an instrumental role.

3.4.3 Expected Outcomes

- Patents and publications in internationally reputed peer-reviewed journals.
- Production of high-tech AI-enabled products and services according to the demand of the market and for the benefit of the society.

- Association and collaboration with professional organizations around the globe with respect to the research work in the field of interest thereby uplifting the Centre to an autarky in Artificial Intelligence.
- Long-term partnerships with communities and community-based organizations that help guide the development of meaningful research projects.
- A technological base for research and education in the field of Machine Learning and Artificial Intelligence that provides consultations, specialized training, customized sponsored research, and networking opportunities for researchers and businesses.

3.4.4 List of Projects in past five years

Sl No.	Name of Project	PI & Co-PI	Funding Agency	Amount in INR Lakhs	Start year & Duration
1.	Energy Efficient Cyber Security Implementations for Internet of Things	Dr. Bijoy Antony Jose (PI) & Dr. Jimson Mathew, IIT Patna (Co-PI)	DST	25	2018 (3 years)
2.	Design and development of adaptive framework for video summarization	Dr Madhu S Nair	State Plan Grant	2.75	2 years (2018-19)
3.	Collusion and Fake News: Are social networks being orchestrated in favor of fake news?	Dr G Santhosh Kumar	SPARC Project of MHRD	68.99	3 years (2019-21)
4.	International partnerships for excellent education and	Dr G Santhosh Kumar and Dr Madhu S Nair	The Research Council	Total 450 CUSAT 40	3 years (2021-2024)

	research/International Network for Image-based Diagnosis		of Norway		
5.	Human Behaviour Analysis with Artificial Intelligence and Machine Learning	Dr Bijoy A Jose (Doctoral Advisor)	DST, CII, Vuelogix Technologies	37.3	4 years (2020-2024)

3.4.5 List of Consultancy taken in this field

1) Software Consulting, Pumex Infotech
Dr Bijoy A Jose For the year 2021-22. Rs 2,40,000

3.4.6 List of Equipment to be Procured

Sl. No.	Type	Quantity	Approximate Price (Rupees)
1.	High-end Server	1	Rs.20,00,000/-
2.	High-end Workstation	10	Rs.60,00,000/-
3.	Desktop PC	5	Rs.7,50,000/-
4.	Printer and Scanner	2	Rs.50,000/-
5.	Network Accessories	-	Rs.1,00,000/-
6.	Accessories for Video Conferencing (Projector, Camera, Microphone, Adapters, etc.)	-	Rs.2,00,000/-
7.	UPS	-	Rs.2,00,000/-
8.	Air Conditioning System	-	Rs.3,50,000/-
9.	Furniture	-	Rs.3,50,000/-
TOTAL			**Rs.1,00,00,000/-**

3.5 CENTRE FOR TRANSLATIONAL RESEARCH IN MATERIAL SCIENCES

Specific Objective of the Centre: To develop wearable Triboelectric Nanogenerators for motion sensing, health monitoring and energy harvesting applications

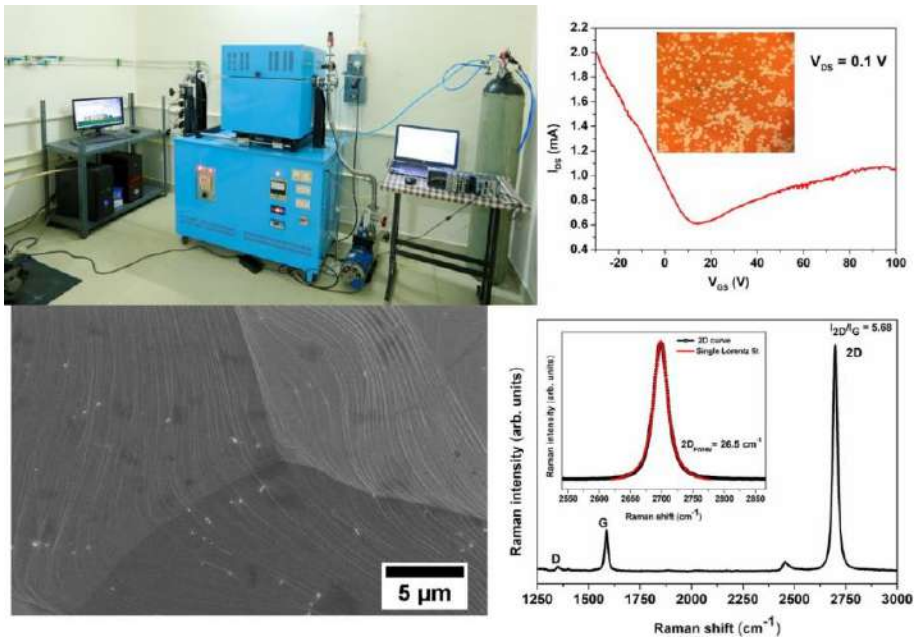
Triboelectric nanogenerators (TENGs) that utilize unused ambient energy to produce electrical energy have become an intensive research area in this decade. Since TENGs were reported in 2012 by Z. L. Wang and co-workers, the negatively treated triboelectricity was utilized in various electronic applications. The peculiarities of TENGs, such as lightweight, flexibility, diversity in materials used, biocompatibility, inexpensiveness, etc., make them significant in the era of energy crisis and IoT. The triboelectric effect portrays the contact electrification where charges are formed when two materials with different electron affinities are brought into contact through friction. Any relative motion (sliding, contact-separation, rotation) between the charged triboelectric materials will develop electric field across the electrodes attached to materials. The potential difference developed by the electrostatic induction drives electrons from one electrode to the other through the external load. The more significant the difference in electron affinities of two selected materials, the more charges will be transferred during the contact electrification. In the triboelectric series, the materials that can donate/lose electrons are designated as tribopositive materials and the materials that can accept/gain electrons are termed tribonegative materials. The polymer materials are highly employed in triboelectric nanogenerators owing to their high charge retaining ability.

Research on polymeric materials, namely polyurethane, natural rubber and nylon, for developing energy harvesting TENG is the thrust area included in the proposal. Research on durable and natural polymeric materials for device fabrication is highly recommended for the sustainable development of TENGs. Isoprene or natural rubber (NR) is one of the flexible and natural polymers with a wide range of applications. NR products such as gloves, carpets, mats, vehicle tyres, etc. are in direct contact with different mechanical energy sources. NR is tribo-negative material in the triboelectric series. The utilization of NR for energy harvesting applications is of interest because Kerala is the nearly monopolistic contributor to the natural rubber production of India, with 90 % of the total production of 78 % of the area under cultivation in the country. Polyurethane (PU) is a lightweight synthetic polymer with various applications in our daily lives due to its excellent chemical inertness, adaptability to use in different climatical

conditions, etc. The PU form-based materials have been used to produce various toys and lightweight sandals. Nylon is an electrospinnable synthetic plastic with good environmental and chemical stability, high strength, and durability. It also found many applications in our day-to-day life. PU form and Nylon are tribopositive, and the TENG performances of these polymeric materials are in its exploring stage. Further, the bulk and surface modified polymeric systems with enhanced charge densities can deliver enhanced TENG output than the unmodified polymeric systems. For instance, the bulk modification of polymers via the incorporation of conducting fillers and dielectric fillers has found to have increased TENG output than the pristine material. The translation research in TENG aims to develop various products (toys, energy harvesting shoes, smart carpets, wearable TENG devices for health monitoring, etc.) using the above-mentioned bulk and surface modified polymeric materials. The polymeric materials used for these applications can be solution cast films, electrospun mats, forms or compounded sheets.

Specific Objective of the Centre: Graphene as a 2D Material

In the present technology development scenario, 2D materials are expected to have a sizeable impact in the future. They found significant applications in various fields due to their large surface area, tunable electronic or optical properties, transparency, mechanical strength, flexibility and one atom thickness. Even though extensive studies are made on thin-film synthesis, the difficulty in circumventing the challenges in 2D material synthesis is one step ahead due to their one atomic thickness. Better insight into the growth mechanism and control over the growth conditions are essential to regulate the synthesis outcome. Graphene has been the most exploited 2D material for the last decade, and struggles remain to be addressed. The reproducible synthesis of high-quality graphene at an industrial scale demands large area uniform growth conditions essential to control the number of layers deposited. Chemical vapour deposition (CVD) is graphene production's most accepted synthesis technique.



As part of a research study, we developed a thermal CVD system capable of producing graphene over a 2× 10 cm^2 area of copper foil using methane as the carbon source. We fabricated a graphene-based field-effect transistor having a hole mobility of ~2000 $cm^2V^{-1}s^{-1}$ and electron mobility of ~450 $cm^2V^{-1}s^{-1}$. The film was also used to modify the performance of the conventional SERS structure. Later, the electrochemical sensing of dopamine and uric acid in the presence of ascorbic acid was demonstrated using graphene modified glassy carbon electrode. The figure shows some reflections of the graphene-related experimental efforts carried out in our laboratory.

Opportunities for graphene are multidimensional, including flexible and transparent electronics and energy applications. As the continuation of our research study, we would like to explore more avenues in graphene's application. India semiconductor mission focuses on building a semiconductor ecosystem to catalyse India's expanding electronics manufacturing and innovation system and thereby position India on the semiconductor map of the world. Integration of graphene into semiconductor technology can solve many issues facing the industry. In advanced ICs, interconnects become more problematic with the progress in device scaling. The mechanical stability and heat dissipation are major concerns while introducing new variables. Graphene or graphene-metal hybrid structure can be a low-resistant interconnect to replace the conventional copper interconnects. In MOSFETs, replacing Si with 2D materials counter the short channel

effects associated with gate length scaling. The stacked structure of graphene and other 2D materials can offer high mobility with less leakage problems.

Graphene offers openings in energy storage and energy conversion. Developing countries make efforts to exploit renewable energy sources, and smart electric grids are essential to store and distribute energy effectively. Graphene permits a more robust electrical system by incorporating graphene into circuit breakers which are safety components of electrical grids. In domestic and industrial applications, low voltage circuit breakers and their failure due to the lack of lubrication are common. Graphene solves this issue through its self-lubricating property. Graphene is an alternative to electrodes in solar cells as a durable, transparent, and conducting material. Exploiting graphene as an interfacial and active layer to improve the overall performance of photovoltaic devices is also important.

Graphene's role in biosensing is highly appreciated by its use in a digital new generation biosensor enabling remote detection of SARS-CoV-2. The transfer of graphene from the growth substrate to flexible materials can provide advanced sensing platforms. By exploiting the potential of graphene, the industry can adopt new findings related to graphene and thereby realise the unlocking of the next generation of graphene for the wellness of humanity.

3.5.1 Expected Outcomes

- NR and PU-based TENG will be implemented to produce various toys and kids' shoes. The energy harvesting abilities of the materials incorporated in the products help to power up the LEDs attached to the toys/kids' shoes without the support of an external battery.
- Energy harvesting and motion-sensing TENG integrated door mats can be developed for security purposes. By scavenging the mechanical energy on footstep, the motion-sensing can be done by the carpet and convert the mechanical energy to an electrical signal for ringing up the alarm. The proposed smart carpets vastly enrich the application of the TENG in security systems, especially for women's safety. TENG–integrated, flexible smart mat can also function as an energy harvester. These self-powered carpets can be used as energy harvesting platforms in places such as educational institutions, malls, and shopping centers,

where many human movements are expected. Here too, the fabricated TENGs modules are integrated in series and parallel combinations to make a carpet. Each TENG unit will generate electricity in particular amounts, depending on the footstep's pressure. Such large area integration of such carpets can deliver large power output on the order of Watt. The so –harvested electric charges from the wasted mechanical energy are stored in a number of charge-storing capacitors/supercapacitors to light up low-power LED lamps and be used for charging portable devices like power banks and mobile phones etc. during power failure. Thus, electricity is ultimately generated from human movements.

- TENGs are getting much attention in nowadays due to its ability in low frequency, irregular biomechanical energy harvesting. The harvesting shoes, socks etc can be developed for adults to self-powered sensors including, step counters, motion detectors, speed sensors, position detectors, etc. The artificial intelligence and internet of things are in close connection with tactile and impact sensors. TENG can be integrated with shoes so that each human footprint will leads to electricity production. The flexible polymers can be incorporated in socks for human gait analysis as well as energy harvest. The high compatibility of TENG with microcontrollers and wireless connectors assure its usage in sports gadgets, health care monitoring, security applications, baby care etc. Thus, biomechanical energy harvesting and IoT based self-powered sensing based on the biocompatible, high-sensitive, compactible TENG shoes and socks are one of the expected outcome of this research.
- Nylon based wearable TENG devices can be developed for pulse monitoring, respiratory monitoring, sleep monitoring applications (Biomedical applications). A wearable respiration rate and sleep monitoring device made of nylon can be developed. The gadget includes a wireless transmission chip for transmitting and displaying signals based on respiratory and sleep modes on a mobile device. The portable and comfortable TENG sensor in a belt can be attached to the abdomen and chest of a person for respiration rate monitoring. The movements of the stomach or chest during respiration can lead to a change in TENG response in contact separation mode, and these can be correlated with the nature of respiration. Further, the proposed TENGs can be attached to the bedsheet for sleep monitoring. Sleep monitoring can be done by the whole body movements of the person as

the body movements can make a significant change in the signals due to variation in TENG responses.

3.5.2 Strength of CUSAT in this Domain

Projects (Submitted in the proposed research area)

S.No	Title	Cost in Lakh	Duration	Faculty in Charge	Agency	Status
1.	Wearable wireless triboelectric nanogenerator sensor for respiratory rate and sleep monitoring		3 years	Dr. Honey John (PI)	DST-SERB (Special call)	*Under evaluation*
2.	Triboelectric sensor for the detection of underwater acoustic waves		3 years	Dr. Saji KJ (PI)	DRDO	
3	Integrated Energy Harvesting and Storage System based on Triboelectric Nanogenerator and Supercapacitor		3 years	Dr. Saji KJ (PI)	KSCSTE	Submitted

Patents

- Honey John, Divya Jose, Jelmy E J, Vijoy K V. M K Jayaraj, Antony Sharon, Reduced Graphene Oxide- Conducting Polymer – Process for preparation Thereof, And Energy Harvester, Indian patent IN 397451, granted in the name of CUSAT on 24th May 2022

- Honey John, Divya Jose, Jelmy E J, Rani Joseph, Conducting Polymer- Dopant Polydimethoxysiloxane Composites and Process For Preparation Thereof, filed with Indian patent application No. 201941047844; dated 22 November, 2019 (Under examination)
- Honey John, Divya Jose, Vijoy K J, Jelmy E.J., Saji K J, Manoj N, Nanohybrids of conducting polymer-graphene oxide based PDMS composites for smart devices. Filed with Indian patent application No.202041006974 dated February 18, 2020.

Facilities already available

S. No.	**Generic Name of Equipment**	**Model, Make and year**	**Remarks including available with of Equipment and current usage of equipment**
1.	Electrometer	Keithley 6517 B	Useful for TENG output measurements
2.	Spin coater	Holmarc	Useful for sample preparation
3.	Dip Coater	Holmarc	Useful for sample preparation
4.	Atomic Force Microscopy	Keysight Technologies 5500 AFM	Useful for morphology analysis
5.	Vertical contact separation mode TENG set up	Holmarc	Useful for TENG output measurements
6.	Oscilloscope	KEYSIGHT DSOX3054T	Useful for TENG measurements
7.	Source meter	KEITHLEY 2450	Useful for TENG measurements
8.	Glovebox	Key-sight (2016)	Useful for the project

9.	Digital thickness monitor		

3.5.3 List of Equipment to be Procured

Sl No	Description	Cost (Rs)
1	Planetary ball milling	34, 86,000.00
2	Screen printing	5,25,000.00
3	Large scale electrospinning unit	30,09,000.00
4	Translational stage	6,00,000.00
5	High resolution mixed signal oscilloscope	26,24,000.00
6	High impedance dual channel source meter	21,62,000.00
7	Force Sensor	6,00,000.00
	TOTAL	**1,30,06,000.**

4.0 Startups in CUSAT in the Focus Areas of Translational Research Centre

4.1 Infusory Future Tech Lab-TutAR App

Infusory is focused on setting up immersive means of education through the augmented reality app TutAR - Next Reality Classroom.

Online learning is going to be indispensable even after the pandemic. Even in online learning, live instructor-led learning is the way forward. TutAR is a digital interactive platform for conducting online sessions in a new way. Here the teacher can bring, 5000+ 3D visualisations available in our library, right next to them on the screen and place them anywhere using our in house developed On-Screen AR Technology.

The best part of TutAR is it works for both Online and Offline classes. At Offline classes, Teachers can present the 3D models for better content delivery in the smart classrooms and for any online classes, they can use any existing Smart Phones, Laptops, Desktops, iPads etc.NO additional gadgets are required.

TutAR was released in August 2020 and, they have had a good journey so far in the last 12 months with more than 5K teachers, 5000+ 3D models, and 150+ licenses, who are using our platform services. Today 1.5 million students learn from our customers, the teachers.

Website: www.tutar.app

4.2 Caliczbee Solutions Pvt Ltd-Pillsbee App

They Re-engineering the B2B pharma sector by offering business intelligence and market insights to pharma stakeholders. PillsbeeisanAIpoweredB2BPharmaplatform integrated with ERP, which provides business intelligence and market insights to Pharma stakeholders.

Services

1.ComprehensivePharmamarketplaceplatform –A multi-channel-commerce platform which integrates technology driven features with industry specific services.

2.Marketinsightsandbusinessoptimisation solutions –Field-ready sales plans and analytical insights to drive sales volume and value, under an easy to interact interface.

3.Financial and enterprise solutions for Pharma businesses -Efficient working capital management through embedded financing and SaaS solutions for Pharma operations .

4.Elevated supply chain visibility for improved responsiveness-Enhances manufacturing and supply chain efficiency by enabling data-driven decision.

4.3 SEAMOTO ELECTRIC ENGINES PRIVATE LIMITED [SEEL]

SEAMOTO ELECTRIC ENGINES PRIVATE LIMITED [SEEL] is a Registered Start-up in India and an OEM Manufacturer of Marine Electric Propulsion engines for boats are here after 2 years of prototyping, rigorous testing and validation is ready to bring the product in the market. The dream of developing a fully non-polluting and silent engine as a MAKE IN INDIA product was a long-time dream of the Directors of SEEL which has now come true.

They are now herewith a perfect cost-effective solution to solve all the bottle necks of conventional engines like every day fuel price hike, range anxiety, non-availability of fuel, engine noise and vibration. Sure that this will be a real blessing for people in remote villages where fuel filling stations are rare. They need not carry fuel from far away.

SEAMOTO is fully running on re-chargeable Lithium Ion battery power ranging from 48Vdc to 96Vdc and up to 20HP propulsion power. The marine safety standards has been met at each step of manufacturing and we have used the best quality Indian raw materials to develop this unique and sturdy product. Our mission is to save the Earth by developing non-polluting next generation green engines.

4.4 Aerobits Biotech

Aerobits Biotech is a company intending to make products which enables its users to enhance their living standards and provides a better living condition. People suffering from diseases like parkinsons where their hands are unstable or it keeps shivering. Without the help of others they cannot have food. Every such attempt to have food by themselves, it will result in spilling food from their spoon. It affects their dignity and freedom; also most of the time there might not be people around to help them.

‘THE PARKINSON'S SPOON WITH ADAPTIVE PATTERN LEARNING’ is a smart spoon capable of tracking all random motions, vibrations or tremors of hand and automatically correct those unwanted motions and make sure that no food spills out. Although have competitors like Google having similar products (Liftware), they are able to cut down its price by almost 80% without compromising its quality. It also has some exclusive features, design and technology.

It has a unique mechanism to adapt to the tremors of patients and provide the best stabilization. Also the innovative direct shaft arrangement with gear reduction mechanism arrangement helps in reducing the overall size and cost of the product.

4.5 AI Aerial Dynamics

For a long time now, India has been depending on foreign countries to procure raw materials for machinery. Following these ideologies, AI Aerial Dynamics is manufacturing indigenous UAVs (Unmanned Aerial Vehicles).The dronetech startup is offering its products at a better cost to consumers. Founded by college friends Vishnu V Nath, M Rubin Ray, Denny Poulose, and Sujai KJ, AI Aerial Dynamics was incubated at CITTIC CUSAT in March 2017. . Rubin Ray, 31, is an MTech graduate CUSAT, and focuses on Machine Learning System Architect. He previously worked with Tata Elxsi. Vishnu, 31, holds a PhD in Aerial Robotics from CTU, Gujarat. Sujai, 32, is currently pursuing MBA and is the CEO of the startup. Denny, 29, on the other hand, is the Director at AI Aerial Dynamics. The startup currently has a team of eight employees.

The founding team initially invested Rs 8 lakh to start the company, and it later received Rs 10 lakh from NIDHI - Promotion and Accelerator of Young and Aspiring technology entrepreneur (PRAYAS). They also selected for Rs 2 lakhs from RUSA fund.

AI Aerial Dynamics has autonomous UAVs from two kilograms to 100 kilograms payloads, and also has sensors, video, data link, and ground control stations. The drones start from Rs 4 lakh. Besides product sales, AI Aerial Dynamics also generates revenue from customising designs, services, and spare parts sales. Pandemic heroes While there were initial delays in the procurement of components and payments, during the beginning of the COVID-19 pandemic, AI Aerial Dynamics soon started helping the Kerala government fight the virus. It helped the government design an UAV capable of spraying sanitisers. The startup further deployed its drones to track people strolling outside their houses during the lockdown. It has also helped in the thermal scanning of crowds. Garud, a UAV developed by the startup, is fitted with thermal scanners to read the temperature of people in a crowd. It has the capacity to carry a load of up to 60 kgs, and was used in Kerala to spray disinfectants, carry medical samples, and emergency deliveries with minimal human touch points.

AI Aerial Dynamics targets the defence sector, government entities, and agricultural sector. It is currently working on a project with Defence Research and Development Organisation (DRDO), under the Ministry of Defence, Naval Physical, and Oceanographic Laboratory (NPOL). According to Vishnu, the drontech startup has recorded up to 15 percent growth in its production. The startup has so far sold three units, and its annual average revenue stands at Rs 35 lakh. The startup is looking forward to getting its products certified by the Indian government.

4.5 Delgado Coating and Technology Solutions Pvt Ltd

They manufacture and market specialized scientific equipment namely **Advanced Spray Coating machine** used for coating thin films of compound semiconductors, metal oxides, nanoparticles, polymers, organic materials etc. The proto-type of this particular machine has been developed under the DST SERB fast track project implemented at Dept. of Physics, CUSAT. The Start-up has obtained Seed fund from Maker Village, Kerala Technology Innovation Zone, Kalamassery

(Rs. 5 lakhs) and Kerala Start-up Mission, Techno-park, Thiruvananthapuram (Rs. 12 lakhs). They are in Production stage and currently have four Confirmed orders for the Advanced Spray Coater from various University and Research Institutions namely DEBEL, DRDO Laboratory, Ministry of Defence, C V Raman Nagar, Bengaluru, Govt. College for Women's, Thiruvananthapuram, M G University, Kottayam and Cochin University of Science and Technology, Kochi.

The another product is an **efficient and comfortable respirator** compared with the existing surgical/N-95 respirator. Conventional respirators made using micrometer sized polyproplyne fibers are inefficient, which has risked the life's of medicos and other health workers who are in close contact with the patients. Figure 1 compares a human hair (micro meter sized) with the nano fiber. The work proposes to include nano fiber layers replacing few layers of polypropylene. The introduction of nano fiber layers will not only enhances the efficiency of the respirator, but also the breathability as it can reduce the number of layers of the polypropylene used, making the respirator much comfortable to the user.

The innovative aspect of the proposed work is the introduction of nano fiber layers, which could efficiently filter particles of even few nanometers in dimension. The nano fiber layer will be developed using electro spinning technique The current proposal aims to develop efficient

respirators, which could be made available at reasonable prices to both health workers and common man. Thus the product has a huge market size covering the society as a whole. Figure 2 shows the schematic sketch of the proposed respirator.

4.6 OmicsGen LifeSciences Pvt Ltd

A start up initiated in 2017 by a Post Graduate in Biotechnology from CUSAT, leads the way in providing superior and reliable quality results. Their vision is to exploit the untapped potential of genomics, proteomics and metabolomics, proceeds with a mission to lead an efficient life science industry by networking ideas and discoveries among scientific community to find new potential and applications, translating new discoveries into products to maximise its impact across all challenging sectors. They present a health problem that our population is unaware but a serious threat, and introducing a simple affordable and effective solution for it. Health care associated infections are a major challenge and has reported mortality, morbidity and economic loss. A large number of people are working in health care and transmission of infections is a threat and these mobile phones are major source for it. There are 650 million mobile phone users in India and have become an indispensable part of us for instant communication and social access. It has health risk of transmitting microbes from hand to hand. These devices have constant contact with us hence optimum living conditions are maintained on it, makes it an open breeding space. Kids use it and are effected. Health workers contribute more to the exchange of microbes if they use it at work places. Hence we are introducing an economically feasible wipe which can completely remove all the microbes that are transmitted by its exchange. How its being solved (approach)- A hand holding object studied SmartLyse is a patent filed, Trademark registered formulation which can remove the microbes of gadget surface by lysis of the existing organism and inhibition of adherence and growth of new microbes for a time period.

SmartLyse can remove the microbes of gadget surface by lysis of the existing organism and inhibition to the adherence and growth of new microbes for a time period. They did a study in a population of about 200 individuals, The result confirmed the presence of thousands of bacteria and fungus that had a proportion of harmful ones. They are introducing the formulation as an economically feasible wipe and sanitiser which can completely remove all the microbes that are transmitted between people. To meet the above challenges of infection the OmicsGen's invention provides a solution that can lyse all the microbial dwellers . The method disclosed in the present invention makes use of a proprietary mix of lysis solution which comprises salts that establish ionic strength in buffer solution, salts that regulate acidity and osmolarity of lysate, compounds that destabilises the integrity of cell wall of microbes by lysing the protein and lipid components, ionic detergents that solubilise cell membranes and a very small % of alcohol for cleaning the surface. SmartLyse solution is eco-friendly and has no harmful agents in it. All the components are FDA approved. It is a combination of inorganic compounds that can lyse the cell wall of these organisms and thereby kill them. This solution for sanitation is an extension of same product. Hence we introduced the same with some modifications as SmartLyse Surface Sanitiser and Air freshener disinfectant. This is economically very feasible and we recommend to use on daily basis.

4.7 ChemSensoRR

Although there have been major advances in the field of biosensors, only a few have undergone successful miniaturization and commercialization while others are still in nascent stages. One such success story is that of the glucometer used in monitoring glucose level by diabetic patients.

Dr. Shalini Menon (Founder of ChemSensoRR**,** incubated at CITTIC CUSAT) & team are focussing on the development of portable (Point-of-Care) & user-friendly devices for the detection of medically relevant compounds in the fight against various diseases. The mission of the team is to launch the devices in 3 phases -

- **Phase I** - Sensor devices for neurological disorders.
- **Phase II** - Sensor devices for morbid diseases.
- **Phase III** - Sensor devices for emerging and re-emerging infectious diseases.

Chronic conditions such as neurological disorders, infections, diabetes, heart related ailments, fertility issues etc. are prelavant for a significant part of the population. Repeated hospital/ clinic visits to continously monitor these conditions is a laborious and expensive activity, since conventional analysis performed in typical laboratories are time consuming and require trained professionals to carry out the process. In contrast, POC testing systems are simple, easy to use and can deliver real-time diagnostics to the patient without specialized training. These devices will significantly reduce the cost of analysis, save time and also give access to people in remote regions better healthcare diagnostics, without the need for niche facilities or capable professionals.

Ist Sensor Device to be launched by team ChemSensoRR - Device for the detection of neurotransmitter hormone Dopamine

As per a report published by World Health Organization (WHO) on 21st January 2020, neurological disorders affect hundreds of millions of individuals worldwide. Per year more than 6 million people suffer from stroke; more than 80 percent of such fatalities arise in low- and middle-income nations. Worldwide more

than 50 million individuals suffer from epilepsy. It is reported that there are 47.5 million individuals with dementia worldwide and 7.7 million new patients each year - Alzheimer's disease is the most prevalent form of dementia and will lead to 60-70 per cent of cases. Migraine rate is over 10 per cent worldwide. All the above-mentioned disorders are directly or indirectly connected to the abnormal levels of dopamine in human body.

We have attempted to develop a portable electrochemical reader for the effective monitoring of dopamine and its related diseases. The sensor is based on integration of a chemically modified screen-printed electrode with a miniaturized electrochemical analyser. The platform, once developed is expected to offer an easy, cost-effective and user-friendly approach in early diagnosis of various neurological disorders, which may require continuous monitoring.

The target customers for the proposed device are people of all age groups suffering from neurological disorders (and/or early detection), who would benefit from a portable, user-friendly device to monitor concentration of dopamine in physiological fluids, while at the comforts of their home.

As of now, no other players are currently in the market with a similar product for the detection and determination of dopamine.

5. Strategic advantage of CUSAT

CUSAT has all the credentials to manage the proposed Translational Research Centre. CUSAT Campus, unlike the usual IT or innovation centres, is not just providing a physical space to the companies but an array of technology and intellectual support services. The advantages of choosing CUSAT is briefly summarized below.

5.1 Research Advantage

In the area of Faculty of Technology, departments have focused on PG Teaching and Doctoral research over the past 50 years. Due to the research focus, departments have gotten project grants in the field of Defence, Ship building, Biotechnology, etc. Past history of projects are vital in getting additional grants for the institution. Proximity to NPOL and Cochin Shipyard has helped Department of Electronics, Department of Ship Technology to execute joint projects for advancement of Technology. Department of Computer Applications has excelled in cybersecurity and forensic science. Cyberdome of Kerala Police runs joint activities and training by utilizing the resources at this department. Data Science and Machine Learning is a focus area for Department of Computer Science and its graduates are sought after in industry during placement. Department of Instrumentation offers UG &PG programmes with state of the art labs in their area of Research. School of photonics in CUSAT has grown into a centre for excellence in research relating to lasers, fibre optics, etc. Department of Polymer Science and Rubber Technology is a pioneer in their field and has won laurels for their work on nano materials & battery technology. All these departments in Faculty of Technology are focused primarily on research and has an excellent history of conducting funded projects.

Departments under the Marine Sciences and Environmental science focus on Identification and beneficiation of new species from hitherto less explored marine environment, Monitoring of Marine environment, identification of causes that lead to environmental damage and development of remedial measures, Studies on new weather patterns and changes to marine environment because of global warming and Development of new breeds, new farming methods and integration of modern technology for sustainable fish farming

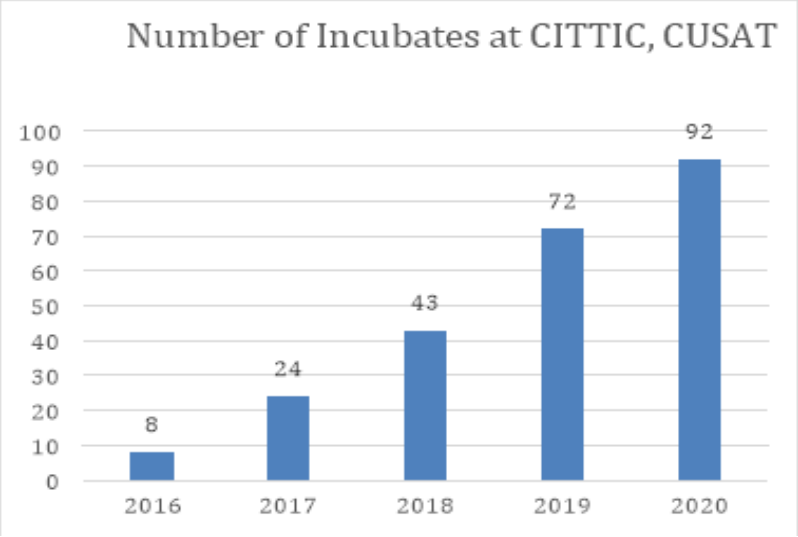
Physical sciences departments develop new materials for energy applications and has grown into developing expertise in solar photovoltaic, super capacitors etc. They have established research

collaboration with well – known laboratories within and outside the country including industrial partners.

5.2 Innovation Advantage

CUSAT is the first state university in Kerala to establish a 8000 sq ft Technology Business Incubators (TBI) in the campus. The first TBI named *CITTIC* was set up in 2016 with a grant of Rs.1 Crore from the Government of Kerala. A new 3000 sq ft TBI named *RISE* set up with financial support from RUSA for hardware and biotech startups was opened in Dec 2021. A bio incubator with necessary equipment and facilities is operational in the new space exclusively for startups working in the field of biotechnology and marine sciences. Work is in progress for the construction of another 10000 sq ft. to be added as TBI / Industry R&D space. There are 50 startups operating from CUSAT TBIs. A FABLAB sponsored by Kerala Startup Mission is available in the TBI to provide the incubates easy access to digital fabrication technologies

CUSAT has incubated 93 startup companies in the last five years providing employment support for over 300 youngsters.



To foster innovation, entrepreneurship and skill development, CUSAT has set up CUSATECH FOUNDATION, a company under section 8 (1) of the Companies Act, 2013. CUSAT has come out with a startup fund with the objective of helping our students and researchers to convert their innovative ideas into full-fledged ventures. This fund, set up with financial support from RUSA, is supporting over 40 companies under various domains like Electronic hardware, Bio

Technology, marine Science, Polymer and Software applications. A note on the pioneering companies in the campus is given in annexure.

5.3 Infrastructure Advantage

CUSAT boasts of strong physical and intellectual research infrastructure. It has a very vibrant research and academic Community in the campus: 500 teachers, 8000+ students including 1200 PhD scholars and 2000 PG students and a strong Alumni base. There are 125 running projects funded by national and state agencies executed by Faculty with research scholars. CUSAT possesses state of the art laboratories supported by agencies like UGC SAP,DST, DBT and DRDO. 90% of departments have recognitions/ funding through research projects, UGC SAP and DST FIST, TEQIP, DST PURSE. It has all facilities including recreational facilities, canteens, banks, playgrounds etc. to make the life easier for the companies.

STIC is an instrumentation and testing facility established In CUSAT in collaboration with KSCSTE, Govt of Kerala. It also houses the advanced analytical and instrumentation facility DST-SAIF with the financial support from DST, Government of India. C-SIS is a centre for educating school students about importance of science in everyday life with hands-on experiments and interesting lab sessions. An interuniversity centre for Nanomaterials and Devices was established with the help of Government of Kerala where joint research activities in the domain of Nanotechnology in nurtured. Support for filing patents, educating faculty and students in innovation practices and protection of intellectual property is being done by our Interuniversity centre for IPR studies.

5.4 Location Advantage

Located in the city of Kochi, CUSAT has huge geographical advantage. It is strategically located in the middle of the state, in close proximity to the International Airport and Railway station. It is a well-developed campus right on the side of the National Highway. Kochi is the commercial capital of Kerala, being home to the best of Industries in the state. Ernakulam is the largest contributor to the state's gross domestic product and has the highest share of industrial units in the state. It has the right mix of public and private enterprises. Most of the IT giants in India have made their presence in Infopark Kochi. Cochin is home to companies in domains such as Electronics, Marine products, Food processing, Polymer and Pharmaceuticals, CUSAT has

already entered into MOUs with many of the leading local companies for collaborative endeavours and is in talk with respected industry bodies like CII Kerala for Research and Academic Collaborations. Cochin has excellent academic infrastructure with a collection of engineering colleges, law colleges, medical college, polytechnics, and industrial training institutes. The Innovation system in Cochin is the best in Kerala with facilitating players like Infopark, KINFRA Park, Integrated Startup Complex of Kerala Startup Mission, Super Fablab of Maker Village and BioNest.

6.0 Budget for CUSAT Translational Research Centre

The CUSAT Translation Research Park will be set up with the funding support from State Government. It is proposed as an independent Innovation Space inside the CUSAT campus in 1 acre land with a total built-up space of 70,000 square feet to be developed in phases. This proposal is for phase I which will contain 30,000 square feet of built-up space, out of which, 5,000 sq ft will be earmarked for Common Amenities and Labs, 5,000 sq ft for Office space, 5,000 sq ft for startup space and 3,000 sq ft for each of the five identified domains. The objective is to make the centre financially self-sustaining in 3 years. The multiple revenue streams identified include Rent from Startups incubated in Startup Hub, Sponsored Research for Companies, Research Grants from Agencies, Revenue from the training and consulting Initiatives , Technology Transfer Fees , Sale of shares of incubated companies, CSR funds / Grants.

Table 1: Capital Cost for CUSAT Translational Research Centre- Phase 1		
Item	**Amount in Rs**	**Total in Rs**
Building (Details in Table 5)		
Civil works including water supply and sanitary	**₹ 10,55,36,342.00**	
Internal Electrification	**₹ 1,26,64,361.04**	
External Service connecting	**₹ 52,76,817.10**	
Fire fighting wet riser	**₹ 35,22,736.00**	
Fire alarm system manual	**₹ 11,00,855.00**	
GST	**₹ 2,30,58,200.01**	
Total Building cost		**₹ 15,11,59,311.15**
Common Amenities		
Fablab	**₹ 20,00,000.00**	
General Measurement Lab	**₹ 20,00,000.00**	
Wetlab	**₹ 10,00,000.00**	
Common Computer lab	**₹ 20,00,000.00**	
Total Common Amenities		**₹ 70,00,000.00**
Furnishing including furniture		**₹ 1,50,00,000.00**
Equipment		
Equipment for Life & Bio Centre(Table 6a)	**₹ 1,01,23,981.00**	
Equipment for Sensor Centre(Table 6b)	**₹ 60,72,000.00**	
Equipment for Electronic Centre(Table 6c)	**₹ 1,00,00,000.00**	
Equipment for AI & ML Centre(Table 6d)	**₹ 1,00,00,000.00**	
Equipment for Materials Centre (Table 6e)	**₹ 1,30,06,000.00**	
Total for the Domain specific Equipment		**₹ 4,92,01,981.00**
Miscellaneous		**₹ 20,00,000.00**
GRAND TOTAL		**₹ 22,43,61,292.15**

Table 2:Recurring Cost (From the year of commencement of operations)

Particulars	Rs. Lakhs
Manpower cost	84
Utility and maintenance	40
Activities and Events	20
Seed fund for startups	30
Administrative expenses including travel	15
Miscellaneous and Contingencies	6
TOTAL	195

Table 3: Internal Revenue on self-sustaining mode (Fourth year onwards)

Particulars	Rs. Lakhs
Training and Consulting fees	10
Rent from Startups incubated in Startup Hub	20
Sponsored Research for Companies	40
Technology Transfer Fees for Patented Technologies of CUSAT	30
Royalty fees	15
Research Grants from Agencies	30
Sale of shares of incubated companies	10
CSR funds / Grants	30
Miscellaneous	10
TOTAL	**195**

Table 4: Fund projection

Particulars	Rs. Cr
Capital Cost	22.43
Recurring Cost for first 3 years (1.95 x3)	5.8
Less: Internal generation first 3 years (taken at 50% of the projected revenue per year in self-sustaining mode)	2.9
Funding by CUSAT / other agencies for the first three years	2.9
Support sought from Govt. of Kerala	**22.43**

Table 5: Details of Building estimate			
Sl. No	**Details of work**	**% of total amount**	**Amount**
1	Civil works including water supply and sanitary		**₹ 10,55,36,342.00**
2	Internal electrification	12.5% of total amount	₹ 1,26,64,361.04
3	External service connection	5% of total amount	₹ 52,76,817.10
4	Fire Fighting wet riser	4403.42 sqm @RS 800 per sqm	₹ 35,22,736.00
5	Fire alarm system manual	4403.42 sqm @RS 250 per sqm	₹ 11,00,855.00
			₹ 2,25,64,769.14
	Total (A+B)		₹ 12,81,01,111.14
	18%GST		₹ 2,30,58,200.01
	Grand total		**₹ 15,11,59,311.15**

Table 6a: Estimates for the cost of equipment in LIFE SCIENCES AND BIOTECHNOLOGY			
Sl. No	Name of the Equipment	Quantity	Cost R.s
1.	100L Fermenter and accessories	3	750000 x 3= 2,25,000.0
2.	Autoclaving facility 178L and 95L with accessories	2	173881.0
3.	Laminar flow	5	76020x5= 380100.0
4.	Sealing Unit	1	25000.0
5.	Packing and forwarding Unit	2	70000.0
6.	Raw material drying and storage	1	500000.0
7.	Solvent extraction unit (100Kg biomass)	1	500000.0

8.	Solvent recovery unit	1	500000.0
9.	Powdering unit	1	1 00000.0
10.	Microalgae seed culture facility	1	2 00000.0
11.	Hot air oven	1	50000.0
12.	1000L photobioreactors	2	@1000000.0 Rs. 2000000.0
13.	Continuous centrifugation	1	1000000.0
14.	Automatic packing machine	1	500000.0
15.	Storage facility: (Walk in cooler)	1	2500000.0
	High vacuum pump with Schlenk line	1	500000.0
16.	Laboratory fume hood	1	600000.00
17.	Dehydrating drier	1	100000.0
18.	Spectrophotometer	1	500000.0
	Grand Total		**1,01,23,981.00**

Table 6b: Estimates for the cost of equipment in SENSOR TECHNOLOGY		
S.No:	**Equipment**	**Approximate price (Rs)**
1	Chemical vapour deposition equipment	40,00,000
2	Thermal vapour depositor	5,00,000
3	2 A booster	2,72,000
4	Upgradation of Electrochemical workstation	13,00,000
5	**Total**	**60,72,000**

Table 6c: Estimates for the cost of equipment in ELECTRONIC PRODUCT DESIGN		
Sl No.	**Item**	**Amount**
1	Cadence for Hardware Design (30 license, 15 systems)	Rs 30,00,000
2	Turtlebot Pi4 robot (2nos) and accessories	Rs 5,50,000
3	CST Design Suite (1 license)	Rs 20,00,000
4	Siemens NX academic Suite	Rs 10,00,000
5	Xilinx FPGA Prototyping boards	Rs 20,00,000
6	Electronic workbench	Rs 5,00,000
7	UPS power backup for lab	Rs 7,50,000
	Total	**Rs 1,00,00,000**

Table 6d: Estimates for the cost of equipment in AI & ML			
Sl. No.	**Type**	**Quantity**	**Approximate Price (Rupees)**
1.	High-end Server	1	Rs.20,00,000/-
2.	High-end Workstation	10	Rs.60,00,000/-
3.	Desktop PC	5	Rs.7,50,000/-
4.	Printer and Scanner	2	Rs.50,000/-
5.	Network Accessories	-	Rs.1,00,000/-
6.	Accessories for Video Conferencing (Projector, Camera, Microphone, Adapters, etc.)	-	Rs.2,00,000/-
7.	UPS	-	Rs.2,00,000/-
8.	Air Conditioning System	-	Rs.3,50,000/-
9.	Furniture	-	Rs.3,50,000/-
TOTAL			**Rs.1,00,00,000/-**

Table 6e: Estimates for the cost of equipment in MATERIAL SCIENCES		
Sl No	**Description**	**Cost (Rs)**
1	Planetary ball milling	34, 86,000.00
2	Screen printing	5,25,000.00
3	Large scale electrospinning unit	30,09,000.00
4	Translational stage	6,00,000.00
5	High resolution mixed signal oscilloscope	26,24,000.00
6	High impedance dual channel source meter	21,62,000.00
7	Force Sensor	6,00,000.00
	TOTAL	**1,30,06,000.00**

ANNEXURE

COCHIN UNIVERSITY OF SCIENCE AND TECHNOLOGY

CONSTRUCTION OF TRANSLATIONAL RESEARCH CENTRE

AT CUSAT THRIKKAKARA CAMPUS

ESTIMATE REPORT

ENGINEERING DEPARTMENT
CUSAT,THRIKKAKARA

REPORT

This detailed estimate Amounting to Rs. 15,11,59,311.00/- includes 18% of GST for the work of **" Construction of translational research centre at CUSAT Thrikkakara Campus"**

Design and Scope

The proposed construction is a three storied RCC framed structure having plinth area 4224.75sqm and floor height 3.60meter with foundation for G+6 floors. Following provisions have been made in the estimate.

1. RCC framed structure with floor height 3.60meter
2. Internal water supply and sanitary installations.
3. Internal Electrification.
4. External Service connection.
5. Fire Fighting and Fire Alarm System.
6. Retaining and compound wall.
7. RCC underground sump for 1 lakh Litre Capacity and Pump room.

Cost	:	Rs. 15,11,59,311.00/- including 18%
Rate	:	DSOR – 2018 with Cost Index 35.59%
Method	:	By contract after call of tenders
Time	:	2 years
Land	:	Available

The details of facilities included

Floor	Plinth Area	Facilities	
		Rooms	**Area**
Ground Floor	1380.15 m2	Director room	66.15 m2 (711.77 Sqft)
		Staff Room	67.5m2 (726.30 sqft)
		Discussion Room	2nos x 67.5m2 = 135 m2 (1452.60 Sqft)
		Fab Lab	67.5m2 (726.30 sqft)
		Wet Lab	67.5m2 (726.30 sqft)
		Common Computing Facility	67.5m2 (726.30 sqft)
		General Measurement Lab	67.5m2 (726.30 sqft)
		Seminar Hall	136.80 m2 (1471.97sqft)
		Fire control room	32.15m2 (345.93SqFt)
		Staff room	32.15m2 (345.93SqFt)
		Electrical room	33.00m2 (355.08sqft)
		Toile Ladies	33.66m2 (362.18sqft.)
		Ladies Rest Room	33.00m2 (355.08sqft)
		Gents Rest Room	21.32m2 (229.40sqft)
		Toilet Gents	35.25m2 (379.29sqft.)
First Floor	1422.30 m2	Centre for translation research in Bio and Life Science	276.30m2 (2972.99sqft)
		Centre for translation research in Material Sciences	274.50m2 (2953.62 sqft)
		Common start-up room	273.60m2 (2943.94sqft)
		Store /Janitor	32.15m2 (345.93SqFt)
		Staff Room	32.15m2 (345.93SqFt)
		Toile Ladies	33.66m2 (362.18sqft.)
		Ladies Rest Room	33.00m2 (355.08sqft)
		Gents Rest Room	21.32m2 (229.40sqft)
		Toilet Gents	35.25m2 (379.29sqft.)
Second Floor	1422.30 m2	Centre for translation Sensor Technology	276.30m2 (2972.99sqft)
		Centre for translation research in Electronic Product Design	274.50m2 (2953.62 sqft)
		Centre for translation research in Artificial Inteligence and Machine Learning	273.60m2 (2943.94sqft)
		Store /Janitor	32.15m2 (345.93SqFt)
		Staff Room	32.15m2 (345.93SqFt)
		Toile Ladies	33.66m2 (362.18sqft.)
		Ladies Rest Room	33.00m2 (355.08sqft)
		Gents Rest Room	21.32m2 (229.40sqft)
		Toilet Gents	35.25m2 (379.29sqft.)
Total	**4224.75 m2**		

Technical Specifications of the building

SL No	General Specification	Estimate is based on DSR 2018 enhanced with a cost index of 35.59
1	Type of Structure	RCC Framed structure M25 design mix with Solid Block masonry wall
2	Type of stories	Ground + 2
3	Area of extension	Ground Floor = 1380.15 m2 First floor area = 1422.30m2 Second floor area = 1422.30m2 Total area = **4224.75m2**
4	Foundation	Single and Combined Footing in RCC M25 Grade Design Mix concrete for **G+6 Floors**
5	Basement	Plinth beams in M25 Grade design mix RCC
6	Super structure	Solid block Masonry work of size 30x20x15cm in CM 1:6
7	Joinery	Doors considered with Second Class teakwood, Windows, Ventilators considered with powder coated aluminium with glazing
8	Doors - Toilet	FRP door shutters and frames
9	Flooring/Skirting	Vitrified floor tiles for Common areas like Discussion rooms, research centres and passages. Toilets are considered with ceramic antiskid floor tile.
10	Roofing	RCC Flat roof
11	Finishing	Finishing the walls with Acrylic smooth Exterior paint and Acrylic emulsion paint for internal walls
12	Water supply and Sanitary Installation	As per Norms

ABSTRACT OF COST			
Name of work: Construction of Translational Research Centre			
Sl. No	**Details of work**	**% of total amount**	**Amount**
	Appendix A - Civil works including watersupply and sanitary		**₹ 10,55,36,342.00**
	Appendix B		
1	Internal electrification	12.5% of total amount	₹ 1,26,64,361.04
2	External service conne	5% of total amount	₹ 52,76,817.10
3	Fire Fighting wet riser	4403.42 sqm @RS 800	₹ 35,22,736.00
4	Fire alarm system mar	4403.42 sqm @RS 250	₹ 11,00,855.00
			₹ 2,25,64,769.14
	Total (A+B)		₹ 12,81,01,111.14
	18%GST		₹ 2,30,58,200.01
	Grand total		₹ 15,11,59,311.15

CONSTRUCTION OF TRANSLATIONAL RESEARCH CENTRE

AT CUSAT THRIKKAKARA CAMPUS

ABSTRACT ESTIMATE

Construction of translational research centre at CUSAT Thrikkakara Campus

Abstract Estimate

(Dsor year: **2018**,Cost Index Applied for this estimate is **35.59**%)

1 civil works		
1	2.8.1 Earth work in excavation by mechanical means (Hydraulic excavator) /manual means in foundation trenches or drains (not exceeding 1.5 m in width or 10 sqm on plan), including dressing of sides and ramming of bottoms, lift up to 1.5 m, including getting out the excavated soil and disposal of surplus excavated soil as directed, within a lead of 50 m.All kinds of soil	
	Net Total Quantity	3251.601 cum
	Say 3251.601 cum @ Rs 296.94 / cum	**Rs 965530.40**
2	4.1.8 Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:4:8 (1 cement : 4 coarse sand : 8 graded stone aggregate 40 nominal size)	
	Net Total Quantity	184.145 cum
	Say 184.145 cum @ Rs 6814.89 / cum	**Rs 1254927.92**
3	5.33.1 Providing and laying in position machine batched and machine mixed design mix M-25 grade cement concrete for reinforced cement concrete work, using cement content as per approved design mix, including pumping of concrete to site of laying but excluding the cost of centering, shuttering, finishing and reinforcement, including admixtures in recommended proportions as per IS: 9103 to accelerate, retard setting of concrete, improve workability without impairing strength and durability as per direction of Engineer - in-charge. Note:- Cement content considered in this item is @ 330 kg/ cum. Excess or less cement used as per design mix is payable or recoverable separately.All work upto plinth level	
	Net Total Quantity	868.175 cum
	Say 868.175 cum @ Rs 9413.54 / cum	**Rs 8172600.09**
4	5.33.2 Providing and laying in position machine batched and machine mixed design mix M-25 grade cement concrete for reinforced cement concrete work, using cement content as per approved design mix, including pumping of concrete to site of laying but excluding the cost of centering, shuttering, finishing and reinforcement, including admixtures in recommended proportions as per IS: 9103 to accelerate, retard setting of concrete, improve workability without impairing strength and durability as per direction of Engineer - in-charge. Note:- Cement content considered in this item is @ 330 kg/ cum. Excess or less cement used as per design mix is payable or recoverable separately.All work above plinth level upto floor V level	
	Net Total Quantity	1044.213 cum
	Say 1044.213 cum @ Rs 11065.64 / cum	**Rs 11554885.14**

5	22.5 Providing and laying water proofing treatment in sunken portion of WCs, bathroom etc., by applying cement slurry mixed with water proofing cement compound consisting of applying : a) First layer of slurry of cement @ 0.488 kg/sqm mixed with water proofing cement compound @ 0.253 kg/sqm. This layer will be allowed to air cure for 4 hours. b) Second layer of slurry of cement @ 0.242 kg /sqm mixed with water proofing cement compound @ 0.126 kg/ sqm. This layer will be allowed to air cure for 4 hours followed with water curing for 48 hours. The rate includes preparation of surface, treatment and sealing of all joints, corners, junctions of pipes and masonry with polymer mixed slurry.	
	Net Total Quantity	267.873 sqm
	Say 267.873 sqm @ Rs 548.05 / sqm	**Rs 146807.80**
6	50.6.1.4 Solid block masonry using pre cast solid blocks (Factory made) of size 30x20x20cm or nearest available size confirming to IS 2185 part I of 1979 for foundation and plinth with thickness 20cm and above in: CM 1:6 (1 cement : 6 coarse sand) etc complete	
	Net Total Quantity	121.653 cum
	Say 121.653 cum @ Rs 5950.30 / cum	**Rs 723871.85**
7	2.25 Filling available excavated earth (excluding rock) in trenches, plinth, sides of foundation etc. in layers not exceeding 20 cm in depth, consolidating each deposited layer by ramming and watering, lead up to 50 m and lift up to 1.5 m.	
	Net Total Quantity	575.108 cum
	Say 575.108 cum @ Rs 258.57 / cum	**Rs 148705.68**
8	od71454/2022_2023 Providing and applying Antitermite treatment by injecting chemical emulsion Imidacloprid emulsiable concentrate .075% for pre-constructional treatment and creating a chemical barrier as per IS 6313 (Part II) 2001 for wall trenches, foundation, top surface of plinth filling, foundation of wall and floor, along the external perimeter of the building, etc. complete conforming to manufacturers specification and as directed by the Engineer-in-Charge. (Plinth area only to be measured for the payment)	
	Net Total Quantity	1278.012 per sqm
	Say 1278.012 per sqm @ Rs 139.38 / per sqm	**Rs 178129.31**
9	13.7.1 12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 (1 cement : 3 fine sand)	
	Net Total Quantity	434.136 sqm
	Say 434.136 sqm @ Rs 401.21 / sqm	**Rs 174179.70**
10	5.9.3 Centering and shuttering including strutting, etc. and removal of form for:Suspended floors, roofs, landings, balconies and access platform	
	Net Total Quantity	5540.770 sqm
	Say 5540.770 sqm @ Rs 815.78 / sqm	**Rs 4520049.35**

11	5.9.1 Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of columns, etc for mass concrete	
	Net Total Quantity	1013.041 sqm
	Say 1013.041 sqm @ Rs 335.31 / sqm	**Rs 339682.78**
12	5.9.5 Centering and shuttering including strutting, etc. and removal of form for:Lintels, beams, plinth beams, girders bressumers and cantilevers	
	Net Total Quantity	4814.389 sqm
	Say 4814.389 sqm @ Rs 649.82 / sqm	**Rs 3128486.26**
13	5.9.6 Centering and shuttering including strutting, etc. and removal of form for:Columns, Pillars, Piers, Abutments, Posts and Struts	
	Net Total Quantity	1574.402 sqm
	Say 1574.402 sqm @ Rs 863.64 / sqm	**Rs 1359716.54**
14	5.9.7 Centering and shuttering including strutting, etc. and removal of form for:Stairs, (excluding landings) except spiral - staircases)	
	Net Total Quantity	73.500 sqm
	Say 73.500 sqm @ Rs 732.52 / sqm	**Rs 53840.22**
15	5.22.6 Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete upto plinth levelThermo - Mechanically Treated bars of grade Fe-500D or more	
	Net Total Quantity	307894.468 kilogram
	Say 307894.468 kilogram @ Rs 98.30 / kilogram	**Rs 30266026.20**
16	5.1.3 Providing and laying in position specified grade of reinforced cement concrete, excluding the cost of centering, shuttering, finishing and reinforcement - All work up to plinth level:1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size)	
	Net Total Quantity	56.412 cum
	Say 56.412 cum @ Rs 8588.47 / cum	**Rs 484492.77**
17	50.6.1.5 Solid block masonry using pre cast solid blocks (Factory made) of size 30x20x20cm or nearest available size confirming to IS 2185 Part I of 1979 for super structure up to floor two level thickness 20cm and above in: CM 1:6 (1 cement : 6 coarse sand) etc complete	
	Net Total Quantity	949.130 cum
	Say 949.130 cum @ Rs 6644.12 / cum	**Rs 6306133.62**

18	10.28 Providing and fixing stainless steel (Grade 304) railing made of Hollow tubes, channels, plates etc., including welding, grinding, buffing, polishing and making curvature (wherever required) and fitting the same with necessary stainless steel nuts and bolts complete, i/c fixing the railing with necessary accessories & stainless steel dash fasteners, stainless steel bolts etc., of required size on the top of the floor or the side of waist slab with suitable arrangement as per approval of Engineer-in-charge, (for payment purpose only weight of stainless steel members shall be considered excluding fixing accessories such as nuts, bolts, fasteners etc.)	
	Net Total Quantity	416.673 kg
	Say 416.673 kg @ Rs 677.34 / kg	**Rs 282229.29**
19	9.1.1 Providing wood work in frames of doors, windows, clerestory windows and other frames, wrought framed and fixed in position with hold fast lugs or with dash fasteners of required dia & length (hold fast lugs or dash fastener shall be paid for separately).Second class teak wood	
	Net Total Quantity	1.020 cum
	Say 1.020 cum @ Rs 153237.78 / cum	**Rs 156302.54**
20	9.5.1.2 Providing and fixing panelled or panelled and glazed shutters for shutters for doors, windows and clerestory windows, including ISI marked M.S. pressed butt hinges bright finished of required size with necessery screws, excluding panelling which will be paid for separately, all complete as per direction of Engineer - in-charge.Providing and fixing panelled or panelled and glazed shutters for doors, windowsand clerestory windows fixing with butt hinges of required size with necessaryscrews, excluding panelling which will be paid for separately, all complete as perdirection of Engineer-in-charge. (Note:- Butt hinges and necessary screws shallbe paid separately)Second class teak wood30 mm thick shutters	
	Net Total Quantity	27.091 sqm
	Say 27.091 sqm @ Rs 3848.93 / sqm	**Rs 104271.36**
21	9.7.1 Providing and fixing panelling or panelling and glazing in panelled or panelled and glazed shutters for doors, windows and clerestory windows (Area of opening for panel inserts excluding portion inside grooves or rebates to be measured), Panelling for panelled or panelled and glazed shutters 25 mm to 40 mm thick:Second class teak wood	
	Net Total Quantity	63.210 sqm
	Say 63.210 sqm @ Rs 3463.31 / sqm	**Rs 218915.83**
22	9.53 Providing 40x5 mm flat iron hold fast 40 cm long including fixing to frame with 10 mm diameter bolts, nuts and wooden plugs and embeddings in cement concrete block 30x10x15 cm 1:3:6 mix (1 cement : 3 coarse sand : 6 graded stone aggregate 20 mm nominal size)	
	Net Total Quantity	480.000 each
	Say 480.000 each @ Rs 210.98 / each	**Rs 101270.40**

23	9.63.1 Providing and fixing ISI marked oxidised M.S. tower bolt black finish, (Barrel type) with necessary screws etc. complete:250x10 mm	
	Net Total Quantity	210.000 no
	Say 210.000 no @ Rs 87.25 / no	**Rs 18322.50**
24	9.63.4 Providing and fixing ISI marked oxidised M.S. tower bolt black finish, (Barrel type) with necessary screws etc. complete:100x10 mm	
	Net Total Quantity	210.000 no
	Say 210.000 no @ Rs 45.56 / no	**Rs 9567.60**
25	9.65.2 Providing and fixing ISI marked oxidised M S door latches conforming to IS : 5930 with screws etc.250x20x6 mm	
	Net Total Quantity	91.000 no
	Say 91.000 no @ Rs 80.47 / no	**Rs 7322.77**
26	9.66.1 Providing and fixing ISI marked oxidised M.S. handles conforming to IS : 4992 with necessary screws etc. complete:125 mm	
	Net Total Quantity	210.000 no
	Say 210.000 no @ Rs 41.02 / no	**Rs 8614.20**
27	9.70.1 Providing and fixing IS : 12817 marked stainless steel butt hinges with stainless steel screws etc. complete:125x64x1.90 mm	
	Net Total Quantity	480.000 no
	Say 480.000 no @ Rs 99.52 / no	**Rs 47769.60**
28	9.121 Providing and fixing Fiber Glass Reinforced plastic (FRP) Door Frames of cross- section 90 mm x 45 mm having single rebate of 32 mm x 15 mm to receive shutter of 30 mm thickness. The laminated shall be moulded with fire resistant grade unsaturated polyester resin and chopped mat. Door frame laminate shall be 2 mm thick and shall be filled with suitable wooden block in all the three legs. The frame shall be covered with fiber glass from all sides. M.S. stay shall be provided at the bottom to steady the frame.	
	Net Total Quantity	210.000 metre
	Say 210.000 metre @ Rs 800.25 / metre	**Rs 168052.50**

29	9.122.1 Providing and fixing to existing door frames.30 mm thick Glas Fibre Reinforced Plastic (FRP) panelled door shutter of required colour and approved brand and manufacture, made with fire - retardant grade unsaturated polyester resin, moulded to 3 mm thick FRP laminate for forming hollow rails and styles, with wooden frame and suitable blocks of seasoned wood inside at required places for fixing of fittings, cast monolithically with 5 mm thick FRP laminate for panels conforming to IS : 14856, including fixing to frames.	
	Net Total Quantity	40.320 sqm
	Say 40.320 sqm @ Rs 4078.68 / sqm	**Rs 164452.38**
30	21.1.1.2 Providing and fixing aluminium work for doors, windows, ventilators and partitions with extruded built up standard tubular sections/ appropriate Z sections and other sections of approved make conforming to IS : 733 and IS: 1285, fixing with dash fasteners of required dia and size, including necessary filling up the gaps at junctions, i.e. at top, bottom and sides with required EPDM rubber/ neoprene gasket etc. Aluminium sections shall be smooth, rust free, straight, mitred and jointed mechanically wherever required including cleat angle, Aluminnium snap beading for glazing /paneling, C.P. brass/ stainless steel screws, all complete as per architectural drawings and the directions of Engineer-in-charge.(Glazing, paneling and dash fasteners to be paid for separately):For fixed portionPowder coated aluminium (minimum thickness of powder coating 50 micron)	
	Net Total Quantity	1899.002 kg
	Say 1899.002 kg @ Rs 537.07 / kg	**Rs 1019897.00**
31	21.1.2.2 For shutters of doors, windows & ventilators including providing and fixing hinges / pivots and making provision for fixing of fittings wherever required including the cost of EPDM rubber/ neoprene gasket required (Fittings shall be paid for separately)Powder coated aluminium (minimum thickness of powder coating 50 micron)	
	Net Total Quantity	1899.002 kg
	Say 1899.002 kg @ Rs 643.10 / kg	**Rs 1221248.19**
32	21.3.1 Providing and fixing glazing in aluminium door, window, ventilator shutters and partitions etc. with EPDM rubber / neoprene gasket etc. complete as per the architectural drawings and the directions of Engineer - in -Charge. (Cost of aluminium snap beading shall be paid in basic item):With float glass panes of 4.0 mm thickness	
	Net Total Quantity	379.802 sqm
	Say 379.802 sqm @ Rs 1176.65 / sqm	**Rs 446894.02**
33	21.11.3 Providing and fixing stainless steel (SS 304 grade) adjustable friction window stays of approved quality with necessary stainless steel screws etc. to the side hung windows as per direction of Engineer - in-Charge complete.355 x 19 mm	
	Net Total Quantity	545.000 no

	Say 545.000 no @ Rs 337.28 / no	**Rs 183817.60**
34	9.100.1 Providing and fixing aluminium handles, ISI marked, anodised (anodic coating not less than grade AC 10 as per IS : 1868) transparent or dyed to required colour or shade, with necessary screws etc. complete:125 mm	
	Net Total Quantity	545.000 no
	Say 545.000 no @ Rs 70.17 / no	**Rs 38242.65**
35	9.101.1 Providing and fixing aluminium hanging floor door stopper, ISI marked, anodised (anodic coating not less than grade AC 10 as per IS: 1868) transparent or dyed to required colour and shade, with necessary screws etc. complete.Single rubber stopper	
	Net Total Quantity	61.000 no
	Say 61.000 no @ Rs 39.93 / no	**Rs 2435.73**
36	od71457/2022_2023 Providing and fixing M.S. Grills of required pattern in frames of windows etc. with M.S. flats, square or round bars etc. including priming coat with approved steel primer all complete. Fixed to steel windows by welding (MR 2020)	
	Net Total Quantity	7095.605 kg
	Say 7095.605 kg @ Rs 184.54 / kg	**Rs 1309422.95**
37	13.1.1 12 mm cement plaster of mix:1:4 (1 cement : 4 fine sand)	
	Net Total Quantity	15825.811 sqm
	Say 15825.811 sqm @ Rs 314.09 / sqm	**Rs 4970728.98**
38	od71458/2022_2023 Providing and laying vitrified matt finished floor tiles 1st quality double charged Kajaria or equivalent in different sizes (thickness to be specified by the manufacturer) with water absorption less than 0.08% and conforming to IS : 15622, of approved make, in all colours and shades, laid on 20 mm thick cement mortar 1:4(1 cement : 4 coarse sand), including grouting the joints with epoxy joint filler with spacer bar in equal interval and matching pigments etc. complete as per the direction from the Engineer in charge.Size of Tile 800 x 800 mm.	
	Net Total Quantity	4176.108 sqm
	Say 4176.108 sqm @ Rs 1486.76 / sqm	**Rs 6208870.33**
39	od71459/2022_2023 Providing and laying vitrified floor tiles 1st quality double charged Kajaria or equivalent in different sizes (thickness to be specified by the manufacturer) with water absorption less than 0.08% and conforming to IS : 15622, of approved make, in all colours and shades, laid on 20 mm thick cement mortar 1:4(1 cement : 4 coarse sand), including grouting the joints with epoxy joint filler with spacer bar in equal interval and matching pigments etc for skirting, risers and threads of stairs etc. complete as per the direction from the Engineer in charge.Size of Tile 800 x 800 mm.	

	Net Total Quantity	295.048 sqm
	Say 295.048 sqm @ Rs 2073.45 / sqm	**Rs 611767.28**
40	od71460/2022_2023 Providing and laying antiskid Ceramic glazed floor tiles of size 300x300 mm (thickness to be specified by the manufacturer), of 1st quality conforming to IS : 15622, of approved make, in colours such as White, Ivory, Grey, Fume Red Brown, laid on 20 mm thick cement mortar 1:4 (1 Cement : 4 Coarse sand),using 3mm thick spacers including pointing the joints with approved quality epoxy grout mix of .7kg of organic coated filler of desired shade (.10 kg of hardner and .2 kg of resin per kg)including filling /grouting and finishing	
	Net Total Quantity	246.363 sqm
	Say 246.363 sqm @ Rs 1091.04 / sqm	**Rs 268791.89**
41	11.37A Providing and fixing 1st quality ceramic glazed floor tiles conforming to IS :15622 (thickness to be specified by the manufacturer) of approved make in allcolours, shades except burgundy, bottle green, black of any size as approvedby Engineer-in-Charge in skirting, risers of steps and dados over 12 mm thickbed of cement Mortar 1:3 (1 cement: 3 coarse sand) and jointing with grey cementslurry @ 3.3kg per sqm including pointing in white cement mixed with pigmentof matching shade complete.	
	Net Total Quantity	430.203 sqm
	Say 430.203 sqm @ Rs 1092.18 / sqm	**Rs 469859.11**
42	13.43.1 Applying one coat of water thinnable cement primer of approved brand and manufacture on wall surface:Water thinnable cement primer	
	Net Total Quantity	15905.911 sqm
	Say 15905.911 sqm @ Rs 70.64 / sqm	**Rs 1123593.55**
43	13.47.1 Finishing walls with Premium Acrylic Smooth exterior paint with Silicone additives of required shade:New work (Two or more coats applied @ 1.43 ltr/ 10 sqm over and including priming coat of exterior primer applied @ 2.20 kg/ 10 sqm)	
	Net Total Quantity	3710.724 sqm
	Say 3710.724 sqm @ Rs 189.69 / sqm	**Rs 703887.24**
44	13.50.1 Applying priming coat:With ready mixed pink or Grey primer of approved and manufacture on wood work (hard and soft wood)	
	Net Total Quantity	202.537 sqm
	Say 202.537 sqm @ Rs 67.18 / sqm	**Rs 13606.44**
45	13.60.1 Wall painting with acrylic emulsion paint of approved brand and manufacture to give an even shade:Two or more coats on new work	
	Net Total Quantity	12195.187 sqm

	Say 12195.187 sqm @ Rs 151.39 / sqm	**Rs 1846229.36**
46	13.61.1 Painting with synthetic enamel paint of approved brand and manufacture to give an even shade:Two or more coats on new work	
	Net Total Quantity	582.339 sqm
	Say 582.339 sqm @ Rs 143.05 / sqm	**Rs 83303.59**
	2 Sanitory and water supply arrangements	
1	17.2.1 Providing and fixing white vitreous china pedestal type water closet (European type W.C. pan) with seat and lid, 10 litre low level white P.V.C. flushing cistern, including flush pipe, with manually controlled device (handle lever), conforming to IS : 7231, with all fittings and fixtures complete, including cutting and making good the walls and floors wherever required:W.C. pan with ISI marked white solid plastic seat and lid	
	Net Total Quantity	42.000 each
	Say 42.000 each @ Rs 6192.67 / each	**Rs 260092.14**
2	17.4.1 Providing and fixing white vitreous china flat back or wall corner type lipped front urinal basin of 430x260x350 mm and 340x410x265 mm sizes respectively with automatic flushing cistern with standard flush pipe and C.P. brass spreaders with brass unions and G.I. clamps complete, including painting of fittings and brackets, cutting and making good the walls and floors wherever required:One urinal basin with 5 litre white P.V.C. automatic flushing cistern	
	Net Total Quantity	9.000 each
	Say 9.000 each @ Rs 5864.54 / each	**Rs 52780.86**
3	17.7.3 Providing and fixing wash basin with C.I. brackets, 15 mm C.P. brass pillar taps, 32 mm C.P. brass waste of standard pattern, including painting of fittings and brackets, cutting and making good the walls wherever require:White Vitreous China Wash basin size 550x400 mm with a pair of 15 mm C.P. brass pillar taps	
	Net Total Quantity	30.000 each
	Say 30.000 each @ Rs 3351.04 / each	**Rs 100531.20**
4	17.73.2 Providing and fixing PTMT towel rail complete with brackets fixed to wooden cleats with CP brass screws with concealed fitting arrangement of approved quality and colour600 mm long towel rail with total length of 645 mm, width 78 mm and effective height of 88 mm, weighting not less than 190 gms	
	Net Total Quantity	42.000 no
	Say 42.000 no @ Rs 701.00 / no	**Rs 29442.00**
5	50.17.1.5 Supplying and fixing CP Health Faucet superior quality (Jagur or equvalent make) including cost of materials and labour charges etc complete as per the direction of site Engineer-in-charge.	

	Net Total Quantity	42.000 no
	Say 42.000 no @ Rs 1280.77 / no	**Rs 53792.34**
6	50.17.1.1 Supplying and fixing Stainless steel soap dish including cost of materials and labour charges etc complete as per the direction of site Engineer-in-charge.	
	Net Total Quantity	42.000 no
	Say 42.000 no @ Rs 67.02 / no	**Rs 2814.84**
7	18.51.1 Providing and fixing C.P. brass long body bib cock of approved quality conforming to IS standards and weighing not less than 690 gms.15 mm nominal bore	
	Net Total Quantity	42.000 each
	Say 42.000 each @ Rs 650.15 / each	**Rs 27306.30**
8	18.52.1 Providing and fixing C.P brass stop cock (concealed) of standard design and of approved make conforming to IS: 893115 mm nominal bore	
	Net Total Quantity	126.000 each
	Say 126.000 each @ Rs 713.61 / each	**Rs 89914.86**
	3 Internal drainage and water supply	
1	50.18.8.6.2 Providing and fixing PVC pipes, fittings including fixing the pipe with clamps at 1.00 m spacing. This includes jointing of pipes & fittings with one step PVC solvent cement and testing of joints complete as per direction of Engineer-in-Charge. Concealed work, including cutting chases and making good the wall etc. 50 mm pipe 6 kgf/cm2	
	Net Total Quantity	75.000 metre
	Say 75.000 metre @ Rs 438.93 / metre	**Rs 32919.75**
2	50.18.8.7.1 Providing and fixing PVC pipes, fittings including fixing the pipe with clamps at 1.00 m spacing. This includes jointing of pipes with one step PVC solvent cement and testing of joints complete as per direction of Engineer-in-Charge. Concealed work including cutting chases and making good the wall etc. 63 mm pipe 6 Kgf/cm2	
	Net Total Quantity	295.202 metre
	Say 295.202 metre @ Rs 609.45 / metre	**Rs 179910.86**
3	50.18.9.17.2 Providing and fixing PVC pipes including fixing the pipe with clamps/clips at 1.00 m spacing. This includes jointing of pipes with one step PVC solvent cement and testing of joints complete as per direction of Engineer-in-Charge 63 mm dia 4 Kgf/cm2- External work - exposed on wall	
	Net Total Quantity	280.802 metre
	Say 280.802 metre @ Rs 225.60 / metre	**Rs 63348.93**

4	50.18.9.7.1 Providing and fixing PVC pipes includings of pipes with one step PVC solvent cement, trenching refilling & testing of joints complete as per direction of Engineer in Charge. 63 mm dia 6Kgf/cm2	
	Net Total Quantity	60.000 metre
	Say 60.000 metre @ Rs 346.95 / metre	**Rs 20817.00**
5	50.18.9.20.1 Providing and fixing PVC moulded fittings/ accessories for Rigid PVC pipes, including jointing with PVC solvent cement - 63 mm dia Elbow	
	Net Total Quantity	20.000 no
	Say 20.000 no @ Rs 72.95 / no	**Rs 1459.00**
6	50.18.9.20.2 Providing and fixing PVC moulded fittings/ accessories for Rigid PVC pipes, including jointing with PVC solvent cement -63 dia 45 degree Elbow	
	Net Total Quantity	20.000 no
	Say 20.000 no @ Rs 64.20 / no	**Rs 1284.00**
7	50.18.9.20.3 Providing and fixing PVC moulded fittings /accessories for Rigid PVC pipes, including jointing with PVC solvent cement - 63 mm dia Door Elbow	
	Net Total Quantity	12.000 no
	Say 12.000 no @ Rs 80.50 / no	**Rs 966.00**
8	50.18.9.20.4 Providing and fixing PVC moulded fittings/ accessories for Rigid PVC pipes, including jointing with PVC solvent cement - 63 mm dia Bend	
	Net Total Quantity	30.000 no
	Say 30.000 no @ Rs 79.30 / no	**Rs 2379.00**
9	50.18.9.20.5 Providing and fixing PVC moulded fittings/accessories for Rigid PVC pipes including jointing with PVC solvent cement - 63x63x63 mm dia Tee	
	Net Total Quantity	12.000 no
	Say 12.000 no @ Rs 86.10 / no	**Rs 1033.20**
10	50.18.9.20.6 Providing and fixing PVC moulded fittings/ accessories for Rigid PVC pipes, including jointing with PVC solvent cement -63x63x63 mm dia Door Tee	
	Net Total Quantity	5.000 no
	Say 5.000 no @ Rs 94.25 / no	**Rs 471.25**

11	50.18.9.20.7 Providing and fixing PVC moulded fittings/ accessories for Rigid PVC pipes, including jointing with PVC solvent cement - 63 mm dia vent cowl	
	Net Total Quantity	8.000 no
	Say 8.000 no @ Rs 76.40 / no	**Rs 611.20**
12	50.18.9.19.1 Providing and fixing PVC pipes including fixing the pipe with clamps/ clips/ at 1.00 m spacing . This includes jointing of pipes with one step PVC solvent cement and testing of joints complete as per direction of Engineer-in-Charge 110 mm dia 6 Kgf/cm2 - External work- Exposed on wall	
	Net Total Quantity	371.202 metre
	Say 371.202 metre @ Rs 381.75 / metre	**Rs 141706.36**
13	50.18.9.19.2 Providing and fixing PVC pipes including fixing the pipe with clamps/clips at 1.00 m spacing. This includes jointing of pipes with one step PVC solvent cement and testing of joints complete as per direction of Engineer-in-Charge 110 m dia 4 Kgf/cm2 - External work - Exposed on wall	
	Net Total Quantity	50.000 metre
	Say 50.000 metre @ Rs 331.70 / metre	**Rs 16585.00**
14	50.18.8.9.1 Providing and fixing PVC pipes, fittings including fixing the pipe with clamps at 1.00 m spacing. This includes jointing of pipes with one step PVC solvent cement and testing of joints complete as per direction of Engineer-in-Charge. Concealed work, including cutting chased and making good the wall etc. 110 mm pipe 6kgf/cm2	
	Net Total Quantity	12.000 metre
	Say 12.000 metre @ Rs 722.90 / metre	**Rs 8674.80**
15	50.18.9.22.2 Providing and fixing PVC moulded fittings / accessories for Rigid PVC pipes, including jointing with PVC solvent cement - 110 mm dia 45 degree Elbow	
	Net Total Quantity	24.000 no
	Say 24.000 no @ Rs 105.33 / no	**Rs 2527.92**
16	50.18.9.22.3 Providing and fixing PVC moulded fittings/ accessories for Rigid PVC pipes, including jointing with PVC solvent cement-110 mm dia Door Elbow	
	Net Total Quantity	12.000 no
	Say 12.000 no @ Rs 132.03 / no	**Rs 1584.36**
17	50.18.9.22.4 Providing and fixing PVC moulded fittings/ accessories for Rigid PVC pipes, including jointing with PVC solvent cement- 110 mm dia Bend	
	Net Total Quantity	50.000 no

	Say 50.000 no @ Rs 161.08 / no	**Rs 8054.00**
18	50.18.9.22.5 Providing and fixing PVC moulded fittings/ accessories for Rigid PVC pipes including jointing with PVC solvent cement 110x110x110 mm dia Tee	
	Net Total Quantity	10.000 no
	Say 10.000 no @ Rs 174.79 / no	**Rs 1747.90**
19	50.18.9.22.6 Providing and fixing PVC moulded fittings/accessories for Rigid PVC pipes, including jointing with PVC solvent cement - 110x110x110 mm dia Door tee	
	Net Total Quantity	5.000 no
	Say 5.000 no @ Rs 187.59 / no	**Rs 937.95**
20	50.18.9.22.7 Providing and fixing PVC moulded fittings/ accessories for Rigid PVC pipes, including jointing with PVC solvent cement - 110x110x75 mm dia Door Tee	
	Net Total Quantity	5.000 no
	Say 5.000 no @ Rs 180.64 / no	**Rs 903.20**
21	50.18.9.22.8 Providing and fixing PVC moulded fittings /accessories for Rigid PVC pipes, including jointing with PVC solvent cement -110 mm dia Vent cowl	
	Net Total Quantity	4.000 no
	Say 4.000 no @ Rs 123.88 / no	**Rs 495.52**
22	50.18.9.5.2 Providing and fixing PVC pipes includings jointing of pipes with one step PVC solvent cement, trenching, refilling & testing of joints compete as per direction of Engineer in Charge. 40 mm dia 6 Kgf/cm2	
	Net Total Quantity	20.000 metre
	Say 20.000 metre @ Rs 234.39 / metre	**Rs 4687.80**
23	50.18.8.3.1 Providing and fixing PVC pipes, fittings including fixing the pipe with clamps at 1.00 m spacing. This includes jointing of pipes & fittings with one step PVC solvent cement and testing of joints complete as per direction of Engineer-in-Charge. Concealed work, including cutting chases and making good the wall etc. 25 mm pipe 12 kgf/cm2	
	Net Total Quantity	50.000 metre
	Say 50.000 metre @ Rs 440.43 / metre	**Rs 22021.50**
24	50.18.8.4.1 Providing and fixing PVC pipes, fittings including fixing the pipe with clamps at 1.00 m spacing. This includes jointing of pipes & fittings with one step PVC solvent cement and testing of joints complete as per direction of Engineer-in-Charge. Concealed work, including cutting chases and making good the wall etc. 32 mm pipe 10Kgf/cm2	

	Net Total Quantity	41.535 metre
	Say 41.535 metre @ Rs 446.48 / metre	**Rs 18544.55**
25	50.18.9.8.1 Providing and fixing PVC pipes includings jointing of pipes with one step PVC solvent cement, trenching, refilling & testing of joints complete as per direction of Engineer in Charge. 75 mm dia 6 Kgf/ cm2	
	Net Total Quantity	10.000 metre
	Say 10.000 metre @ Rs 360.40 / metre	**Rs 3604.00**
26	od71455/2022_2023 Suppling and fixing 110 steel gratings	
	Net Total Quantity	36.000 each
	Say 36.000 each @ Rs 259.71 / each	**Rs 9349.56**
27	19.7.1.1 Constructing brick masonry manhole in cement mortar 1:4 (1 cement : 4 coarse sand) with R.C.C. top with 1:2:4 mix (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size), foundation concrete 1:4:8 mix (1 cement : 4 coarse sand : 8 graded stone aggregate 40 mm nominal size,) inside plastering 12 mm thick with cement mortar 1:3 (1 cement : 3 coarse sand) finished with floating coat of neat cement and making channels in cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size) finished with a floating coat of neat cement complete as per standard design:Inside size 90x80 cm and 45 cm deep including C.I. cover with frame (light duty) 455x610 mm internal dimensions, total weight of cover and frame to be not less than 38 kg (weigh of cover 23 kg and weight of frame 15 kg):With common burnt clay F.P.S. (non modular) bricks of class designation 7.5	
	Net Total Quantity	5.000 each
	Say 5.000 each @ Rs 12836.64 / each	**Rs 64183.20**
28	od71456/2022_2023 Supplying approved make PVC gully trap of size 160 x 110mm and CI grating 150mmx150mm size and light duty C.I cover with frames 300mmx300mm size(inside) the weight of cover to be not less than4.5kg and frame to be not less than2.7kg (CI MH cover and frame as per IS:1726) single sealed of size conveying to size the above mentioned items and constructing 30cmx30cm internal size gully trap chamber and depth upto 60cm,115 thk brick wall in CM 1:6 on a foundation of PCC 1:4:8.100mm thick plastering inside with CM 1:3,12mm thk with a neat cement flushing coat and conveying to site,cleaning ,installing and testing approved make PVC gully trap with 160mm outlet(Fabricated),surrounding with CC 1:1.5:3, 150x150mmm,top with CI grating above the PVC gulley trap and light duty CI cover and frame over the chamber including cost of all materials, etc complete as per approved drawing and as directed by Engineer-in- Charge.	
	Net Total Quantity	36.000 each
	Say 36.000 each @ Rs 3020.69 / each	**Rs 108744.84**
29	18.18.3 Providing and fixing ball valve (brass) of approved quality, High or low pressure, with plastic floats complete:25 mm nominal bore	
	Net Total Quantity	5.000 each

	Say 5.000 each @ Rs 463.79 / each	**Rs 2318.95**
30	18.19.2.2 Providing and fixing gun metal non-return valve of approved quality (screwed end):32 mm nominal boreVertical	
	Net Total Quantity	5.000 each
	Say 5.000 each @ Rs 834.15 / each	**Rs 4170.75**
31	18.48 Providing and placing on terrace (at all floor levels) polyethylene water storage tank :ISI 12701 marked, with cover and suitable locking arrangement and making necessary holes for inlet, outlet and overflow pipes but without fittings and the base support for tank.	
	Net Total Quantity	12000.000 Litre
	Say 12000.000 Litre @ Rs 10.37 / Litre	**Rs 124440.00**
	4 septic tank	
1	2.2.1 Earth work in rough excavation, banking excavated earth in layers not exceeding 20 cm in depth, breaking clods, watering, rolling each layer with 1/2 tonne roller or wooden or steel rammers, and rolling every 3rd and top-most layer with power roller of minimum 8 tonnes and dressing up in embankments for roads, flood banks, marginal banks and guide banks or filling up ground depressions, lead up to 50 m and lift up to 1.5 m:All kinds of soil	
	Net Total Quantity	96.000 cum
	Say 96.000 cum @ Rs 879.03 / cum	**Rs 84386.88**
2	4.1.8 Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:4:8 (1 cement : 4 coarse sand : 8 graded stone aggregate 40 nominal size)	
	Net Total Quantity	3.000 cum
	Say 3.000 cum @ Rs 6814.89 / cum	**Rs 20444.67**
3	5.1.2 Providing and laying in position specified grade of reinforced cement concrete, excluding the cost of centering, shuttering, finishing and reinforcement - All work up to plinth level:1:1:5:3 (1 cement 1.5 coarse sand :3 graded stone aggregate 20 mm nominal size	
	Net Total Quantity	6.000 cum
	Say 6.000 cum @ Rs 9085.14 / cum	**Rs 54510.84**
4	5.2.2 Reinforced cement concrete work in walls (any thickness), including attached pilasters, buttresses, plinth and string courses, fillets, columns, pillars, piers, abutments, posts and struts etc. up tot floor five level excluding cost of centering, shuttering, finishing and reinforcement :1:1.5:3(1 cement : 1.5 coarse sand : 3 graded stone aggregate 20 mm nominal size)	
	Net Total Quantity	10.000 cum

	Say 10.000 cum @ Rs 10954.04 / cum	**Rs 109540.40**
5	5.22.6 Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete upto plinth levelThermo - Mechanically Treated bars of grade Fe-500D or more	
	Net Total Quantity	2100.000 kilogram
	Say 2100.000 kilogram @ Rs 98.30 / kilogram	**Rs 206430.00**
6	13.3.1 20 mm cement plaster of mix:1:4 (1 cement : 4 fine sand)	
	Net Total Quantity	87.000 sqm
	Say 87.000 sqm @ Rs 429.96 / sqm	**Rs 37406.52**
7	6.23 Honey-comb brick work 10/11.4 cm thick with common burnt clay bricks of class designation 7.5 in super structure above plinth level upto floor V level with cement mortar 1:4 (1 cement : 4 coarse sand).	
	Net Total Quantity	10.000 sqm
	Say 10.000 sqm @ Rs 699.37 / sqm	**Rs 6993.70**
8	19.19.1.1 Providing and fixing in position Pre-cast R.C.C. manhole cover and frame of required shape and approved quality.L D - 2.5Rectangular shape 600x450 mm internal dimensions	
	Net Total Quantity	2.000 each
	Say 2.000 each @ Rs 1446.54 / each	**Rs 2893.08**
5 APPENDIX B RETAINING AND COMPOUND WALL		
1	2.3.1 Banking excavated earth in layers not exceeding 20 cm in depth, breaking clods, watering, rolling each layer with 1/2 tonne roller, or wooden or steel rammers, and rolling every 3rd and top-most layer with power roller of minimum 8 tonnes and dressing up, in embankments for roads, flood banks, marginal banks, and guide banks etc., lead up to 50 m and lift up to 1.5 m :All kinds of soil	
	Net Total Quantity	10.000 cum
	Say 10.000 cum @ Rs 553.89 / cum	**Rs 5538.90**
2	2.8.1 Earth work in excavation by mechanical means (Hydraulic excavator) /manual means in foundation trenches or drains (not exceeding 1.5 m in width or 10 sqm on plan), including dressing of sides and ramming of bottoms, lift up to 1.5 m, including getting out the excavated soil and disposal of surplus excavated soil as directed, within a lead of 50 m.All kinds of soil	
	Net Total Quantity	90.000 cum
	Say 90.000 cum @ Rs 296.94 / cum	**Rs 26724.60**

3	2.25 Filling available excavated earth (excluding rock) in trenches, plinth, sides of foundation etc. in layers not exceeding 20 cm in depth, consolidating each deposited layer by ramming and watering, lead up to 50 m and lift up to 1.5 m.	
	Net Total Quantity	72.000 cum
	Say 72.000 cum @ Rs 258.57 / cum	**Rs 18617.04**
4	2.28.1 Surface dressing of the ground including removing vegetation and in-equalities not exceeding 15 cm deep and disposal of rubbish, lead up to 50 m and lift up to 1.5 m.All kinds of soil	
	Net Total Quantity	100.000 sqm
	Say 100.000 sqm @ Rs 28.68 / sqm	**Rs 2868.00**
5	4.1.3 Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:2:4 (cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size)	
	Net Total Quantity	9.000 cum
	Say 9.000 cum @ Rs 7990.86 / cum	**Rs 71917.74**
6	4.1.10 Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:5:10 (1 cement : 5 coarse sand : 10 graded stone aggregate 40 mm nominal size)	
	Net Total Quantity	29.000 cum
	Say 29.000 cum @ Rs 6497.88 / cum	**Rs 188438.52**
7	5.9.1 Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of columns, etc for mass concrete	
	Net Total Quantity	156.000 sqm
	Say 156.000 sqm @ Rs 335.31 / sqm	**Rs 52308.36**
8	5.9.2 Centering and shuttering including strutting, etc. and removal of form for:Walls (any thickness) including attached pilasters, butteresses, plinth and string courses etc.	
	Net Total Quantity	700.000 sqm
	Say 700.000 sqm @ Rs 717.20 / sqm	**Rs 502040.00**
9	5.9.5 Centering and shuttering including strutting, etc. and removal of form for:Lintels, beams, plinth beams, girders bressumers and cantilevers	
	Net Total Quantity	27.000 sqm
	Say 27.000 sqm @ Rs 649.82 / sqm	**Rs 17545.14**

10	5.9.6 Centering and shuttering including strutting, etc. and removal of form for:Columns, Pillars, Piers, Abutments, Posts and Struts	
	Net Total Quantity	50.000 sqm
	Say 50.000 sqm @ Rs 863.64 / sqm	**Rs 43182.00**
11	5.22.6 Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete upto plinth levelThermo - Mechanically Treated bars of grade Fe-500D or more	
	Net Total Quantity	15600.000 kilogram
	Say 15600.000 kilogram @ Rs 98.30 / kilogram	**Rs 1533480.00**
12	5.23 Smooth finishing of the exposed surface of RCC work with 6mm thick cement mortar 1:3 (cement : 3 fine sand).	
	Net Total Quantity	20.000 sqm
	Say 20.000 sqm @ Rs 267.59 / sqm	**Rs 5351.80**
13	5.33.1 Providing and laying in position machine batched and machine mixed design mix M-25 grade cement concrete for reinforced cement concrete work, using cement content as per approved design mix, including pumping of concrete to site of laying but excluding the cost of centering, shuttering, finishing and reinforcement, including admixtures in recommended proportions as per IS: 9103 to accelerate, retard setting of concrete, improve workability without impairing strength and durability as per direction of Engineer - in-charge. Note:- Cement content considered in this item is @ 330 kg/ cum. Excess or less cement used as per design mix is payable or recoverable separately.All work upto plinth level	
	Net Total Quantity	156.000 cum
	Say 156.000 cum @ Rs 9413.54 / cum	**Rs 1468512.24**
14	5.33.2 Providing and laying in position machine batched and machine mixed design mix M-25 grade cement concrete for reinforced cement concrete work, using cement content as per approved design mix, including pumping of concrete to site of laying but excluding the cost of centering, shuttering, finishing and reinforcement, including admixtures in recommended proportions as per IS: 9103 to accelerate, retard setting of concrete, improve workability without impairing strength and durability as per direction of Engineer - in-charge. Note:- Cement content considered in this item is @ 330 kg/ cum. Excess or less cement used as per design mix is payable or recoverable separately.All work above plinth level upto floor V level	
	Net Total Quantity	55.000 cum
	Say 55.000 cum @ Rs 11065.64 / cum	**Rs 608610.20**
15	5.35 Add for using extra cement in the items of design mix over and above the specified cement content therein	

	Net Total Quantity	60.000 quintal
	Say 60.000 quintal @ Rs 792.52 / quintal	**Rs 47551.20**
16	5.22A.6 Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete above plinth level.Thermo - Mechanically Treated bars of grade Fe-500D or more	
	Net Total Quantity	5500.000 kg
	Say 5500.000 kg @ Rs 98.30 / kg	**Rs 540650.00**
17	6.34.2 Brick work with non modular fly ash lime bricks (FALG Bricks) conforming to IS: 12894, class designation 10 average compressive strength in super structure above plinth level up to floor V level in:Cement mortar 1:6 (1 cement : 6 coarse sand)	
	Net Total Quantity	58.440 cum
	Say 58.440 cum @ Rs 8570.03 / cum	**Rs 500832.55**
18	7.1.1 Random rubble masonry with hard stone in foundation and plinth including levelling up with cement concrete 1:6:12 (1 cement : 6 coarse sand : 12 graded stone aggregate 20 mm nominal size) up to plinth level with:Cement mortar 1:6 (1 cement : 6 coarse sand)	
	Net Total Quantity	2.000 cum
	Say 2.000 cum @ Rs 7204.78 / cum	**Rs 14409.56**
19	10.25.2 Item Shifted to head 14 as item 14.74Steel work welded in built up sections/framed work, including cutting, hoisting, fixing in position and applying a priming coat of approved steel primer using structural steel etc. as required.In gratings, frames, guard bar, ladder, railings, brackets, gates and similar works	
	Net Total Quantity	2680.000 kg
	Say 2680.000 kg @ Rs 154.17 / kg	**Rs 413175.60**
20	13.1.2 12 mm cement plaster of mix:1:6 (1 cement : 6 fine sand).	
	Net Total Quantity	255.000 sqm
	Say 255.000 sqm @ Rs 299.25 / sqm	**Rs 76308.75**
21	13.2.2 15 mm cement plaster on the rough side of single or half brick wall of mix:1:6 (1 cement : 6 fine sand)	
	Net Total Quantity	255.000 sqm
	Say 255.000 sqm @ Rs 344.67 / sqm	**Rs 87890.85**
22	13.52.1 Finishing with Epoxy paint (two or more coats) at all locations prepared and applied as per manufacturer's specifications including appropriate priming coat, preparation of surface, etc. complete.On steel work	

	Net Total Quantity	550.000 sqm
	Say 550.000 sqm @ Rs 223.32 / sqm	**Rs 122826.00**
23	13.48A.1 Finishing walls with 100% Premium acrylic emulsion paint having VOC lessthan 50 gm/litre and UV resistance as per IS 15489:2004, Alkali & fungalresistance, dirt resistance exterior paint of required shade (Company DepotTinted) with silicon additives.New work (Two or more coats applied @ 1.43 litre/ 10 sqm. Over and includingpriming coat of exterior primer applied @ 0.90 litre/10 sqm.	
	Net Total Quantity	175.000 sqm
	Say 175.000 sqm @ Rs 172.13 / sqm	**Rs 30122.75**
24	od78676/2022_2023 Providing and laying factory made chamfered edge Cement Concrete paver blocks in footpath, parks, lawns, drive ways or light traffic parking etc, of required strength, thickness & size/ shape, made by table vibratory method using PU mould, laid in required colour & pattern over 50mm thick compacted bed of 6mm metal, compacting and proper embedding/laying of inter locking paver blocks into the bedding layer through vibratory compaction by using plate vibrator, and cutting of paver blocks as per required size and pattern, finishing etc. complete all as per direction of Engineer-in-Charge. 80 mm thick C.C. paver block of M-30 grade with approved color design and pattern.	
	Net Total Quantity	100.000 sqm
	Say 100.000 sqm @ Rs 1058.07 / sqm	**Rs 105807.00**
	6 Appendix C	
1	2.6.1 Earth work in excavation by mechanical means (Hydraulic excavator)/manual means over areas (exceeding 30 cm in depth, 1.5 m in width as well as 10 sqm on plan) including disposal of excavated earth, lead up to 50 m and lift up to 1.5 m, disposed earth to be levelled and neatly dressed.All kinds of soil	
	Net Total Quantity	180.000 cum
	Say 180.000 cum @ Rs 214.03 / cum	**Rs 38525.40**
2	2.25 Filling available excavated earth (excluding rock) in trenches, plinth, sides of foundation etc. in layers not exceeding 20 cm in depth, consolidating each deposited layer by ramming and watering, lead up to 50 m and lift up to 1.5 m.	
	Net Total Quantity	30.000 cum
	Say 30.000 cum @ Rs 258.57 / cum	**Rs 7757.10**
3	2.26.1 Extra for every additional lift 1.5 m or part there of in excavation / banking excavated or stacked materials.All kinds of soil	
	Net Total Quantity	102.000 cum
	Say 102.000 cum @ Rs 106.37 / cum	**Rs 10849.74**

4	4.1.10 Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:5:10 (1 cement : 5 coarse sand : 10 graded stone aggregate 40 mm nominal size)	
	Net Total Quantity	9.000 cum
	Say 9.000 cum @ Rs 6497.88 / cum	**Rs 58480.92**
5	5.9.1 Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of columns, etc for mass concrete	
	Net Total Quantity	13.000 sqm
	Say 13.000 sqm @ Rs 335.31 / sqm	**Rs 4359.03**
6	5.9.2 Centering and shuttering including strutting, etc. and removal of form for:Walls (any thickness) including attached pilasters, butteresses, plinth and string courses etc.	
	Net Total Quantity	200.000 sqm
	Say 200.000 sqm @ Rs 717.20 / sqm	**Rs 143440.00**
7	5.9.3 Centering and shuttering including strutting, etc. and removal of form for:Suspended floors, roofs, landings, balconies and access platform	
	Net Total Quantity	37.000 sqm
	Say 37.000 sqm @ Rs 815.78 / sqm	**Rs 30183.86**
8	5.9.5 Centering and shuttering including strutting, etc. and removal of form for:Lintels, beams, plinth beams, girders bressumers and cantilevers	
	Net Total Quantity	25.000 sqm
	Say 25.000 sqm @ Rs 649.82 / sqm	**Rs 16245.50**
9	5.22.6 Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete upto plinth levelThermo - Mechanically Treated bars of grade Fe-500D or more	
	Net Total Quantity	5000.000 kilogram
	Say 5000.000 kilogram @ Rs 98.30 / kilogram	**Rs 491500.00**
10	5.33.1 Providing and laying in position machine batched and machine mixed design mix M-25 grade cement concrete for reinforced cement concrete work, using cement content as per approved design mix, including pumping of concrete to site of laying but excluding the cost of centering, shuttering, finishing and reinforcement, including admixtures in recommended proportions as per IS: 9103 to accelerate, retard setting of concrete, improve workability without impairing strength and durability as per direction of Engineer - in-charge. Note:- Cement content considered in this item is @ 330 kg/ cum. Excess or less cement used as per design mix is payable or recoverable separately.All work upto plinth level	

	Net Total Quantity	50.000 cum
	Say 50.000 cum @ Rs 9413.54 / cum	**Rs 470677.00**
11	5.35 Add for using extra cement in the items of design mix over and above the specified cement content therein	
	Net Total Quantity	15.000 quintal
	Say 15.000 quintal @ Rs 792.52 / quintal	**Rs 11887.80**
12	5.22A.6 Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete above plinth level.Thermo - Mechanically Treated bars of grade Fe-500D or more	
	Net Total Quantity	150.000 kg
	Say 150.000 kg @ Rs 98.30 / kg	**Rs 14745.00**
13	6.27.1 Brick work with common burnt clay modular bricks of class designation 7.5 in exposed brick work including making horizontal and vertical grooves 10 mm wide 12mm deep complete in cement mortar 1:6 (1 cement : 6 coarse sand).From ground level upto plinth level	
	Net Total Quantity	3.000 cum
	Say 3.000 cum @ Rs 6284.61 / cum	**Rs 18853.83**
14	6.34.2 Brick work with non modular fly ash lime bricks (FALG Bricks) conforming to IS: 12894, class designation 10 average compressive strength in super structure above plinth level up to floor V level in:Cement mortar 1:6 (1 cement : 6 coarse sand)	
	Net Total Quantity	3.200 cum
	Say 3.200 cum @ Rs 8570.03 / cum	**Rs 27424.10**
15	9.96.1 Providing and fixing aluminium sliding door bolts, ISI marked anodised (anodic coating not less than grade AC 10 as per IS : 1868), transparent or dyed to required colour or shade, with nuts and screws etc. complete:300x16 mm	
	Net Total Quantity	1.000 no
	Say 1.000 no @ Rs 302.70 / no	**Rs 302.70**
16	9.97.1 Providing and fixing aluminium tower bolts, ISI marked, anodised(anodic coating not less than grade AC 10 as per : 1868), transparent or dyed to required colour or shade, with necessary screws complete:300x10 mm	
	Net Total Quantity	1.000 no
	Say 1.000 no @ Rs 137.49 / no	**Rs 137.49**
17	9.97.4 150x10 mm	

	Net Total Quantity	4.000 no
	Say 4.000 no @ Rs 88.27 / no	**Rs 353.08**
18	9.100.1 Providing and fixing aluminium handles, ISI marked, anodised (anodic coating not less than grade AC 10 as per IS : 1868) transparent or dyed to required colour or shade, with necessary screws etc. complete:125 mm	
	Net Total Quantity	1.000 no
	Say 1.000 no @ Rs 70.17 / no	**Rs 70.17**
19	9.101.1 Providing and fixing aluminium hanging floor door stopper, ISI marked, anodised (anodic coating not less than grade AC 10 as per IS: 1868) transparent or dyed to required colour and shade, with necessary screws etc. complete.Single rubber stopper	
	Net Total Quantity	1.000 no
	Say 1.000 no @ Rs 39.93 / no	**Rs 39.93**
20	10.16.1 Steel work in built up tubular (round, square or rectangular hollow tubes etc.) trusses etc., including cutting, hoisting, fixing position and applying a priming coat of approved steel primer, including welding and bolted with special shaped washers etc. complete.Hot finished welded type tubes	
	Net Total Quantity	135.000 kg
	Say 135.000 kg @ Rs 168.81 / kg	**Rs 22789.35**
21	10.19 Providing and fixing mild steel round holding down bolts with nuts and washer plates complete.	
	Net Total Quantity	20.000 kg
	Say 20.000 kg @ Rs 98.64 / kg	**Rs 1972.80**
22	11.41.2 Providing and laying vitrified floor tiles in different sizes (thickness to be specified by the manufacturer) with water absorption less than 0.08% and conforming to IS : 15622, of approved make, in all colours and shades, laid on 20 mm thick cement mortar 1:4(1 cement : 4 coarse sand), including grouting the joints with white cement and matching pigments etc., complete.Size of Tile 600 x 600 mm.	
	Net Total Quantity	8.000 sqm
	Say 8.000 sqm @ Rs 1766.26 / sqm	**Rs 14130.08**
23	11.46.2 Providing and laying Vitrified tiles indifferent sizes (thickness to be specified by manufacturer), with water absorption less than 0.08 % and conforming to I.S. 15622, of approved make, in all colours & shade, in skirting, riser of steps, over 12 mm thick bed of cement mortar 1:3 (1 cement : 3 coarse sand), including grouting the joint with white cement & matching pigments etc. complete.Size of Tile 600x600 mm	
	Net Total Quantity	1.000 sqm
	Say 1.000 sqm @ Rs 1819.62 / sqm	**Rs 1819.62**

24	12.50 Providing and fixing precoated galvanised iron profile sheets (size, shape and pitch of corrugation as approved by Engineer-in-charge) 0.50 mm (+0.05%), total coated thickness with zinc coating 120 grams per sqm as per IS: 277, in 240 mpa steel grade, 5-7 microns epoxy primer on both side of the sheet and polyester top coat 15-18 microns. Sheet should have protective guard film of 25 microns minimum to avoid scratches during transportation and should be supplied in single length upto 12 metre or as desired by Engineer-in-charge. The sheet shall be fixed using self drilling/self tapping screws of size (5.5x55mm) with EPDM seal, complete upto any pitch in horizontal/ vertical or curved surfaces, excluding the cost of purlins, rafters and trusses and including cutting to size and shape wherever required.	
	Net Total Quantity	15.000 sqm
	Say 15.000 sqm @ Rs 738.69 / sqm	**Rs 11080.35**
25	12.51.1 Providing and fixing precoated galvanised steel sheet roofing accessories 0.50 mm (+ 0.05%) total coated thickness, zinc coating 120 grams per sqm as per IS:mm(+0.05%) total coated thickness, Zinc coating 120 grams per sqm as per IS: 277, in 240 mpa steel grade, 5-7 microns epoxy primer on both side of the sheet and polyester top coat 15-18 microns using self drilling/self tapping screws complete:Ridges plain (500-600 mm)	
	Net Total Quantity	8.000 metre
	Say 8.000 metre @ Rs 490.02 / metre	**Rs 3920.16**
26	13.1.2 12 mm cement plaster of mix:1:6 (1 cement : 6 fine sand).	
	Net Total Quantity	36.000 sqm
	Say 36.000 sqm @ Rs 299.25 / sqm	**Rs 10773.00**
27	13.2.2 15 mm cement plaster on the rough side of single or half brick wall of mix:1:6 (1 cement : 6 fine sand)	
	Net Total Quantity	31.000 sqm
	Say 31.000 sqm @ Rs 344.67 / sqm	**Rs 10684.77**
28	13.9.1 Cement plaster 1:3 (1 cement : 3 coarse sand) finished with a floating coat of neat cement.12 mm cement plaster	
	Net Total Quantity	152.000 sqm
	Say 152.000 sqm @ Rs 412.13 / sqm	**Rs 62643.76**
29	13.42 Distempering with 1st quality acrylic distemper (ready mixed) of approvedmanufacturer, of required shade and colour complete, as per manufacturer'sspecification.	
	Net Total Quantity	36.000 sqm
	Say 36.000 sqm @ Rs 102.57 / sqm	**Rs 3692.52**

30	13.61.1 Painting with synthetic enamel paint of approved brand and manufacture to give an even shade:Two or more coats on new work	
	Net Total Quantity	10.000 sqm
	Say 10.000 sqm @ Rs 143.05 / sqm	**Rs 1430.50**
31	13.48A.1 Finishing walls with 100% Premium acrylic emulsion paint having VOC lessthan 50 gm/litre and UV resistance as per IS 15489:2004, Alkali & fungalresistance, dirt resistance exterior paint of required shade (Company DepotTinted) with silicon additives.New work (Two or more coats applied @ 1.43 litre/ 10 sqm. Over and includingpriming coat of exterior primer applied @ 0.90 litre/10 sqm.	
	Net Total Quantity	22750.000 sqm
	Say 22750.000 sqm @ Rs 172.13 / sqm	**Rs 3915957.50**
32	18.7.5 Providing and fixing Chlorinated Polyvinyl Chloride (CPVC) pipes, having thermal stability for hot & cold water supply, including all CPVC plain & brass threaded fittings including fixing the pipe with clamps at 1.00 m spacing. This includes jointing of pipes & fittings with one step CPVC solvent cement and testing of joints complete as per direction of Engineer -in-Charge. Internal work - Exposed on wall40 mm nominal outer dia pipes	
	Net Total Quantity	10.000 metre
	Say 10.000 metre @ Rs 763.44 / metre	**Rs 7634.40**
33	18.9.5 Providing and fixing Chlorinated Polyvinyl Chloride (CPVC) pipes, having thermal stability for hot & cold water supply including all CPVC plain & brass threaded fittings. This includes jointing of pipes & fittings with one step CPVC solvent cement, trenching , refilling & testing of joints complete as per direction of Engineer- in-Charge. External work40 mm nominal outer dia pipes	
	Net Total Quantity	20.000 metre
	Say 20.000 metre @ Rs 631.85 / metre	**Rs 12637.00**
34	18.17.3 Providing and fixing gun metal gate valve with C.I. wheel of approved quality (screwed end) :40 mm nominal bore	
	Net Total Quantity	1.000 each
	Say 1.000 each @ Rs 798.56 / each	**Rs 798.56**
35	18.19.3.1 Providing and fixing gun metal non-return valve of approved quality (screwed end):40 mm nominal boreHorizontal	
	Net Total Quantity	1.000 each
	Say 1.000 each @ Rs 932.72 / each	**Rs 932.72**

36	21.1.1.2 Providing and fixing aluminium work for doors, windows, ventilators and partitions with extruded built up standard tubular sections/ appropriate Z sections and other sections of approved make conforming to IS : 733 and IS: 1285, fixing with dash fasteners of required dia and size, including necessary filling up the gaps at junctions, i.e. at top, bottom and sides with required EPDM rubber/ neoprene gasket etc. Aluminium sections shall be smooth, rust free, straight, mitred and jointed mechanically wherever required including cleat angle, Aluminnium snap beading for glazing /paneling, C.P. brass/ stainless steel screws, all complete as per architectural drawings and the directions of Engineer-in-charge.(Glazing, paneling and dash fasteners to be paid for separately):For fixed portionPowder coated aluminium (minimum thickness of powder coating 50 micron)	
	Net Total Quantity	35.000 kg
	Say 35.000 kg @ Rs 537.07 / kg	**Rs 18797.45**
37	21.1.2.2 For shutters of doors, windows & ventilators including providing and fixing hinges / pivots and making provision for fixing of fittings wherever required including the cost of EPDM rubber/ neoprene gasket required (Fittings shall be paid for separately)Powder coated aluminium (minimum thickness of powder coating 50 micron)	
	Net Total Quantity	25.000 kg
	Say 25.000 kg @ Rs 643.10 / kg	**Rs 16077.50**
38	21.2.1 Providing and fixing 12 mm thick prelaminated particle board flat pressed three layer or graded wood particle board conforming to IS : 12823 Grade I Type II, in panelling fixed in aluminum doors, windows shutters and partition frames with C.P. brass / stainless steel screws etc. complete as per architectural drawings and directions of Engineer - in- Charge.Pre-laminated particle board with decorative lamination on one side and balancing lamination on other side	
	Net Total Quantity	1.200 sqm
	Say 1.200 sqm @ Rs 1174.41 / sqm	**Rs 1409.29**
39	21.3.2 Providing and fixing glazing in aluminium door, window, ventilator shutters and partitions etc. with EPDM rubber / neoprene gasket etc. complete as per the architectural drawings and the directions of Engineer - in -Charge. (Cost of aluminium snap beading shall be paid in basic item):With float glass panes of 5.50 mm thickness	
	Net Total Quantity	3.000 sqm
	Say 3.000 sqm @ Rs 1526.00 / sqm	**Rs 4578.00**
40	21.8.1 nullUpto 5 mm depth and 5 mm width	
	Net Total Quantity	15.000 metre
	Say 15.000 metre @ Rs 93.56 / metre	**Rs 1403.40**

41	19.18.1 Supplying and fixing C.I with out frame for manholes:455 x 610 mm rectangular C.I cover (light duty) the weight of the cover to be no less than 23 kg	
	Net Total Quantity	2.000 each
	Say 2.000 each @ Rs 1561.12 / each	**Rs 3122.24**
	Provision for GST payments (in %) @	**18.0%**
	Amount reserved for GST payments	**18996541.54**
	Total	**124532883.54**
	Lumpsum for round off	**0.00**
		TOTAL Rs 124532883.54
		Rounded Total Rs 12,45,32,884
	Rupees Twelve Crore Forty Five Lakh Thirty Two Thousand Eight Hundred and Eighty Four Only	

(Cost Index Applied for this estimate is 35.59%)

CONSTRUCTION OF TRANSLATIONAL RESEARCH CENTRE

AT CUSAT THRIKKAKARA CAMPUS

DETAILED ESTIMATE

Construction of translational research centre at CUSAT Thrikkakara Campus

Detailed Estimate

(Dsor year: **2018**,Cost Index Applied for this estimate is **35.59**%)

Sl No	Description	No	L	B	D	CF	Quantity	Remark
	1 civil works							
1	2.8.1 Earth work in excavation by mechanical means (Hydraulic excavator) /manual means in foundation trenches or drains (not exceeding 1.5 m in width or 10 sqm on plan), including dressing of sides and ramming of bottoms, lift up to 1.5 m, including getting out the excavated soil and disposal of surplus excavated soil as directed, within a lead of 50 m.All kinds of soil							
	footing							
	for indipendant footing	48	4.700	5.200	2.000		2346.241	
	Double footin	11	8.000	4.200	2.000		739.200	
	Combined footing	2	6.700	6.200	2.000		166.160	
						Total Quantity	3251.601 cum	
						Total Deducted Quantity	0.000 cum	
						Net Total Quantity	3251.601 cum	
						Say 3251.601 cum @ Rs 296.94 / cum	**Rs 965530.40**	
2	4.1.8 Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:4:8 (1 cement : 4 coarse sand : 8 graded stone aggregate 40 nominal size)							
	for basement levelling							
	entrance lobby	1	8.600	5.200	0.075		3.354	
	Gents rest room and passage	1	7.510	4.100	0.075		2.310	
	Gents toilet room	1	4.700	7.000	0.075		2.468	
	store	1	2.800	2.100	0.075		0.441	
	store	1	2.000	2.100	0.075		0.315	
	lab	1	9.000	15.200	0.075		10.260	
	Seminar hall	1	11.000	22.900	0.075		18.893	
	Research lab	3	9.000	7.500	0.075		15.188	
	Class room	1	9.000	7.500	0.075		5.063	
	Staff room and passage	1	11.000	7.300	0.075		6.023	
	Staff toilet	1	2.700	2.100	0.075		0.426	

	Stair cabin	1	9.200	5.400	0.075		3.726	
		1	2.300	4.100	0.075		0.708	
	Staff room	2	5.450	5.900	0.075		4.824	
	Ladies rest room	1	4.400	7.500	0.075		2.475	
	Toilet Ladies	1	7.600	4.400	0.075		2.508	
	Staff toilet, cooler, H toilet etc	1	7.600	4.400	0.075		2.508	
	Common passage	1	63.850	3.000	0.075		14.367	
	footing							
	for indipendant footing	48	3.500	3.500	0.100		58.801	
	Double footin	11	7.000	3.100	0.100		23.870	
	Combined footing	2	5.400	5.200	0.100		5.617	
						Total Quantity	184.145 cum	
						Total Deducted Quantity	0.000 cum	
						Net Total Quantity	184.145 cum	
						Say 184.145 cum @ Rs 6814.89 / cum	**Rs 1254927.92**	
3	5.33.1 Providing and laying in position machine batched and machine mixed design mix M-25 grade cement concrete for reinforced cement concrete work, using cement content as per approved design mix, including pumping of concrete to site of laying but excluding the cost of centering, shuttering, finishing and reinforcement, including admixtures in recommended proportions as per IS: 9103 to accelerate, retard setting of concrete, improve workability without impairing strength and durability as per direction of Engineer - in-charge. Note:- Cement content considered in this item is @ 330 kg/ cum. Excess or less cement used as per design mix is payable or recoverable separately.All work upto plinth level							
	Column Pedestal							
		78	0.800	0.500	1.100		34.321	
	plinth beam							
	Vertical PB A1-A7	1	23.600	0.300	0.600		4.248	
	A9 -A18	1	38.850	0.300	0.600		6.993	
	B1 to B3	1	8.100	0.300	0.600		1.458	
	B9 to B14	2	23.500	0.300	0.600		8.460	
	C1 to C18, D1 to D18	2	69.350	0.300	0.600		24.966	
	F1 to F3	1	8.100	0.300	0.600		1.458	
	G5 to G13	1	30.800	0.300	0.600		5.544	
	F13 to F18	1	23.550	0.300	0.600		4.239	

	E16 to E18	1	8.050	0.300	0.600		1.449	
	Horizhontal PB in Short span A1 t0 F1,A3 to F3	2	21.800	0.300	0.600		7.848	
	B2 to C2	1	5.650	0.300	0.600		1.017	
	A4 to D4	1	12.700	0.300	0.600		2.286	
	A5-G5,A6-G6,A7-G7,A9-G9,A11-G11,A13-G13	6	23.800	0.300	0.600		25.704	
	C8 TO G8	1	14.850	0.300	0.600		2.673	
	D12 TO G12	1	11.400	0.300	0.600		2.052	
	LIFT	1	5.300	0.300	0.600		0.954	
		2	1.900	0.300	0.600		0.684	
	a14-f14,A15 TO F15,A16 TO F16,A17 TO F17,A18 TO F18	5	21.800	0.300	0.600		19.620	
	footing							
	for indipendant footing	48	3.500	4.000	0.600		403.201	
		48	2.000	1.500	0.600		86.400	
	Double footin	11	7.000	3.000	0.600		138.600	
		11	5.000	1.100	0.600		36.300	
	Combined footing	2	5.500	5.000	0.600		33.000	
		2	3.500	3.500	0.600		14.700	
						Total Quantity	868.175 cum	
						Total Deducted Quantity	0.000 cum	
						Net Total Quantity	868.175 cum	
						Say 868.175 cum @ Rs 9413.54 / cum	**Rs 8172600.09**	
4	5.33.2 Providing and laying in position machine batched and machine mixed design mix M-25 grade cement concrete for reinforced cement concrete work, using cement content as per approved design mix, including pumping of concrete to site of laying but excluding the cost of centering, shuttering, finishing and reinforcement, including admixtures in recommended proportions as per IS: 9103 to accelerate, retard setting of concrete, improve workability without impairing strength and durability as per direction of Engineer - in-charge. Note:- Cement content considered in this item is @ 330 kg/ cum. Excess or less cement used as per design mix is payable or recoverable separately.All work above plinth level upto floor V level							
	COLUMN G 2							

	columns	3*78	0.200	0.600	3.600		101.088	
	stair columns	12	0.200	0.800	3.600		6.913	
	stair case G 2							
	Ms & FS flight	2*2*3	3.600	1.250	0.120		6.480	
		2*1*3	1.400	1.250	0.120		1.260	
	landing slab	2*2*3	2.000	2.000	0.120		5.760	
	step	2*4*25	2.000	.5*.15*.3	0.120		1.080	
	Sunshade G 2							
	Long wall direction	2*3	69.350	0.600	0.100		24.966	
	Short wall direction	2*3	23.000	0.600	0.100		8.280	
	Cutting portion	2*3	8.950	0.600	0.100		3.222	
		1*3	11.100	0.600	0.100		1.998	
		1*3	9.100	0.600	0.100		1.639	
	beam G 2							
	Vertical PB A1-A7	1*3	23.600	0.200	0.600		8.496	
	A9 -A18	1*3	38.850	0.200	0.600		13.986	
	B1 to B3	1*3	8.100	0.200	0.600		2.916	
	B9 to B14	2*3	23.500	0.200	0.600		16.920	
	C1 to C18, D1 to D18	2*3	69.350	0.200	0.600		49.932	
	F1 to F3	1*3	8.100	0.200	0.600		2.916	
	G5 to G13	1*3	30.800	0.200	0.600		11.088	
	F13 to F18	1*3	23.550	0.200	0.600		8.478	
	E16 to E18	1*3	8.050	0.200	0.600		2.899	
	Horizhontal PB in Short span A1 t0 F1,A3 to F3	2*3	21.800	0.200	0.600		15.697	
	B2 to C2	1*3	5.650	0.200	0.600		2.035	
	A4 to D4	1*3	12.700	0.200	0.600		4.572	
	A5-G5,A6-G6,A7-G7,A9-G9,A11-G11,A13-G13	6*3	23.800	0.200	0.600		51.409	
	C8 TO G8	1*3	14.850	0.200	0.600		5.346	
	D12 TO G12	1*3	11.400	0.200	0.600		4.104	
	LIFT	1*3	5.300	0.200	0.600		1.908	

		2*3	1.900	0.200	0.600		1.368	
	a14-f14,A15 TO F15,A16 TO F16,A17 TO F17,A18 TO F18	5*3	21.800	0.200	0.600		39.240	
	SLAB G+2							
	SLAB G+2	1*3	69.660	23.800	0.130		646.585	
	STAIRCABIN SLAB	1	9.200	23.800	0.130		28.465	
		1	9.200	7.230	0.130		8.648	
	Slab Deduction G 2							
	slab deductions	3*1	2.000	23.350	0.130		-18.213	
		3*1	9.200	7.400	0.130		-26.551	
	Stair portion	3*1	5.000	5.300	0.130		-10.335	
	Cuting portion	3*1	11.200	7.400	0.130		-32.323	
		3*1	8.100	2.000	0.130		-6.318	
	Fire stair	3*1	5.600	5.200	0.130		-11.356	
	cOLUMN	78	0.200	0.600	0.130		-1.216	
	LINTELS G +2							
	Vertical PB A1-A7	1*3	23.600	0.200	0.150		2.124	
	A9 -A18	1*3	38.850	0.200	0.150		3.497	
	B1 to B3	1*3	8.100	0.200	0.150		0.729	
	B9 to B14	2*3	23.500	0.200	0.150		4.230	
	C1 to C18, D1 to D18	2*3	69.350	0.200	0.150		12.483	
	F1 to F3	1*3	8.100	0.200	0.150		0.729	
	G5 to G13	1*3	30.800	0.200	0.150		2.772	
	F13 to F18	1*3	23.550	0.200	0.150		2.120	
	E16 to E18	1*3	8.050	0.200	0.150		0.725	
	Horizhontal PB in Short span A1 t0 F1,A3 to F3	2*3	21.800	0.200	0.150		3.925	
	B2 to C2	1*3	5.650	0.200	0.150		0.509	
	A4 to D4	1*3	12.700	0.200	0.150		1.143	
	A5-G5,A6-G6,A7-G7,A9-G9,A11-G11,A13-G13	6*3	23.800	0.200	0.150		12.853	
	C8 TO G8	1*3	14.850	0.200	0.150		1.337	

	D12 TO G12	1*3	11.400	0.200	0.150		1.026	
	LIFT	1*3	5.300	0.200	0.150		0.477	
		2*3	1.900	0.200	0.150		0.342	
	a14-f14,A15 TO F15,A16 TO F16,A17 TO F17,A18 TO F18	5*3	21.800	0.200	0.150		9.810	
						Total Quantity	1150.525 cum	
						Total Deducted Quantity	-106.312 cum	
						Net Total Quantity	1044.213 cum	
						Say 1044.213 cum @ Rs 11065.64 / cum	**Rs 11554885.14**	
5	22.5 Providing and laying water proofing treatment in sunken portion of WCs, bathroom etc., by applying cement slurry mixed with water proofing cement compound consisting of applying : a) First layer of slurry of cement @ 0.488 kg/sqm mixed with water proofing cement compound @ 0.253 kg/sqm. This layer will be allowed to air cure for 4 hours. b) Second layer of slurry of cement @ 0.242 kg /sqm mixed with water proofing cement compound @ 0.126 kg/ sqm. This layer will be allowed to air cure for 4 hours followed with water curing for 48 hours. The rate includes preparation of surface, treatment and sealing of all joints, corners, junctions of pipes and masonry with polymer mixed slurry.							
	Gents Toilet	2	7.000	4.700			65.800	
	toilet wall	2	(7.0+4.7)*2		0.450		21.060	
	Staff room toilet	2	2.000	2.100			8.400	
	Wall	2*2	(2.000+2.1)		0.450		7.380	
	Staff room toilet	2	4.400	2.900			25.520	
		2	(4.400+2.9)*2		0.450		13.141	
	Cooler	2	1.500	2.500			7.500	
		2	(1.500+2.5)*2		0.450		7.200	
	H toilet	2	2.700	2.500			13.500	
		2	(2.700+2.50)*2		0.450		9.361	
		2	4.400	7.650			67.321	
		2	(4.400+7.65)*2		0.450		21.690	
						Total Quantity	267.873 sqm	

						Total Deducted Quantity	0.000 sqm	
						Net Total Quantity	267.873 sqm	
						Say 267.873 sqm @ Rs 548.05 / sqm	**Rs 146807.80**	
6	50.6.1.4 Solid block masonry using pre cast solid blocks (Factory made) of size 30x20x20cm or nearest available size confirming to IS 2185 part I of 1979 for foundation and plinth with thickness 20cm and above in: CM 1:6 (1 cement : 6 coarse sand) etc complete							
	plinth beam							
	Vertical PB A1-A7	1	23.600	0.300	0.600		4.248	
	A9 -A18	1	38.850	0.300	0.600		6.993	
	B1 to B3	1	8.100	0.300	0.600		1.458	
	B9 to B14	2	23.500	0.300	0.600		8.460	
	C1 to C18, D1 to D18	2	69.350	0.300	0.600		24.966	
	F1 to F3	1	8.100	0.300	0.600		1.458	
	G5 to G13	1	30.800	0.300	0.600		5.544	
	F13 to F18	1	23.550	0.300	0.600		4.239	
	E16 to E18	1	8.050	0.300	0.600		1.449	
	Horizhontal PB in Short span A1 t0 F1,A3 to F3	2	21.800	0.300	0.600		7.848	
	B2 to C2	1	5.650	0.300	0.600		1.017	
	A4 to D4	1	12.700	0.300	0.600		2.286	
	A5-G5,A6-G6,A7-G7,A9-G9,A11-G11,A13-G13	6	23.800	0.300	0.600		25.704	
	C8 TO G8	1	14.850	0.300	0.600		2.673	
	D12 TO G12	1	11.400	0.300	0.600		2.052	
	LIFT	1	5.300	0.300	0.600		0.954	
		2	1.900	0.300	0.600		0.684	
	a14-f14,A15 TO F15,A16 TO F16,A17 TO F17,A18 TO F18	5	21.800	0.300	0.600		19.620	
						Total Quantity	121.653 cum	
						Total Deducted Quantity	0.000 cum	
						Net Total Quantity	121.653 cum	
						Say 121.653 cum @ Rs 5950.30 / cum	**Rs 723871.85**	

7	2.25 Filling available excavated earth (excluding rock) in trenches, plinth, sides of foundation etc. in layers not exceeding 20 cm in depth, consolidating each deposited layer by ramming and watering, lead up to 50 m and lift up to 1.5 m.							
	for basement filling							
	entrance lobby	1	8.600	5.200	0.450		20.124	
	Gents rest room and passage	1	7.510	4.100	0.450		13.856	
	Gents toilet room	1	4.700	7.000	0.450		14.805	
	store	1	2.800	2.100	0.450		2.646	
	store	1	2.000	2.100	0.450		1.891	
	lab	1	9.000	15.200	0.450		61.560	
	Seminar hall	1	11.000	22.900	0.450		113.355	
	Research lab	3	9.000	7.500	0.450		91.125	
	Class room	1	9.000	7.500	0.450		30.375	
	Staff room and passage	1	11.000	7.300	0.450		36.135	
	Staff toilet	1	2.700	2.100	0.450		2.552	
	Stair cabin	1	9.200	5.400	0.450		22.356	
		1	2.300	4.100	0.450		4.244	
	Staff room	2	5.450	5.900	0.450		28.940	
	Ladies rest room	1	4.400	7.500	0.450		14.850	
	Toilet Ladies	1	7.600	4.400	0.450		15.048	
	Staff toilet, cooler, H toilet etc	1	7.600	4.400	0.450		15.048	
	Common passage	1	63.850	3.000	0.450		86.198	
						Total Quantity	575.108 cum	
						Total Deducted Quantity	0.000 cum	
						Net Total Quantity	575.108 cum	
						Say 575.108 cum @ Rs 258.57 / cum	**Rs 148705.68**	
8	od71454/2022_2023 Providing and applying Antitermite treatment by injecting chemical emulsion Imidacloprid emulsiable concentrate .075% for pre-constructional treatment and creating a chemical barrier as per IS 6313 (Part II) 2001 for wall trenches, foundation, top surface of plinth filling, foundation of wall and floor, along the external perimeter of the building, etc. complete conforming to manufacturers specification and as directed by the Engineer-in-Charge. (Plinth area only to be measured for the payment)							

	for basement filling							
	entrance lobby	1	8.600	5.200			44.720	
	Gents rest room and passage	1	7.510	4.100			30.791	
	Gents toilet room	1	4.700	7.000			32.900	
	store	1	2.800	2.100			5.880	
	store	1	2.000	2.100			4.200	
	lab	1	9.000	15.200			136.800	
	Seminar hall	1	11.000	22.900			251.900	
	Research lab	3	9.000	7.500			202.500	
	Class room	1	9.000	7.500			67.500	
	Staff room and passage	1	11.000	7.300			80.300	
	Staff toilet	1	2.700	2.100			5.671	
	Stair cabin	1	9.200	5.400			49.680	
		1	2.300	4.100			9.430	
	Staff room	2	5.450	5.900			64.310	
	Ladies rest room	1	4.400	7.500			33.000	
	Toilet Ladies	1	7.600	4.400			33.440	
	Staff toilet, cooler, H toilet etc	1	7.600	4.400			33.440	
	Common passage	1	63.850	3.000			191.550	
						Total Quantity	1278.012 per sqm	
						Total Deducted Quantity	0.000 per sqm	
						Net Total Quantity	1278.012 per sqm	
						Say 1278.012 per sqm @ Rs 139.38 / per sqm	**Rs 178129.31**	
9	13.7.1 12 mm cement plaster finished with a floating coat of neat cement of mix:1:3 (1 cement : 3 fine sand)							
	Terrace floor top							
	Terrace floor	1	18.250	23.450			427.963	
	deduction for slab							
	deduction for cutting	2	3.950	9.050			-71.495	
		1	2.650	5.350			-14.177	
		1	1.500	1.000			-1.500	

	sunshade top							
	w3 bottom	2*4*3	1.500	0.600			21.600	
	ventilator bottom	4*1*3	1.000	0.600			7.200	
	KW2 bottom	4*1*3	3.400	0.600			24.480	
	W2 bottom	4*1*3	1.000	0.600			7.200	
	W2A bottom	4*1*3	1.500	0.600			10.800	
	Stair room window bottom	1*3	2.650	0.600			4.770	
	Staircabin							
	Staircabin slab top	2	9.200	7.230	0.130		17.295	
						Total Quantity	521.308 sqm	
						Total Deducted Quantity	-87.172 sqm	
						Net Total Quantity	434.136 sqm	
						Say 434.136 sqm @ Rs 401.21 / sqm	**Rs 174179.70**	
10	5.9.3 Centering and shuttering including strutting, etc. and removal of form for:Suspended floors, roofs, landings, balconies and access platform							
	SLAB G 2							
	SLAB G+2	1*3	69.660	23.800			4973.724	
		1*3	(69.660+23.8)*2				560.760	
	STAIRCABIN SLAB	1	9.200	23.800			218.960	
		1	9.200	7.230			66.516	
	Slab Deduction G 2							
	slab deductions	3*1	2.000	23.350			-140.100	
		3*1	9.200	7.400			-204.240	
	Stair portion	3*1	5.000	5.300			-79.500	
	Cuting portion	3*1	11.200	7.400			-248.640	
		3*1	8.100	2.000			-48.599	
	Fire stair	3*1	5.600	5.200			-87.359	
	stair case G 2							
	landing slab	2*2*3	2.000	2.000			48.000	
	Sunshade G 2							
	Long wall direction	2*3	69.350	0.600+.12			299.592	

	Short wall direction	2*3	23.000	0.600+.12			99.360	
	Cutting portion	2*3	8.950	0.600+.12			38.664	
		1*3	11.100	0.600+.12			23.976	
		1*3	9.100	0.600+.12			19.656	
						Total Quantity	6349.208 sqm	
						Total Deducted Quantity	-808.438 sqm	
						Net Total Quantity	5540.770 sqm	
						Say 5540.770 sqm @ Rs 815.78 / sqm	**Rs 4520049.35**	
11	5.9.1 Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of columns, etc for mass concrete							
	Column Pedestal							
		78	(0.800+0.50)*2		1.100		223.080	
	footing							
	for indipendant footing	48	(3.5+4)*2		0.600		432.000	
		48	(2+1.5)		0.600		100.801	
	Double footin	11	(6.800+3)*2		0.600		129.360	
		11	(5.000+1.5)*2		0.600		85.800	
	Combined footing	2	(5.5+5)*2		0.600		25.200	
		2	(3.5+3.5)*2		0.600		16.800	
						Total Quantity	1013.041 sqm	
						Total Deducted Quantity	0.000 sqm	
						Net Total Quantity	1013.041 sqm	
						Say 1013.041 sqm @ Rs 335.31 / sqm	**Rs 339682.78**	
12	5.9.5 Centering and shuttering including strutting, etc. and removal of form for:Lintels, beams, plinth beams, girders bressumers and cantilevers							
	plinth beam							
	Vertical PB A1-A7	1	23.600	0.300+.6+.6			35.401	
	A9 -A18	1	38.850	0.300+.6+.6			58.276	

	B1 to B3	1	8.100	0.300+.6+.6			12.150	
	B9 to B14	2	23.500	0.300+.6+.6			70.500	
	C1 to C18, D1 to D18	2	69.350	0.300+.6+.6			208.050	
	F1 to F3	1	8.100	0.300+.6+.6			12.150	
	G5 to G13	1	30.800	0.300+.6+.6			46.200	
	F13 to F18	1	23.550	0.300+.6+.6			35.325	
	E16 to E18	1	8.050	0.300+.6+.6			12.076	
	Horizhontal PB in Short span A1 t0 F1,A3 to F3	2	21.800	0.300+.6+.6			65.401	
	B2 to C2	1	5.650	0.300+.6+.6			8.476	
	A4 to D4	1	12.700	0.300+.6+.6			19.050	
	A5-G5,A6-G6,A7-G7,A9-G9,A11-G11,A13-G13	6	23.800	0.300+.6+.6			214.201	
	C8 TO G8	1	14.850	0.300+.6+.6			22.275	
	D12 TO G12	1	11.400	0.300+.6+.6			17.100	
	LIFT	1	5.300	0.300+.6+.6			7.950	
		2	1.900	0.300+.6+.6			5.700	
	a14-f14,A15 TO F15,A16 TO F16,A17 TO F17,A18 TO F18	5	21.800	0.300+.6+.6			163.500	
	beam G 2							
	Vertical PB A1-A7	1*3	23.600	0.200+.6+.6			99.120	

	A9 -A18	1*3	38.850	0.200+.6+.6			163.171	
	B1 to B3	1*3	8.100	0.200+.6+.6			34.020	
	B9 to B14	2*3	23.500	0.200+.6+.6			197.400	
	C1 to C18, D1 to D18	2*3	69.350	0.200+.6+.6			582.540	
	F1 to F3	1*3	8.100	0.200+.6+.6			34.020	
	G5 to G13	1*3	30.800	0.200+.6+.6	0.600		77.616	
	F13 to F18	1*3	23.550	0.200+.6+.6			98.910	
	E16 to E18	1*3	8.050	0.200+.6+.6			33.810	
	Horizhontal PB in Short span A1 t0 F1,A3 to F3	2*3	21.800	0.200+.6+.6			183.120	
	B2 to C2	1*3	5.650	0.200+.6+.6			23.730	
	A4 to D4	1*3	12.700	0.200+.6+.6			53.340	
	A5-G5,A6-G6,A7-G7,A9-G9,A11-G11,A13-G13	6*3	23.800	0.200+.6+.6			599.760	
	C8 TO G8	1*3	14.850	0.200+.6+.6			62.370	
	D12 TO G12	1*3	11.400	0.200+.6+.6			47.880	
	LIFT	1*3	5.300	0.200+.6+.6			22.260	
		2*3	1.900	0.200+.6+.6			15.960	
	a14-f14,A15 TO F15,A16 TO F16,A17 TO F17,A18 TO F18	5*3	21.800	0.200+.6+.6			457.800	
	LINTELS G 2							

	Vertical PB A1-A7	1*3	23.600	0.200+.15 +.15			35.401	
	A9 -A18	1*3	38.850	0.200+.15 +.15			58.276	
	B1 to B3	1*3	8.100	0.200+.15 +.15			12.150	
	B9 to B14	2*3	23.500	0.200+.15 +.15			70.500	
	C1 to C18, D1 to D18	2*3	69.350	0.200+.15 +.15			208.050	
	F1 to F3	1*3	8.100	0.200+.15 +.15			12.150	
	G5 to G13	1*3	30.800	0.200+.15 +.15			46.200	
	F13 to F18	1*3	23.550	0.200+.15 +.15			35.325	
	E16 to E18	1*3	8.050	0.200+.15 +.15			12.076	
	Horizhontal PB in Short span A1 t0 F1,A3 to F3	2*3	21.800	0.200+.15 +.15			65.401	
	B2 to C2	1*3	5.650	0.200+.15 +.15			8.476	
	A4 to D4	1*3	12.700	0.200+.15 +.15			19.050	
	A5-G5,A6-G6,A7-G7,A9-G9,A11-G11,A13-G13	6*3	23.800	0.200+.15 +.15			214.201	
	C8 TO G8	1*3	14.850	0.200+.15 +.15			22.275	
	D12 TO G12	1*3	11.400	0.200+.15 +.15			17.100	
	LIFT	1*3	5.300	0.200+.15 +.15			7.950	
		2*3	1.900	0.200+.15 +.15			5.700	
	a14-f14,A15 TO F15,A16 TO F16,A17 TO F17,A18 TO F18	5*3	21.800	0.200+.15 +.15			163.500	

						Total Quantity	4814.389 sqm	
						Total Deducted Quantity	0.000 sqm	
						Net Total Quantity	4814.389 sqm	
						Say 4814.389 sqm @ Rs 649.82 / sqm	**Rs 3128486.26**	
13	5.9.6 Centering and shuttering including strutting, etc. and removal of form for:Columns, Pillars, Piers, Abutments, Posts and Struts							
	COLUMN G 2							
	columns	3*78	(0.200+.6) *2		4.000		1497.601	
	stair columns	12	(0.200+.6) *2		4.000		76.801	
						Total Quantity	1574.402 sqm	
						Total Deducted Quantity	0.000 sqm	
						Net Total Quantity	1574.402 sqm	
						Say 1574.402 sqm @ Rs 863.64 / sqm	**Rs 1359716.54**	
14	5.9.7 Centering and shuttering including strutting, etc. and removal of form for:Stairs, (excluding landings) except spiral - staircases)							
	stair case G 2							
	Ms & FS flight	2*2*3	3.600	1.250			54.000	
		2*1*3	1.400	1.250			10.500	
	step	2*4*25	2.000	.5*.15*.3			9.000	
						Total Quantity	73.500 sqm	
						Total Deducted Quantity	0.000 sqm	
						Net Total Quantity	73.500 sqm	
						Say 73.500 sqm @ Rs 732.52 / sqm	**Rs 53840.22**	
15	5.22.6 Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete upto plinth levelThermo - Mechanically Treated bars of grade Fe-500D or more							
	Total RCC steel quantity	1	1912.388			161.0	307894.468	
						Total Quantity	307894.468 kilogram	
						Total Deducted Quantity	0.000 kilogram	
						Net Total Quantity	307894.468 kilogram	
						Say 307894.468 kilogram @ Rs 98.30 / kilogram	**Rs 30266026.20**	

16	5.1.3 Providing and laying in position specified grade of reinforced cement concrete, excluding the cost of centering, shuttering, finishing and reinforcement - All work up to plinth level:1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size)							
	Gents Toilet	2	7.000	4.700	0.300		19.740	
	Staff room toilet	2	2.000	2.100	0.300		2.520	
	Staff room toilet	2	4.400	2.900	0.300		7.656	
	Cooler	2	1.500	2.500	0.300		2.250	
	H toilet	2	2.700	2.500	0.300		4.050	
		2	4.400	7.650	0.300		20.196	
						Total Quantity	56.412 cum	
						Total Deducted Quantity	0.000 cum	
						Net Total Quantity	56.412 cum	
						Say 56.412 cum @ Rs 8588.47 / cum	**Rs 484492.77**	
17	50.6.1.5 Solid block masonry using pre cast solid blocks (Factory made) of size 30x20x20cm or nearest available size confirming to IS 2185 Part I of 1979 for super structure up to floor two level thickness 20cm and above in: CM 1:6 (1 cement : 6 coarse sand) etc complete							
	GROUND FLOOR WALLS							
	A3 - A7	1	15.600	0.200	3.600		11.233	
	B1 TO B3	1	7.805	0.200	3.600		5.620	
	A9-A11	1	8.000	0.200	3.600		5.761	
	A14-A18 ,E14-E18	2	15.700	0.200	3.600		22.608	
	C1-C18,D1-D18 AND F1-F18	3	69.6550	0.200	3.600		150.455	
	1A-1F.18A-18F	2	21.800	0.200	3.600		31.393	
	GENTS TOILET PARTITION	1	7.000	0.200	3.600		5.041	
	REST ROOM PARTION	1	4.100	0.200	3.600		2.952	
	INTERNAL PARTIONS	14	9.000	0.200	3.600		90.720	
	partition wall b/w bathroom and wc1	1	6.800	0.200	3.600		4.897	
		4	1.800	0.200	3.600		5.185	

	sTAFF TOILET PSRTION	1	2.900	0.200	3.600		2.088	
		1	1.800	0.200	3.600		1.297	
	b/W JENITORS	1	1.800	0.200	3.600		1.297	
		1	1.800	0.200	3.600		1.297	
	deduction for walls							
	W4	24	2.000	0.200	1.350		-12.960	
	W3	26	1.500	0.200	1.350		-10.530	
	V	12	0.600	0.200	0.450		-0.648	
	D1	11	1.200	0.200	2.100		-5.544	
	D2	3	1.000	0.200	2.100		-1.260	
	DT	12	0.800	0.200	1.500		-2.880	
	FIRST FLOOR WALLS							
	1A TO A7	1	23.405	0.200	3.600		16.852	
	C1 TO C18,D1-D18	2	69.355	0.200	3.600		99.872	
	G1 TO G3	1	8.105	0.200	3.600		5.836	
	G5-G13	1	30.750	0.200	3.600		22.140	
	F13-F18	1	23.300	0.200	3.600		16.776	
	A1-F1,A3-F3	2	23.300	0.200	3.600		33.552	
	INTERNAL PARTION 14	13	9.000	0.200	3.600		84.241	
	TOILET PARTION	9	1.800	0.200	3.600		11.665	
		1	7.650	0.200	3.600		5.509	
		1	7.000	0.200	3.600		5.041	
	gENTS REST ROOM PARTITION	1	4.100	0.200	3.600		2.952	
	LADIES REST ROOM PARTION	1	7.500	0.200	3.600		5.400	
	JENITORS	3	5.450	0.200	3.600		11.773	
	DEDUCTION FF							
	fIRST FLOOR DEDUCTION w3	51	1.500	0.200	1.500		-22.950	
	v	13	0.600	0.200	0.600		-0.936	
	d1	7	1.200	0.200	2.100		-3.528	

	D2	4	1.000	0.200	2.100		-1.680	
	DT	15	0.800	0.200	2.100		-5.040	
	SECOND FLOOR WALLS							
	1A TO A7	1	23.405	0.200	3.600		16.852	
	C1 TO C18,D1-D18	2	69.355	0.200	3.600		99.872	
	G1 TO G3	1	8.105	0.200	3.600		5.836	
	G5-G13	1	30.750	0.200	3.600		22.140	
	F13-F18	1	23.300	0.200	3.600		16.776	
	A1-F1,A3-F3	2	23.300	0.200	3.600		33.552	
	I N T E R N A L P A R T I O N 1 4	13	9.000	0.200	3.600		84.241	
	TOILET PARTION	9	1.800	0.200	3.600		11.665	
		1	7.650	0.200	3.600		5.509	
		1	7.000	0.200	3.600		5.041	
	gENTS REST ROOM PARTITION	1	4.100	0.200	3.600		2.952	
	LADIES REST ROOM PARTION	1	7.500	0.200	3.600		5.400	
	JENITORS	3	5.450	0.200	3.600		11.773	
	DECUCTION SF							
	f I R S T F L O O R D E D U C T I O N w 3	51	1.500	0.200	1.500		-22.950	
	v	13	0.600	0.200	0.600		-0.936	
	d1	7	1.200	0.200	2.100		-3.528	
	D2	4	1.000	0.200	2.100		-1.680	
	DT	15	0.800	0.200	2.100		-5.040	
	tERRACE AND STAIRECABIN							
	fIRESTAIRE	2	9.400	0.200	3.600		13.537	
		2	5.555	0.200	3.600		8.000	
	MAINSTARE	2	9.300	0.200	3.600		13.393	
		2	5.850	0.200	3.600		8.424	
	PARAPET	2	69.655	0.100	1.100		15.325	
		2	21.800	0.100	1.100		4.797	
		3	9.200	0.100	1.100		3.036	

		3	11.200	0.100	1.100		3.696	
	sTAIRCABIN							
	WINDOWS	9	1.500	0.200	1.500		-4.050	
	Total Quantity						1055.270 cum	
	Total Deducted Quantity						-106.140 cum	
	Net Total Quantity						949.130 cum	
	Say 949.130 cum @ Rs 6644.12 / cum						**Rs 6306133.62**	
18	10.28 Providing and fixing stainless steel (Grade 304) railing made of Hollow tubes, channels, plates etc., including welding, grinding, buffing, polishing and making curvature (wherever required) and fitting the same with necessary stainless steel nuts and bolts complete, i/c fixing the railing with necessary accessories & stainless steel dash fasteners, stainless steel bolts etc., of required size on the top of the floor or the side of waist slab with suitable arrangement as per approval of Engineer-in-charge, (for payment purpose only weight of stainless steel members shall be considered excluding fixing accessories such as nuts, bolts, fasteners etc.)							
	Hand rail for stair							
	50 mm SS pipe, 1.65 mm thick(inclined portion)	3*2*2*2	3.700			2.01	178.488	
		3*2*2*2	3.700			2.01	178.488	
	Vertical	3*4*2	1.100			2.01	53.064	
		3	1.100			2.01	6.633	
	Total Quantity						416.673 kg	
	Total Deducted Quantity						0.000 kg	
	Net Total Quantity						416.673 kg	
	Say 416.673 kg @ Rs 677.34 / kg						**Rs 282229.29**	
19	9.1.1 Providing wood work in frames of doors, windows, clerestory windows and other frames, wrought framed and fixed in position with hold fast lugs or with dash fasteners of required dia & length (hold fast lugs or dash fastener shall be paid for separately).Second class teak wood							
	GF							
	D1	11	1.200+2.1 +2.1	0.100	0.050		0.298	
	D2	3	1.000+2.1 +2.1	0.100	0.050		0.079	
	FF							

	d1	7	1.200+2.1 +2.1	0.100	0.050		0.190	
	D2	4	1.000+2.1 +2.1	0.100	0.050		0.105	
	SF							
	d1	7	1.200+2.1 +2.1	0.100	0.050		0.190	
	D2	4	1.000+2.1 +2.1	0.100	0.050		0.105	
	Terrace							
		2	1.000+2.1 +2.1	0.100	0.050		0.053	
	Total Quantity						1.020 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						1.020 cum	
	Say 1.020 cum @ Rs 153237.78 / cum						**Rs 156302.54**	
20	9.5.1.2 Providing and fixing panelled or panelled and glazed shutters for shutters for doors, windows and clerestory windows, including ISI marked M.S. pressed butt hinges bright finished of required size with necessery screws, excluding panelling which will be paid for separately, all complete as per direction of Engineer - in-charge.Providing and fixing panelled or panelled and glazed shutters for doors, windowsand clerestory windows fixing with butt hinges of required size with necessaryscrews, excluding panelling which will be paid for separately, all complete as perdirection of Engineer-in-charge. (Note:- Butt hinges and necessary screws shallbe paid separately)Second class teak wood30 mm thick shutters							
	GF							
	D1	11	1.200		2.100	0.3	8.316	
	D2	3	1.000		2.100	0.3	1.891	
	FF							
	d1	7	1.200		2.100	0.3	5.292	
	D2	4	1.000		2.100	0.3	2.520	
	FF							
	d1	7	1.200		2.100	0.3	5.292	
	D2	4	1.000		2.100	0.3	2.520	
	Terrace							
		2	1.000		2.100	0.3	1.260	
	Total Quantity						27.091 sqm	

						Total Deducted Quantity	0.000 sqm	
						Net Total Quantity	27.091 sqm	
						Say 27.091 sqm @ Rs 3848.93 / sqm	**Rs 104271.36**	
21	9.7.1 Providing and fixing panelling or panelling and glazing in panelled or panelled and glazed shutters for doors, windows and clerestory windows (Area of opening for panel inserts excluding portion inside grooves or rebates to be measured), Panelling for panelled or panelled and glazed shutters 25 mm to 40 mm thick:Second class teak wood							
	GF							
	D1	11	1.200		2.100	0.7	19.404	
	D2	3	1.000		2.100	0.7	4.410	
	FF							
	d1	7	1.200		2.100	0.7	12.348	
	D2	4	1.000		2.100	0.7	5.880	
	SF							
	d1	7	1.200		2.100	0.7	12.348	
	D2	4	1.000		2.100	0.7	5.880	
	Terrace							
		2	1.000		2.100	0.7	2.940	
						Total Quantity	63.210 sqm	
						Total Deducted Quantity	0.000 sqm	
						Net Total Quantity	63.210 sqm	
						Say 63.210 sqm @ Rs 3463.31 / sqm	**Rs 218915.83**	
22	9.53 Providing 40x5 mm flat iron hold fast 40 cm long including fixing to frame with 10 mm diameter bolts, nuts and wooden plugs and embeddings in cement concrete block 30x10x15 cm 1:3:6 mix (1 cement : 3 coarse sand : 6 graded stone aggregate 20 mm nominal size)							
	GF							
	D1	11*2*3					66.000	
	D2	3*2*3					18.000	
	DT	12*2*3					72.000	
	FF							
	d1	7*2*3					42.000	
	D2	4*2*3					24.000	
	DT	15*2*3					90.000	

	SF							
	d1	7*2*3					42.000	
	D2	4*2*3					24.000	
	DT	15*2*3					90.000	
	Terrace							
		2*2*3					12.000	
						Total Quantity	480.000 each	
						Total Deducted Quantity	0.000 each	
						Net Total Quantity	480.000 each	
						Say 480.000 each @ Rs 210.98 / each	**Rs 101270.40**	
23	9.63.1 Providing and fixing ISI marked oxidised M.S. tower bolt black finish, (Barrel type) with necessary screws etc. complete:250x10 mm							
	GF							
	D1	11*2*2					44.000	
	D2	3*2					6.000	
	DT	12*2					24.000	
	FF							
	d1	7*2*2					28.000	
	D2	4*2					8.000	
	DT	15*2					30.000	
	SF							
	d1	7*2*2					28.000	
	D2	4*2					8.000	
	DT	15*2					30.000	
	Terrace							
		2*2					4.000	
						Total Quantity	210.000 no	
						Total Deducted Quantity	0.000 no	
						Net Total Quantity	210.000 no	
						Say 210.000 no @ Rs 87.25 / no	**Rs 18322.50**	
24	9.63.4 Providing and fixing ISI marked oxidised M.S. tower bolt black finish, (Barrel type) with necessary screws etc. complete:100x10 mm							

	GF							
	D1	11*2*2					44.000	
	D2	3*2					6.000	
	DT	12*2					24.000	
	FF							
	d1	7*2*2					28.000	
	D2	4*2					8.000	
	DT	15*2					30.000	
	SF							
	d1	7*2*2					28.000	
	D2	4*2					8.000	
	DT	15*2					30.000	
	Terrace							
		2*2					4.000	
						Total Quantity	210.000 no	
						Total Deducted Quantity	0.000 no	
						Net Total Quantity	210.000 no	
						Say 210.000 no @ Rs 45.56 / no	**Rs 9567.60**	
25	9.65.2 Providing and fixing ISI marked oxidised M S door latches conforming to IS : 5930 with screws etc.250x20x6 mm							
	GF							
	D1	11*2					22.000	
	D2	3					3.000	
	DT	12					12.000	
	FF							
	d1	7					7.000	
	D2	4					4.000	
	DT	15					15.000	
	SF							
	d1	7					7.000	
	D2	4					4.000	
	DT	15					15.000	

	Terrace							
		2					2.000	
	Total Quantity						91.000 no	
	Total Deducted Quantity						0.000 no	
	Net Total Quantity						91.000 no	
	Say 91.000 no @ Rs 80.47 / no						**Rs 7322.77**	
26	9.66.1 Providing and fixing ISI marked oxidised M.S. handles conforming to IS : 4992 with necessary screws etc. complete:125 mm							
	GF							
	D1	11*2*2					44.000	
	D2	3*2					6.000	
	DT	12*2					24.000	
	FF							
	d1	7*2*2					28.000	
	D2	4*2					8.000	
	DT	15*2					30.000	
	SF							
	d1	7*2*2					28.000	
	D2	4*2					8.000	
	DT	15*2					30.000	
	Terrace							
		2*2					4.000	
	Total Quantity						210.000 no	
	Total Deducted Quantity						0.000 no	
	Net Total Quantity						210.000 no	
	Say 210.000 no @ Rs 41.02 / no						**Rs 8614.20**	
27	9.70.1 Providing and fixing IS : 12817 marked stainless steel butt hinges with stainless steel screws etc. complete:125x64x1.90 mm							
	GF							
	D1	11*2*3					66.000	
	D2	3*2*3					18.000	
	DT	12*2*3					72.000	

	FF							
	d1	7*2*3					42.000	
	D2	4*2*3					24.000	
	DT	15*2*3					90.000	
	SF							
	d1	7*2*3					42.000	
	D2	4*2*3					24.000	
	DT	15*2*3					90.000	
	Terrace							
		2*2*3					12.000	
	Total Quantity						480.000 no	
	Total Deducted Quantity						0.000 no	
	Net Total Quantity						480.000 no	
	Say 480.000 no @ Rs 99.52 / no						**Rs 47769.60**	
28	9.121 Providing and fixing Fiber Glass Reinforced plastic (FRP) Door Frames of cross- section 90 mm x 45 mm having single rebate of 32 mm x 15 mm to receive shutter of 30 mm thickness. The laminated shall be moulded with fire resistant grade unsaturated polyester resin and chopped mat. Door frame laminate shall be 2 mm thick and shall be filled with suitable wooden block in all the three legs. The frame shall be covered with fiber glass from all sides. M.S. stay shall be provided at the bottom to steady the frame.							
	GF							
	DT	12	.8+2.1+2.1				60.000	
	FF							
	DT	15	.8+2.1+2.1				75.000	
	SF							
	DT	15	.8+2.1+2.1				75.000	
	Total Quantity						210.000 metre	
	Total Deducted Quantity						0.000 metre	
	Net Total Quantity						210.000 metre	
	Say 210.000 metre @ Rs 800.25 / metre						**Rs 168052.50**	
29	9.122.1 Providing and fixing to existing door frames.30 mm thick Glas Fibre Reinforced Plastic (FRP) panelled door shutter of required colour and approved brand and manufacture, made with fire - retardant grade unsaturated polyester resin, moulded to 3 mm thick FRP laminate for forming hollow rails and styles, with wooden frame and suitable blocks of seasoned wood inside at required places for fixing of fittings, cast monolithically with 5 mm thick FRP laminate for panels conforming to IS : 14856, including fixing to							

	frames.							
	GF							
	DT	12	0.800	1.200			11.520	
	FF							
	DT	15	0.800	1.200			14.400	
	SF							
	DT	15	0.800	1.200			14.400	
	Total Quantity						40.320 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						40.320 sqm	
	Say 40.320 sqm @ Rs 4078.68 / sqm						**Rs 164452.38**	
30	21.1.1.2 Providing and fixing aluminium work for doors, windows, ventilators and partitions with extruded built up standard tubular sections/ appropriate Z sections and other sections of approved make conforming to IS : 733 and IS: 1285, fixing with dash fasteners of required dia and size, including necessary filling up the gaps at junctions, i.e. at top, bottom and sides with required EPDM rubber/ neoprene gasket etc. Aluminium sections shall be smooth, rust free, straight, mitred and jointed mechanically wherever required including cleat angle, Aluminnium snap beading for glazing /paneling, C.P. brass/ stainless steel screws, all complete as per architectural drawings and the directions of Engineer-in-charge.(Glazing, paneling and dash fasteners to be paid for separately):For fixed portionPowder coated aluminium (minimum thickness of powder coating 50 micron)							
	FF							
	w3	51	1.500		1.500	5.0	573.750	
	v	13	0.600		0.600	5.0	23.400	
	SF							
	w3	51	1.500		1.500	5.0	573.750	
	v	13	0.600		0.600	5.0	23.400	
	sTAIRCABIN							
	WINDOWS	9	1.500		1.500	5.0	101.250	
	GF							
	W4	24	2.000		1.350	5.0	324.001	
	W3	26	1.500		1.350	5.0	263.250	
	V	12	0.600		0.450	5.0	16.201	
	Total Quantity						1899.002 kg	
	Total Deducted Quantity						0.000 kg	
	Net Total Quantity						1899.002 kg	

					Say 1899.002 kg @ Rs 537.07 / kg		**Rs 1019897.00**	
31	21.1.2.2 For shutters of doors, windows & ventilators including providing and fixing hinges / pivots and making provision for fixing of fittings wherever required including the cost of EPDM rubber/ neoprene gasket required (Fittings shall be paid for separately)Powder coated aluminium (minimum thickness of powder coating 50 micron)							
				FF				
	w3	51	1.500		1.500	5.0	573.750	
	v	13	0.600		0.600	5.0	23.400	
				SF				
	w3	51	1.500		1.500	5.0	573.750	
	v	13	0.600		0.600	5.0	23.400	
				STAIRCABIN				
	WINDOWS	9	1.500		1.500	5.0	101.250	
				GF				
	W4	24	2.000		1.350	5.0	324.001	
	W3	26	1.500		1.350	5.0	263.250	
	V	12	0.600		0.450	5.0	16.201	
					Total Quantity		1899.002 kg	
					Total Deducted Quantity		0.000 kg	
					Net Total Quantity		1899.002 kg	
					Say 1899.002 kg @ Rs 643.10 / kg		**Rs 1221248.19**	
32	21.3.1 Providing and fixing glazing in aluminium door, window, ventilator shutters and partitions etc. with EPDM rubber / neoprene gasket etc. complete as per the architectural drawings and the directions of Engineer - in -Charge. (Cost of aluminium snap beading shall be paid in basic item):With float glass panes of 4.0 mm thickness							
				FF				
	w3	51	1.500		1.500		114.750	
	v	13	0.600		0.600		4.680	
				SF				
	w3	51	1.500		1.500		114.750	
	v	13	0.600		0.600		4.680	
				STAIRCABIN				
	WINDOWS	9	1.500		1.500		20.250	

	GF							
	W4	24	2.000		1.350		64.801	
	W3	26	1.500		1.350		52.651	
	V	12	0.600		0.450		3.240	
						Total Quantity	379.802 sqm	
						Total Deducted Quantity	0.000 sqm	
						Net Total Quantity	379.802 sqm	
						Say 379.802 sqm @ Rs 1176.65 / sqm	**Rs 446894.02**	
33	21.11.3 Providing and fixing stainless steel (SS 304 grade) adjustable friction window stays of approved quality with necessary stainless steel screws etc. to the side hung windows as per direction of Engineer - in-Charge complete.355 x 19 mm							
	FF							
	w3	51*3					153.000	
	v	13*1					13.000	
	SF							
	w3	51*3					153.000	
	v	13					13.000	
	STAIRCABIN							
	WINDOWS	9*3					27.000	
	GF							
	W4	24*4					96.000	
	W3	26*3					78.000	
	V	12					12.000	
						Total Quantity	545.000 no	
						Total Deducted Quantity	0.000 no	
						Net Total Quantity	545.000 no	
						Say 545.000 no @ Rs 337.28 / no	**Rs 183817.60**	
34	9.100.1 Providing and fixing aluminium handles, ISI marked, anodised (anodic coating not less than grade AC 10 as per IS : 1868) transparent or dyed to required colour or shade, with necessary screws etc. complete:125 mm							
	FF							
	w3	51*3					153.000	
	v	13*1					13.000	

	SF							
	w3	51*3					153.000	
	v	13					13.000	
	STAIRCABIN							
	WINDOWS	9*3					27.000	
	GF							
	W4	24*4					96.000	
	W3	26*3					78.000	
	V	12					12.000	
	Total Quantity						545.000 no	
	Total Deducted Quantity						0.000 no	
	Net Total Quantity						545.000 no	
	Say 545.000 no @ Rs 70.17 / no						**Rs 38242.65**	
35	9.101.1 Providing and fixing aluminium hanging floor door stopper, ISI marked, anodised (anodic coating not less than grade AC 10 as per IS: 1868) transparent or dyed to required colour and shade, with necessary screws etc. complete.Single rubber stopper							
	GF							
	D1	11*2					22.000	
	D2	3					3.000	
	FF							
	d1	7*2					14.000	
	D2	4					4.000	
	SF							
	d1	7*2					14.000	
	D2	4					4.000	
	Total Quantity						61.000 no	
	Total Deducted Quantity						0.000 no	
	Net Total Quantity						61.000 no	
	Say 61.000 no @ Rs 39.93 / no						**Rs 2435.73**	
36	od71457/2022_2023 Providing and fixing M.S. Grills of required pattern in frames of windows etc. with M.S. flats, square or round bars etc. including priming coat with approved steel primer all complete. Fixed to steel windows by welding (MR 2020)							
	FF							

	w3	51	1.500		1.500	15.0	1721.250	
	v	13	0.600		0.600	15.0	70.200	
	Grill door	2	7.400		2.100	15.0	466.201	
	SF							
	w3	51	1.500		1.500	15.0	1721.250	
	v	13	0.600		0.600	15.0	70.200	
	Grill door	2	7.400		2.100	15.0	466.201	
	STAIRCABIN							
	WINDOWS	9	1.500		1.500	15.0	303.750	
	GF							
	W4	24	2.000		1.350	15.0	972.001	
	W3	26	1.500		1.350	15.0	789.751	
	V	12	0.600		0.450	15.0	48.600	
	Grill door	2	7.400		2.100	15.0	466.201	
						Total Quantity	7095.605 kg	
						Total Deducted Quantity	0.000 kg	
						Net Total Quantity	7095.605 kg	
						Say 7095.605 kg @ Rs 184.54 / kg	**Rs 1309422.95**	
37	13.1.1 12 mm cement plaster of mix:1:4 (1 cement : 4 fine sand)							
	Inside Wall - GF							
	Gents rest room	1	(4.10+5.20)*2		3.600		66.961	
	Passage	1	(4.4+2.1)*2		3.600		46.801	
	Gents toilet room	1	(4.70+7)*2		3.600		84.240	
	Fire staircase	4	5+5.6+5.6		3.600		233.280	
	Store GF FF SF	3	(2.8+2)*2		3.600		103.680	
	Lifts GF to Terrace	4*2	(2.1+2)*2		3.600		236.160	
	Library and Lab	1*2	(9+15.2)*2		3.600		348.480	
	Class room,Office room HOD room	4	(9+7.5)*2		3.600		475.200	
	HOD toilet	1	(2.1+2)*2		3.600		29.520	
	partition wall	2	2.100		3.600		15.121	

	Fire control room and staff room	2	(5.45+5.9)*2		3.600		163.441	
	Electrical room	1	(4.4+7.5)*2		3.600		85.680	
	Toilet wing ladies	1	(4.4+7.65)*2		3.600		86.760	
	Staff toilet	1	(4.4+2.9)*2		3.600		52.561	
	Passage	2	69.250		3.600		498.600	
	GF Deductions for plastering							
	W4	24	2.000		1.350		-64.800	
	W3	26	1.500		1.350		-52.650	
	V	12	0.600		0.450		-3.240	
	D1	11	1.200		2.100		-27.720	
	D2	3	1.000		2.100		-6.300	
	DT	12	0.800		1.500		-14.400	
	Inside Wall - FF							
	Gents rest room	1	(4.10+5.20)*2		3.600		66.961	
	Passage	1	(4.4+2.1)*2		3.600		46.801	
	Gents toilet room	1	(4.70+7)*2		3.600		84.240	
	Fire staircase	4	5+5.6+5.6		3.600		233.280	
	Store GF FF SF	3	(2.8+2)*2		3.600		103.680	
	Lifts GF to Terrace	4*2	(2.1+2)*2		3.600		236.160	
	Library and Lab	1	(9+15.2)*2		3.600		174.240	
	Seminar Hall	1	(11+22.9)*2		3.600		244.080	
	Research lab 1,2,3 and Class room	4	(9+7.5)*2		3.600		475.200	
	HOD toilet	1	(2.1+2)*2		3.600		29.520	
	partition wall	2	2.100		3.600		15.121	
	Fire control room and staff room	2	(5.45+5.9)*2		3.600		163.441	
	Electrical room	1	(4.4+7.5)*2		3.600		85.680	

	Toilet wing ladies	1	(4.4+7.65)*2		3.600		86.760	
	Staff toilet	1	(4.4+2.9)*2		3.600		52.561	
	Staff room	1	(9+7.65)*2		3.600		119.880	
	Passage	2	69.250		3.600		498.600	
	DEDUCTION FF							
	fIRST FLOOR DEDUCTION w3	51	1.500		1.500		-114.750	
	v	13	0.600		0.600		-4.680	
	d1	7	1.200		2.100		-17.640	
	D2	4	1.000		2.100		-8.400	
	DT	15	0.800		2.100		-25.200	
	Inside Wall - SF							
	Gents rest room	1	(4.10+5.20)*2		3.600		66.961	
	Passage	1	(4.4+2.1)*2		3.600		46.801	
	Gents toilet room	1	(4.70+7)*2		3.600		84.240	
	Fire staircase	4	5+5.6+5.6		3.600		233.280	
	Store GF FF SF	3	(2.8+2)*2		3.600		103.680	
	Lifts GF to Terrace	4*2	(2.1+2)*2		3.600		236.160	
	Library and Lab	1	(9+15.2)*2		3.600		174.240	
	Seminar Hall	1	(11+22.9)*2		3.600		244.080	
	Research lab 1,2,3 and Class room	4	(9+7.5)*2		3.600		475.200	
	HOD toilet	1	(2.1+2)*2		3.600		29.520	
	partition wall	2	2.100		3.600		15.121	
	Fire control room and staff room	2	(5.45+5.9)*2		3.600		163.441	
	Electrical room	1	(4.4+7.5)*2		3.600		85.680	
	Toilet wing ladies	1	(4.4+7.65)*2		3.600		86.760	

	Staff toilet	1	(4.4+2.9)*2		3.600		52.561	
	Staff room	1	(9+7.65)*2		3.600		119.880	
	Passage	2	69.250		3.600		498.600	
	DEDUCTION SF							
	fIRST FLOOR DEDUCTION w3	51	1.500		1.500		-114.750	
	v	13	0.600		0.600		-4.680	
	d1	7	1.200		2.100		-17.640	
	D2	4	1.000		2.100		-8.400	
	DT	15	0.800		2.100		-25.200	
	Ceiling - GF							
	Gents rest room	1	4.100	5.200			21.320	
	Passage	1	4.400	2.100			9.241	
	Gents toilet room	1	4.700	7.000			32.900	
	Fire staircase	4	5.000	5.600			112.000	
	Store GF FF SF	3	2.800	2.000			16.800	
	Lifts GF to Terrace	4*2	2.100	2.000			33.600	
	Library and Lab	1*2	9.000	15.200			273.600	
	Class room,Office room HOD room	4	9.000	7.500			270.000	
	HOD toilet	1	2.100	2.000			4.200	
	Fire control room and staff room	2	5.450	5.900			64.310	
	Electrical room	1	4.400	7.500			33.000	
	Toilet wing ladies	1	4.400	7.650			33.661	
	Staff toilet	1	4.400	2.900			12.760	
	Passage	1	69.250	3.000			207.750	
	Ceiling - FF							
	Gents rest room	1	4.100	5.200			21.320	
	Passage	1	4.400	2.100			9.241	
	Gents toilet room	1	4.700	7.000			32.900	
	Fire staircase	4	5.000	5.600			112.000	
	Store GF FF SF	3	2.800	2.000			16.800	

	Lifts GF to Terrace	4*2	2.100	2.000			33.600	
	Library and Lab	1	9.000	15.200			136.800	
	Seminar Hall	1	11.000	22.900			251.900	
	Research lab 1,2,3 and Class room	4	9.000	7.500			270.000	
	HOD toilet	1	2.100	2.000			4.200	
	Fire control room and staff room	2	5.450	5.900			64.310	
	Electrical room	1	4.400	7.500			33.000	
	Toilet wing ladies	1	4.400	7.650			33.661	
	Staff toilet	1	4.400	2.900			12.760	
	Staff room	1	9.000	7.650			68.851	
	Passage	2	69.250	3.000			415.500	
	TERRACE AND STAIRECABIN							
	fIRESTAIRE	2	9.400	5.555			104.434	
	MAINSTARE	2	9.300	5.850			108.810	
	waste slab	3*2*2	3.700	1.200			53.280	
	Landing	3*2*2	1.200	1.200			17.280	
	sTAIRCABIN							
	WINDOWS	9	1.500	0.200	1.500		-4.050	
	tERRACE AND STAIRECABIN							
	fIRESTAIRE	2	(9.400+5.55)*2		3.600		215.280	
	MAINSTARE	2	9.300+5.85		3.600		109.080	
	sTAIRCABIN							
	WINDOWS	9	1.500		1.500		-20.250	
	Outer wall							
	fIRESTAIRE	2	9.800		3.600		70.560	
		2	5.950	0.200	3.600		8.569	
	MAINSTARE	2	9.700	0.200	3.600		13.968	
		2	6.200	0.200	3.600		8.929	
	Outer wall including parapet in and out	2	69.655		14.160		1972.630	

		2	21.800		14.160		617.376	
		3	9.200		14.160		390.816	
		3	11.200		14.160		475.776	
	Ceiling - SF							
	Gents rest room	1	4.100	5.200			21.320	
	Passage	1	4.400	2.100			9.241	
	Gents toilet room	1	4.700	7.000			32.900	
	Fire staircase	4	5.000	5.600			112.000	
	Store GF FF SF	3	2.800	2.000			16.800	
	Lifts GF to Terrace	4*2	2.100	2.000			33.600	
	Library and Lab	1	9.000	15.200			136.800	
	Seminar Hall	1	11.000	22.900			251.900	
	Research lab 1,2,3 and Class room	4	9.000	7.500			270.000	
	HOD toilet	1	2.100	2.000			4.200	
	Fire control room and staff room	2	5.450	5.900			64.310	
	Electrical room	1	4.400	7.500			33.000	
	Toilet wing ladies	1	4.400	7.650			33.661	
	Staff toilet	1	4.400	2.900			12.760	
	Staff room	1	9.000	7.650			68.851	
	Passage	2	69.250	3.000			415.500	
	sunshade bottom							
	w3 bottom	2*4*3	1.500	0.600			21.600	
	ventilator bottom	4*1*3	1.000	0.600			7.200	
	KW2 bottom	4*1*3	3.400	0.600			24.480	
	W2 bottom	4*1*3	1.000	0.600			7.200	
	W2A bottom	4*1*3	1.500	0.600			10.800	
	Stair room window bottom	1*3	2.650	0.600			4.770	
						Total Quantity	16360.561 sqm	
						Total Deducted Quantity	-534.750 sqm	
						Net Total Quantity	15825.811 sqm	
						Say 15825.811 sqm @ Rs 314.09 / sqm	**Rs 4970728.98**	

38	od71458/2022_2023 Providing and laying vitrified matt finished floor tiles 1st quality double charged Kajaria or equivalent in different sizes (thickness to be specified by the manufacturer) with water absorption less than 0.08% and conforming to IS : 15622, of approved make, in all colours and shades, laid on 20 mm thick cement mortar 1:4(1 cement : 4 coarse sand), including grouting the joints with epoxy joint filler with spacer bar in equal interval and matching pigments etc. complete as per the direction from the Engineer in charge.Size of Tile 800 x 800 mm.							
	Flooring - GF							
	Gents rest room	1	4.100	5.200			21.320	
	Passage	1	4.400	2.100			9.241	
	Gents toilet room	1	4.700	7.000			32.900	
	Fire staircase	4	5.000	5.600			112.000	
	Store GF FF SF	3	2.800	2.000			16.800	
	Lifts GF to Terrace	4*2	2.100	2.000			33.600	
	Library and Lab	1*2	9.000	15.200			273.600	
	Class room,Office room HOD room	4	9.000	7.500			270.000	
	HOD toilet	1	2.100	2.000			4.200	
	Fire control room and staff room	2	5.450	5.900			64.310	
	Electrical room	1	4.400	7.500			33.000	
	Toilet wing ladies	1	4.400	7.650			33.661	
	Staff toilet	1	4.400	2.900			12.760	
	Passage	1	69.250	3.000			207.750	
	Flooring - FF							
	Gents rest room	1	4.100	5.200			21.320	
	Passage	1	4.400	2.100			9.241	
	Gents toilet room	1	4.700	7.000			32.900	
	Fire staircase	4	5.000	5.600			112.000	
	Store GF FF SF	3	2.800	2.000			16.800	
	Lifts GF to Terrace	4*2	2.100	2.000			33.600	
	Library and Lab	1	9.000	15.200			136.800	
	Seminar Hall	1	11.000	22.900			251.900	
	Research lab 1,2,3 and Class room	4	9.000	7.500			270.000	

	HOD toilet	1	2.100	2.000			4.200	
	Fire control room and staff room	2	5.450	5.900			64.310	
	Electrical room	1	4.400	7.500			33.000	
	Toilet wing ladies	1	4.400	7.650			33.661	
	Staff toilet	1	4.400	2.900			12.760	
	Staff room	1	9.000	7.650			68.851	
	Passage	2	69.250	3.000			415.500	
	Flooring - SF							
	Gents rest room	1	4.100	5.200			21.320	
	Passage	1	4.400	2.100			9.241	
	Gents toilet room	1	4.700	7.000			32.900	
	Fire staircase	4	5.000	5.600			112.000	
	Store GF FF SF	3	2.800	2.000			16.800	
	Lifts GF to Terrace	4*2	2.100	2.000			33.600	
	Library and Lab	1	9.000	15.200			136.800	
	Seminar Hall	1	11.000	22.900			251.900	
	Research lab 1,2,3 and Class room	4	9.000	7.500			270.000	
	HOD toilet	1	2.100	2.000			4.200	
	Fire control room and staff room	2	5.450	5.900			64.310	
	Electrical room	1	4.400	7.500			33.000	
	Toilet wing ladies	1	4.400	7.650			33.661	
	Staff toilet	1	4.400	2.900			12.760	
	Staff room	1	9.000	7.650			68.851	
	Passage	2	69.250	3.000			415.500	
	STAIRCASES ANS LANDINGS							
	LANDING	2*3*2	1.200	1.200			17.280	
						Total Quantity	4176.108 sqm	
						Total Deducted Quantity	0.000 sqm	
						Net Total Quantity	4176.108 sqm	
						Say 4176.108 sqm @ Rs 1486.76 / sqm	**Rs 6208870.33**	
39	od71459/2022_2023							

	Providing and laying vitrified floor tiles 1st quality double charged Kajaria or equivalent in different sizes (thickness to be specified by the manufacturer) with water absorption less than 0.08% and conforming to IS : 15622, of approved make, in all colours and shades, laid on 20 mm thick cement mortar 1:4(1 cement : 4 coarse sand), including grouting the joints with epoxy joint filler with spacer bar in equal interval and matching pigments etc for skirting, risers and threads of stairs etc. complete as per the direction from the Engineer in charge.Size of Tile 800 x 800 mm.							
	SKIRTING - GF							
	Gents rest room	1	(4.10+5.20)*2		0.100		1.861	
	Passage	1	(4.4+2.1)*2		0.100		1.300	
	Fire staircase	4	5+5.6+5.6		0.100		6.480	
	Store GF FF SF	3	(2.8+2)*2		0.100		2.880	
	Lifts GF to Terrace	4*2	(2.1+2)*2		0.100		6.560	
	Library and Lab	1*2	(9+15.2)*2		0.100		9.680	
	Class room,Office room HOD room	4	(9+7.5)*2		0.100		13.201	
	partition wall	2	2.100		0.100		0.421	
	Fire control room and staff room	2	(5.45+5.9)*2		0.100		4.541	
	Electrical room	1	(4.4+7.5)*2		0.100		2.381	
	Passage	2	69.250		0.100		13.851	
	SKIRTING - FF							
	Gents rest room	1	(4.10+5.20)*2		0.100		1.861	
	Passage	1	(4.4+2.1)*2		0.100		1.300	
	Fire staircase	4	5+5.6+5.6		0.100		6.480	
	Store GF FF SF	3	(2.8+2)*2		0.100		2.880	
	Lifts GF to Terrace	4*2	(2.1+2)*2		0.100		6.560	
	Library and Lab	1	(9+15.2)*2		0.100		4.840	
	Seminar Hall	1	(11+22.9)*2		0.100		6.780	
	Research lab 1,2,3 and Class room	4	(9+7.5)*2		0.100		13.201	
	partition wall	2	2.100		0.100		0.421	

	Fire control room and staff room	2	(5.45+5.9) *2		0.100		4.541	
	Electrical room	1	(4.4+7.5)* 2		0.100		2.381	
	Staff room	1	(9+7.65)*2		0.100		3.330	
	Passage	2	69.250		0.100		13.851	
	SKIRTING - SF							
	Gents rest room	1	(4.10+5.20)*2		0.100		1.861	
	Passage	1	(4.4+2.1)* 2		0.100		1.300	
	Fire staircase	4	5+5.6+5.6		0.100		6.480	
	Store GF FF SF	3	(2.8+2)*2		0.100		2.880	
	Lifts GF to Terrace	4*2	(2.1+2)*2		0.100		6.560	
	Library and Lab	1	(9+15.2)*2		0.100		4.840	
	Seminar Hall	1	(11+22.9)* 2		0.100		6.780	
	Research lab 1,2,3 and Class room	4	(9+7.5)*2		0.100		13.201	
	partition wall	2	2.100		0.100		0.421	
	Fire control room and staff room	2	(5.45+5.9) *2		0.100		4.541	
	Electrical room	1	(4.4+7.5)* 2		0.100		2.381	
	Staff room	1	(9+7.65)*2		0.100		3.330	
	Passage	2	69.250		0.100		13.851	
	STAIRCASES ANS LANDINGS							
	STEPS	2*3*24	.15+.3	1.200			77.760	
	LANDING	2*3*2	1.200	1.200			17.280	
						Total Quantity	295.048 sqm	
						Total Deducted Quantity	0.000 sqm	
						Net Total Quantity	295.048 sqm	
						Say 295.048 sqm @ Rs 2073.45 / sqm	**Rs 611767.28**	
40	od71460/2022_2023 Providing and laying antiskid Ceramic glazed floor tiles of size 300x300 mm (thickness to be specified by the manufacturer), of 1st quality conforming to IS : 15622, of approved make, in colours such as White,							

	Ivory, Grey, Fume Red Brown, laid on 20 mm thick cement mortar 1:4 (1 Cement : 4 Coarse sand),using 3mm thick spacers including pointing the joints with approved quality epoxy grout mix of .7kg of organic coated filler of desired shade (.10 kg of hardner and .2 kg of resin per kg)including filling /grouting and finishing							
	Flooring - GF							
	Gents toilet room	1	4.700	7.000			32.900	
	Toilet wing ladies	1	4.400	7.650			33.661	
	Staff toilet	1	4.400	2.900			12.760	
	Flooring - FF							
	Gents toilet room	1	4.700	7.000			32.900	
	HOD toilet	1	2.100	2.000			4.200	
	Toilet wing ladies	1	4.400	7.650			33.661	
	Staff toilet	1	4.400	2.900			12.760	
	Flooring - SF							
	Gents toilet room	1	4.700	7.000			32.900	
	HOD toilet	1	2.100	2.000			4.200	
	Toilet wing ladies	1	4.400	7.650			33.661	
	Staff toilet	1	4.400	2.900			12.760	
						Total Quantity	246.363 sqm	
						Total Deducted Quantity	0.000 sqm	
						Net Total Quantity	246.363 sqm	
						Say 246.363 sqm @ Rs 1091.04 / sqm	**Rs 268791.89**	
41	11.37A Providing and fixing 1st quality ceramic glazed floor tiles conforming to IS :15622 (thickness to be specified by the manufacturer) of approved make in allcolours, shades except burgundy, bottle green, black of any size as approvedby Engineer-in-Charge in skirting, risers of steps and dados over 12 mm thickbed of cement Mortar 1:3 (1 cement: 3 coarse sand) and jointing with grey cementslurry @ 3.3kg per sqm including pointing in white cement mixed with pigmentof matching shade complete.							
	SKIRTING - GF							
	Gents toilet room	1	(4.70+7)*2		2.000		46.800	
	HOD toilet	1	(2.1+2)*2		2.000		16.400	
	Toilet wing ladies	1	(4.4+7.65)*2		2.000		48.200	
	Staff toilet	1	(4.4+2.9)*2		2.000		29.201	
	SKIRTING - FF							

	Gents toilet room	1	(4.70+7)*2		2.000		46.800	
	HOD toilet	1	(2.1+2)*2		2.000		16.400	
	partition wall	2	2.100		2.000		8.400	
	Toilet wing ladies	1	(4.4+7.65)*2		2.000		48.200	
	Staff toilet	1	(4.4+2.9)*2		2.000		29.201	
	SKIRTING - SF							
	Gents toilet room	1	(4.70+7)*2		2.000		46.800	
	HOD toilet	1	(2.1+2)*2		2.000		16.400	
	Toilet wing ladies	1	(4.4+7.65)*2		2.000		48.200	
	Staff toilet	1	(4.4+2.9)*2		2.000		29.201	
	Total Quantity						430.203 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						430.203 sqm	
	Say 430.203 sqm @ Rs 1092.18 / sqm						**Rs 469859.11**	
42	13.43.1 Applying one coat of water thinnable cement primer of approved brand and manufacture on wall surface:Water thinnable cement primer							
	Inside Wall - GF							
	Gents rest room	1	(4.10+5.20)*2		3.600		66.961	
	Passage	1	(4.4+2.1)*2		3.600		46.801	
	Gents toilet room	1	(4.70+7)*2		3.600		84.240	
	Fire staircase	4	5+5.6+5.6		3.600		233.280	
	Store GF FF SF	3	(2.8+2)*2		3.600		103.680	
	Lifts GF to Terrace	4*2	(2.1+2)*2		3.600		236.160	
	Library and Lab	1*2	(9+15.2)*2		3.600		348.480	
	Class room,Office room HOD room	4	(9+7.5)*2		3.600		475.200	
	HOD toilet	1	(2.1+2)*2		3.600		29.520	
	partition wall	2	2.100		3.600		15.121	

	Fire control room and staff room	2	(5.45+5.9) *2		3.600		163.441	
	Electrical room	1	(4.4+7.5)* 2		3.600		85.680	
	Toilet wing ladies	1	(4.4+7.65) *2		3.600		86.760	
	Staff toilet	1	(4.4+2.9)* 2		3.600		52.561	
	Passage	2	69.250		3.600		498.600	
	GF Deductions for plastering							
	W4	24	2.000		1.350		-64.800	
	W3	26	1.500		1.350		-52.650	
	V	12	0.600		0.450		-3.240	
	D1	11	1.200		2.100		-27.720	
	D2	3	1.000		2.100		-6.300	
	DT	12	0.800		1.500		-14.400	
	Inside Wall - FF							
	Gents rest room	1	(4.10+5.20)*2		3.600		66.961	
	Passage	1	(4.4+2.1)* 2		3.600		46.801	
	Gents toilet room	1	(4.70+7)*2		3.600		84.240	
	Fire staircase	4	5+5.6+5.6		3.600		233.280	
	Store GF FF SF	3	(2.8+2)*2		3.600		103.680	
	Lifts GF to Terrace	4*2	(2.1+2)*2		3.600		236.160	
	Library and Lab	1	(9+15.2)*2		3.600		174.240	
	Seminar Hall	1	(11+22.9)* 2		3.600		244.080	
	Research lab 1,2,3 and Class room	4	(9+7.5)*2		3.600		475.200	
	HOD toilet	1	(2.1+2)*2		3.600		29.520	
	partition wall	2	2.100		3.600		15.121	
	Fire control room and staff room	2	(5.45+5.9) *2		3.600		163.441	
	Electrical room	1	(4.4+7.5)* 2		3.600		85.680	

	Toilet wing ladies	1	(4.4+7.65)*2		3.600		86.760	
	Staff toilet	1	(4.4+2.9)*2		3.600		52.561	
	Staff room	1	(9+7.65)*2		3.600		119.880	
	Passage	2	69.250		3.600		498.600	
	DEDUCTION FF							
	fIRST FLOOR DEDUCTION w3	51	1.500		1.500		-114.750	
	v	13	0.600		0.600		-4.680	
	d1	7	1.200		2.100		-17.640	
	D2	4	1.000		2.100		-8.400	
	DT	15	0.800		2.100		-25.200	
	Inside Wall - SF							
	Gents rest room	1	(4.10+5.20)*2		3.600		66.961	
	Passage	1	(4.4+2.1)*2		3.600		46.801	
	Gents toilet room	1	(4.70+7)*2		3.600		84.240	
	Fire staircase	4	5+5.6+5.6		3.600		233.280	
	Store GF FF SF	3	(2.8+2)*2		3.600		103.680	
	Lifts GF to Terrace	4*2	(2.1+2)*2		3.600		236.160	
	Library and Lab	1	(9+15.2)*2		3.600		174.240	
	Seminar Hall	1	(11+22.9)*2		3.600		244.080	
	Research lab 1,2,3 and Class room	4	(9+7.5)*2		3.600		475.200	
	HOD toilet	1	(2.1+2)*2		3.600		29.520	
	partition wall	2	2.100		3.600		15.121	
	Fire control room and staff room	2	(5.45+5.9)*2		3.600		163.441	
	Electrical room	1	(4.4+7.5)*2		3.600		85.680	
	Toilet wing ladies	1	(4.4+7.65)*2		3.600		86.760	

	Staff toilet	1	(4.4+2.9)*2		3.600		52.561	
	Staff room	1	(9+7.65)*2		3.600		119.880	
	Passage	2	69.250		3.600		498.600	
	DEDUCTION SF							
	fIRST FLOOR DEDUCTION w3	51	1.500		1.500		-114.750	
	v	13	0.600		0.600		-4.680	
	d1	7	1.200		2.100		-17.640	
	D2	4	1.000		2.100		-8.400	
	DT	15	0.800		2.100		-25.200	
	tERRACE AND STAIRECABIN							
	fIRESTAIRE	2	(9.400+5.55)*2		3.600		215.280	
	MAINSTARE	2	9.300+5.85		3.600		109.080	
	sTAIRCABIN							
	WINDOWS	9	1.500		1.500		-20.250	
	Ceiling - GF							
	Gents rest room	1	4.100	5.200			21.320	
	Passage	1	4.400	2.100			9.241	
	Gents toilet room	1	4.700	7.000			32.900	
	Fire staircase	4	5.000	5.600			112.000	
	Store GF FF SF	3	2.800	2.000			16.800	
	Lifts GF to Terrace	4*2	2.100	2.000			33.600	
	Library and Lab	1*2	9.000	15.200			273.600	
	Class room,Office room HOD room	4	9.000	7.500			270.000	
	HOD toilet	1	2.100	2.000			4.200	
	Fire control room and staff room	2	5.450	5.900			64.310	
	Electrical room	1	4.400	7.500			33.000	
	Toilet wing ladies	1	4.400	7.650			33.661	
	Staff toilet	1	4.400	2.900			12.760	
	Passage	1	69.250	3.000			207.750	

	Ceiling - FF							
	Gents rest room	1	4.100	5.200			21.320	
	Passage	1	4.400	2.100			9.241	
	Gents toilet room	1	4.700	7.000			32.900	
	Fire staircase	4	5.000	5.600			112.000	
	Store GF FF SF	3	2.800	2.000			16.800	
	Lifts GF to Terrace	4*2	2.100	2.000			33.600	
	Library and Lab	1	9.000	15.200			136.800	
	Seminar Hall	1	11.000	22.900			251.900	
	Research lab 1,2,3 and Class room	4	9.000	7.500			270.000	
	HOD toilet	1	2.100	2.000			4.200	
	Fire control room and staff room	2	5.450	5.900			64.310	
	Electrical room	1	4.400	7.500			33.000	
	Toilet wing ladies	1	4.400	7.650			33.661	
	Staff toilet	1	4.400	2.900			12.760	
	Staff room	1	9.000	7.650			68.851	
	Passage	2	69.250	3.000			415.500	
	TERRACE AND STAIRECABIN							
	fIRESTAIRE	2	9.400	5.555			104.434	
	MAINSTARE	2	9.300	5.850			108.810	
	waste slab	3*2*2	3.700	1.200			53.280	
	Landing	3*2*2	1.200	1.200			17.280	
	Ceiling - SF							
	Gents rest room	1	4.100	5.200			21.320	
	Passage	1	4.400	2.100			9.241	
	Gents toilet room	1	4.700	7.000			32.900	
	Fire staircase	4	5.000	5.600			112.000	
	Store GF FF SF	3	2.800	2.000			16.800	
	Lifts GF to Terrace	4*2	2.100	2.000			33.600	
	Library and Lab	1	9.000	15.200			136.800	
	Seminar Hall	1	11.000	22.900			251.900	

	Research lab 1,2,3 and Class room	4	9.000	7.500			270.000	
	HOD toilet	1	2.100	2.000			4.200	
	Fire control room and staff room	2	5.450	5.900			64.310	
	Electrical room	1	4.400	7.500			33.000	
	Toilet wing ladies	1	4.400	7.650			33.661	
	Staff toilet	1	4.400	2.900			12.760	
	Staff room	1	9.000	7.650			68.851	
	Passage	2	69.250	3.000			415.500	
	Outer wall							
	fIRESTAIRE	2	9.800		3.600		70.560	
		2	5.950	0.200	3.600		8.569	
	MAINSTARE	2	9.700	0.200	3.600		13.968	
		2	6.200	0.200	3.600		8.929	
	Outer wall including parapet in and out	2	69.655		14.160		1972.630	
		2	21.800		14.160		617.376	
		3	9.200		14.160		390.816	
		3	11.200		14.160		475.776	
	sunshade top							
	w3 bottom	2*4*3	1.500	0.600			21.600	
	ventilator bottom	4*1*3	1.000	0.600			7.200	
	KW2 bottom	4*1*3	3.400	0.600			24.480	
	W2 bottom	4*1*3	1.000	0.600			7.200	
	W2A bottom	4*1*3	1.500	0.600			10.800	
	Stair room window bottom	1*3	2.650	0.600			4.770	
	sunshade bottom							
	w3 bottom	2*4*3	1.500	0.600			21.600	
	ventilator bottom	4*1*3	1.000	0.600			7.200	
	KW2 bottom	4*1*3	3.400	0.600			24.480	
	W2 bottom	4*1*3	1.000	0.600			7.200	
	W2A bottom	4*1*3	1.500	0.600			10.800	

	Stair room window bottom	1*3	2.650	0.600			4.770	
						Total Quantity	16436.611 sqm	
						Total Deducted Quantity	-530.700 sqm	
						Net Total Quantity	15905.911 sqm	
						Say 15905.911 sqm @ Rs 70.64 / sqm	**Rs 1123593.55**	
43	13.47.1 Finishing walls with Premium Acrylic Smooth exterior paint with Silicone additives of required shade:New work (Two or more coats applied @ 1.43 ltr/ 10 sqm over and including priming coat of exterior primer applied @ 2.20 kg/ 10 sqm)							
	Outer wall							
	fIRESTAIRE	2	9.800		3.600		70.560	
		2	5.950	0.200	3.600		8.569	
	MAINSTARE	2	9.700	0.200	3.600		13.968	
		2	6.200	0.200	3.600		8.929	
	Outer wall including parapet in and out	2	69.655		14.160		1972.630	
		2	21.800		14.160		617.376	
		3	9.200		14.160		390.816	
		3	11.200		14.160		475.776	
	sunshade top							
	w3 bottom	2*4*3	1.500	0.600			21.600	
	ventilator bottom	4*1*3	1.000	0.600			7.200	
	KW2 bottom	4*1*3	3.400	0.600			24.480	
	W2 bottom	4*1*3	1.000	0.600			7.200	
	W2A bottom	4*1*3	1.500	0.600			10.800	
	Stair room window bottom	1*3	2.650	0.600			4.770	
	sunshade bottom							
	w3 bottom	2*4*3	1.500	0.600			21.600	
	ventilator bottom	4*1*3	1.000	0.600			7.200	
	KW2 bottom	4*1*3	3.400	0.600			24.480	
	W2 bottom	4*1*3	1.000	0.600			7.200	
	W2A bottom	4*1*3	1.500	0.600			10.800	

	Stair room window bottom	1*3	2.650	0.600			4.770	
						Total Quantity	3710.724 sqm	
						Total Deducted Quantity	0.000 sqm	
						Net Total Quantity	3710.724 sqm	
						Say 3710.724 sqm @ Rs 189.69 / sqm	**Rs 703887.24**	
44	13.50.1 Applying priming coat:With ready mixed pink or Grey primer of approved and manufacture on wood work (hard and soft wood)							
	GF							
	D1	11	1.200		2.100	2.24	62.093	
	D2	3	1.000		2.100	2.24	14.113	
	FF							
	d1	7	1.200		2.100	2.25	39.690	
	D2	4	1.000		2.100	2.25	18.901	
	SF							
	d1	7	1.200		2.100	2.24	39.514	
	D2	4	1.000		2.100	2.24	18.817	
	Terrace							
		2	1.000		2.100	2.24	9.409	
						Total Quantity	202.537 sqm	
						Total Deducted Quantity	0.000 sqm	
						Net Total Quantity	202.537 sqm	
						Say 202.537 sqm @ Rs 67.18 / sqm	**Rs 13606.44**	
45	13.60.1 Wall painting with acrylic emulsion paint of approved brand and manufacture to give an even shade:Two or more coats on new work							
	Inside Wall - GF							
	Gents rest room	1	(4.10+5.20)*2		3.600		66.961	
	Passage	1	(4.4+2.1)*2		3.600		46.801	
	Gents toilet room	1	(4.70+7)*2		3.600		84.240	
	Fire staircase	4	5+5.6+5.6		3.600		233.280	
	Store GF FF SF	3	(2.8+2)*2		3.600		103.680	

	Lifts GF to Terrace	4*2	(2.1+2)*2		3.600		236.160	
	Library and Lab	1*2	(9+15.2)*2		3.600		348.480	
	Class room,Office room HOD room	4	(9+7.5)*2		3.600		475.200	
	HOD toilet	1	(2.1+2)*2		3.600		29.520	
	partition wall	2	2.100		3.600		15.121	
	Fire control room and staff room	2	(5.45+5.9)*2		3.600		163.441	
	Electrical room	1	(4.4+7.5)*2		3.600		85.680	
	Toilet wing ladies	1	(4.4+7.65)*2		3.600		86.760	
	Staff toilet	1	(4.4+2.9)*2		3.600		52.561	
	Passage	2	69.250		3.600		498.600	
	GF Deductions for plastering							
	W4	24	2.000		1.350		-64.800	
	W3	26	1.500		1.350		-52.650	
	V	12	0.600		0.450		-3.240	
	D1	11	1.200		2.100		-27.720	
	D2	3	1.000		2.100		-6.300	
	DT	12	0.800		1.500		-14.400	
	Inside Wall - FF							
	Gents rest room	1	(4.10+5.20)*2		3.600		66.961	
	Passage	1	(4.4+2.1)*2		3.600		46.801	
	Gents toilet room	1	(4.70+7)*2		3.600		84.240	
	Fire staircase	4	5+5.6+5.6		3.600		233.280	
	Store GF FF SF	3	(2.8+2)*2		3.600		103.680	
	Lifts GF to Terrace	4*2	(2.1+2)*2		3.600		236.160	
	Library and Lab	1	(9+15.2)*2		3.600		174.240	
	Seminar Hall	1	(11+22.9)*2		3.600		244.080	

	Research lab 1,2,3 and Class room	4	(9+7.5)*2		3.600		475.200	
	HOD toilet	1	(2.1+2)*2		3.600		29.520	
	partition wall	2	2.100		3.600		15.121	
	Fire control room and staff room	2	(5.45+5.9)*2		3.600		163.441	
	Electrical room	1	(4.4+7.5)*2		3.600		85.680	
	Toilet wing ladies	1	(4.4+7.65)*2		3.600		86.760	
	Staff toilet	1	(4.4+2.9)*2		3.600		52.561	
	Staff room	1	(9+7.65)*2		3.600		119.880	
	Passage	2	69.250		3.600		498.600	
	DEDUCTION FF							
	fIRST FLOOR DEDUCTION w3	51	1.500		1.500		-114.750	
	v	13	0.600		0.600		-4.680	
	d1	7	1.200		2.100		-17.640	
	D2	4	1.000		2.100		-8.400	
	DT	15	0.800		2.100		-25.200	
	Inside Wall - SF							
	Gents rest room	1	(4.10+5.20)*2		3.600		66.961	
	Passage	1	(4.4+2.1)*2		3.600		46.801	
	Gents toilet room	1	(4.70+7)*2		3.600		84.240	
	Fire staircase	4	5+5.6+5.6		3.600		233.280	
	Store GF FF SF	3	(2.8+2)*2		3.600		103.680	
	Lifts GF to Terrace	4*2	(2.1+2)*2		3.600		236.160	
	Library and Lab	1	(9+15.2)*2		3.600		174.240	
	Seminar Hall	1	(11+22.9)*2		3.600		244.080	
	Research lab 1,2,3 and Class room	4	(9+7.5)*2		3.600		475.200	
	HOD toilet	1	(2.1+2)*2		3.600		29.520	

	partition wall	2	2.100		3.600		15.121	
	Fire control room and staff room	2	(5.45+5.9) *2		3.600		163.441	
	Electrical room	1	(4.4+7.5)* 2		3.600		85.680	
	Toilet wing ladies	1	(4.4+7.65) *2		3.600		86.760	
	Staff toilet	1	(4.4+2.9)* 2		3.600		52.561	
	Staff room	1	(9+7.65)*2		3.600		119.880	
	Passage	2	69.250		3.600		498.600	
	DEDUCTION SF							
	fIRST FLOOR DEDUCTION w3	51	1.500		1.500		-114.750	
	v	13	0.600		0.600		-4.680	
	d1	7	1.200		2.100		-17.640	
	D2	4	1.000		2.100		-8.400	
	DT	15	0.800		2.100		-25.200	
	tERRACE AND STAIRECABIN							
	fIRESTAIRE	2	(9.400+5.55)*2		3.600		215.280	
	MAINSTARE	2	9.300+5.85		3.600		109.080	
	sTAIRCABIN							
	WINDOWS	9	1.500		1.500		-20.250	
	Ceiling - GF							
	Gents rest room	1	4.100	5.200			21.320	
	Passage	1	4.400	2.100			9.241	
	Gents toilet room	1	4.700	7.000			32.900	
	Fire staircase	4	5.000	5.600			112.000	
	Store GF FF SF	3	2.800	2.000			16.800	
	Lifts GF to Terrace	4*2	2.100	2.000			33.600	
	Library and Lab	1*2	9.000	15.200			273.600	
	Class room,Office room HOD room	4	9.000	7.500			270.000	

	HOD toilet	1	2.100	2.000			4.200	
	Fire control room and staff room	2	5.450	5.900			64.310	
	Electrical room	1	4.400	7.500			33.000	
	Toilet wing ladies	1	4.400	7.650			33.661	
	Staff toilet	1	4.400	2.900			12.760	
	Passage	1	69.250	3.000			207.750	
	Ceiling - FF							
	Gents rest room	1	4.100	5.200			21.320	
	Passage	1	4.400	2.100			9.241	
	Gents toilet room	1	4.700	7.000			32.900	
	Fire staircase	4	5.000	5.600			112.000	
	Store GF FF SF	3	2.800	2.000			16.800	
	Lifts GF to Terrace	4*2	2.100	2.000			33.600	
	Library and Lab	1	9.000	15.200			136.800	
	Seminar Hall	1	11.000	22.900			251.900	
	Research lab 1,2,3 and Class room	4	9.000	7.500			270.000	
	HOD toilet	1	2.100	2.000			4.200	
	Fire control room and staff room	2	5.450	5.900			64.310	
	Electrical room	1	4.400	7.500			33.000	
	Toilet wing ladies	1	4.400	7.650			33.661	
	Staff toilet	1	4.400	2.900			12.760	
	Staff room	1	9.000	7.650			68.851	
	Passage	2	69.250	3.000			415.500	
	TERRACE AND STAIRECABIN							
	fIRESTAIRE	2	9.400	5.555			104.434	
	MAINSTARE	2	9.300	5.850			108.810	
	waste slab	3*2*2	3.700	1.200			53.280	
	Landing	3*2*2	1.200	1.200			17.280	
	Ceiling - SF							
	Gents rest room	1	4.100	5.200			21.320	
	Passage	1	4.400	2.100			9.241	

	Gents toilet room	1	4.700	7.000			32.900	
	Fire staircase	4	5.000	5.600			112.000	
	Store GF FF SF	3	2.800	2.000			16.800	
	Lifts GF to Terrace	4*2	2.100	2.000			33.600	
	Library and Lab	1	9.000	15.200			136.800	
	Seminar Hall	1	11.000	22.900			251.900	
	Research lab 1,2,3 and Class room	4	9.000	7.500			270.000	
	HOD toilet	1	2.100	2.000			4.200	
	Fire control room and staff room	2	5.450	5.900			64.310	
	Electrical room	1	4.400	7.500			33.000	
	Toilet wing ladies	1	4.400	7.650			33.661	
	Staff toilet	1	4.400	2.900			12.760	
	Staff room	1	9.000	7.650			68.851	
	Passage	2	69.250	3.000			415.500	
						Total Quantity	12725.887 sqm	
						Total Deducted Quantity	-530.700 sqm	
						Net Total Quantity	12195.187 sqm	
						Say 12195.187 sqm @ Rs 151.39 / sqm	**Rs 1846229.36**	
46	13.61.1 Painting with synthetic enamel paint of approved brand and manufacture to give an even shade:Two or more coats on new work							
	GF							
	D1	11	1.200		2.100	2.24	62.093	
	D2	3	1.000		2.100	2.24	14.113	
	FF							
	d1	7	1.200		2.100	2.25	39.690	
	D2	4	1.000		2.100	2.25	18.901	
	SF							
	d1	7	1.200		2.100	2.24	39.514	
	D2	4	1.000		2.100	2.24	18.817	
	Terrace							
		2	1.000		2.100	2.24	9.409	

	FF							
	w3	51	1.500		1.500		114.750	
	v	13	0.600		0.600		4.680	
	SF							
	w3	51	1.500		1.500		114.750	
	v	13	0.600		0.600		4.680	
	STAIRCABIN							
	WINDOWS	9	1.500		1.500		20.250	
	GF							
	W4	24	2.000		1.350		64.801	
	W3	26	1.500		1.350		52.651	
	V	12	0.600		0.450		3.240	
						Total Quantity	582.339 sqm	
						Total Deducted Quantity	0.000 sqm	
						Net Total Quantity	582.339 sqm	
						Say 582.339 sqm @ Rs 143.05 / sqm	**Rs 83303.59**	
Sl No	Description	No	L	B	D	CF	Quantity	Remark
	2 Sanitory and water supply arrangements							
1	17.2.1 Providing and fixing white vitreous china pedestal type water closet (European type W.C. pan) with seat and lid, 10 litre low level white P.V.C. flushing cistern, including flush pipe, with manually controlled device (handle lever), conforming to IS : 7231, with all fittings and fixtures complete, including cutting and making good the walls and floors wherever required:W.C. pan with ISI marked white solid plastic seat and lid							
	GF,FF and SF	14*3					42.000	
						Total Quantity	42.000 each	
						Total Deducted Quantity	0.000 each	
						Net Total Quantity	42.000 each	
						Say 42.000 each @ Rs 6192.67 / each	**Rs 260092.14**	
2	17.4.1 Providing and fixing white vitreous china flat back or wall corner type lipped front urinal basin of 430x260x350 mm and 340x410x265 mm sizes respectively with automatic flushing cistern with standard flush pipe and C.P. brass spreaders with brass unions and G.I. clamps complete, including painting of fittings and brackets, cutting and making good the walls and floors wherever required:One urinal basin with 5 litre white P.V.C. automatic flushing cistern							
		3*3					9.000	

							Total Quantity	9.000 each
							Total Deducted Quantity	0.000 each
							Net Total Quantity	9.000 each
							Say 9.000 each @ Rs 5864.54 / each	**Rs 52780.86**
3	17.7.3 Providing and fixing wash basin with C.I. brackets, 15 mm C.P. brass pillar taps, 32 mm C.P. brass waste of standard pattern, including painting of fittings and brackets, cutting and making good the walls wherever require:White Vitreous China Wash basin size 550x400 mm with a pair of 15 mm C.P. brass pillar taps							
		3*10					30.000	
							Total Quantity	30.000 each
							Total Deducted Quantity	0.000 each
							Net Total Quantity	30.000 each
							Say 30.000 each @ Rs 3351.04 / each	**Rs 100531.20**
4	17.73.2 Providing and fixing PTMT towel rail complete with brackets fixed to wooden cleats with CP brass screws with concealed fitting arrangement of approved quality and colour600 mm long towel rail with total length of 645 mm, width 78 mm and effective height of 88 mm, weighting not less than 190 gms							
	GF,FF and SF	14*3					42.000	
							Total Quantity	42.000 no
							Total Deducted Quantity	0.000 no
							Net Total Quantity	42.000 no
							Say 42.000 no @ Rs 701.00 / no	**Rs 29442.00**
5	50.17.1.5 Supplying and fixing CP Health Faucet superior quality (Jagur or equvalent make) including cost of materials and labour charges etc complete as per the direction of site Engineer-in-charge.							
	GF,FF and SF	14*3					42.000	
							Total Quantity	42.000 no
							Total Deducted Quantity	0.000 no
							Net Total Quantity	42.000 no
							Say 42.000 no @ Rs 1280.77 / no	**Rs 53792.34**
6	50.17.1.1 Supplying and fixing Stainless steel soap dish including cost of materials and labour charges etc complete as per the direction of site Engineer-in-charge.							
	GF,FF and SF	14*3					42.000	
							Total Quantity	42.000 no

						Total Deducted Quantity	0.000 no	
						Net Total Quantity	42.000 no	
						Say 42.000 no @ Rs 67.02 / no	**Rs 2814.84**	
7	18.51.1 Providing and fixing C.P. brass long body bib cock of approved quality conforming to IS standards and weighing not less than 690 gms.15 mm nominal bore							
	GF,FF and SF	14*3					42.000	
						Total Quantity	42.000 each	
						Total Deducted Quantity	0.000 each	
						Net Total Quantity	42.000 each	
						Say 42.000 each @ Rs 650.15 / each	**Rs 27306.30**	
8	18.52.1 Providing and fixing C.P brass stop cock (concealed) of standard design and of approved make conforming to IS: 893115 mm nominal bore							
	In toilet	14*3*3					126.000	
						Total Quantity	126.000 each	
						Total Deducted Quantity	0.000 each	
						Net Total Quantity	126.000 each	
						Say 126.000 each @ Rs 713.61 / each	**Rs 89914.86**	
Sl No	Description	No	L	B	D	CF	Quantity	Remark
	3 Internal drainage and water supply							
1	50.18.8.6.2 Providing and fixing PVC pipes, fittings including fixing the pipe with clamps at 1.00 m spacing. This includes jointing of pipes & fittings with one step PVC solvent cement and testing of joints complete as per direction of Engineer-in-Charge. Concealed work, including cutting chases and making good the wall etc. 50 mm pipe 6 kgf/cm2							
		75					75.000	
						Total Quantity	75.000 metre	
						Total Deducted Quantity	0.000 metre	
						Net Total Quantity	75.000 metre	
						Say 75.000 metre @ Rs 438.93 / metre	**Rs 32919.75**	
2	50.18.8.7.1 Providing and fixing PVC pipes, fittings including fixing the pipe with clamps at 1.00 m spacing. This includes jointing of pipes with one step PVC solvent cement and testing of joints complete as per direction of Engineer-in-Charge. Concealed work including cutting chases and making good the wall etc. 63 mm pipe 6 Kgf/cm2							

	From wash basin to out side	1*3*2	7.5+4.4+7.5				116.400	
	From Sink	1*3*2	7.5+4.4+7.5				116.400	
	fROM STAFF TOILETS	1*3	5.4+2.5+2.5				31.201	
		1*3	5.4+2.5+2.5				31.201	
						Total Quantity	295.202 metre	
						Total Deducted Quantity	0.000 metre	
						Net Total Quantity	295.202 metre	
						Say 295.202 metre @ Rs 609.45 / metre	**Rs 179910.86**	
3	50.18.9.17.2 Providing and fixing PVC pipes including fixing the pipe with clamps/clips at 1.00 m spacing. This includes jointing of pipes with one step PVC solvent cement and testing of joints complete as per direction of Engineer-in-Charge 63 mm dia 4 Kgf/cm2- External work - exposed on wall							
	VERTICALFrom FLOOR TRAP OF WASH AREA to out side gENTS	1*3*2*2	10.800				129.601	
	VERTICALFrom FLOOR TRAPS OF TOILET to out side gENTS	1*3*2*2	10.800				129.601	
	fROM STAFF TOILETS	1*2	10.800				21.600	
						Total Quantity	280.802 metre	
						Total Deducted Quantity	0.000 metre	
						Net Total Quantity	280.802 metre	
						Say 280.802 metre @ Rs 225.60 / metre	**Rs 63348.93**	
4	50.18.9.7.1 Providing and fixing PVC pipes includings of pipes with one step PVC solvent cement, trenching refilling & testing of joints complete as per direction of Engineer in Charge. 63 mm dia 6Kgf/cm2							
		60					60.000	
						Total Quantity	60.000 metre	
						Total Deducted Quantity	0.000 metre	
						Net Total Quantity	60.000 metre	
						Say 60.000 metre @ Rs 346.95 / metre	**Rs 20817.00**	

5	50.18.9.20.1 Providing and fixing PVC moulded fittings/ accessories for Rigid PVC pipes, including jointing with PVC solvent cement - 63 mm dia Elbow							
		20					20.000	
	Total Quantity						20.000 no	
	Total Deducted Quantity						0.000 no	
	Net Total Quantity						20.000 no	
	Say 20.000 no @ Rs 72.95 / no						**Rs 1459.00**	
6	50.18.9.20.2 Providing and fixing PVC moulded fittings/ accessories for Rigid PVC pipes, including jointing with PVC solvent cement -63 dia 45 degree Elbow							
		20					20.000	
	Total Quantity						20.000 no	
	Total Deducted Quantity						0.000 no	
	Net Total Quantity						20.000 no	
	Say 20.000 no @ Rs 64.20 / no						**Rs 1284.00**	
7	50.18.9.20.3 Providing and fixing PVC moulded fittings /accessories for Rigid PVC pipes, including jointing with PVC solvent cement - 63 mm dia Door Elbow							
		12					12.000	
	Total Quantity						12.000 no	
	Total Deducted Quantity						0.000 no	
	Net Total Quantity						12.000 no	
	Say 12.000 no @ Rs 80.50 / no						**Rs 966.00**	
8	50.18.9.20.4 Providing and fixing PVC moulded fittings/ accessories for Rigid PVC pipes, including jointing with PVC solvent cement - 63 mm dia Bend							
		30					30.000	
	Total Quantity						30.000 no	
	Total Deducted Quantity						0.000 no	
	Net Total Quantity						30.000 no	
	Say 30.000 no @ Rs 79.30 / no						**Rs 2379.00**	
9	50.18.9.20.5 Providing and fixing PVC moulded fittings/accessories for Rigid PVC pipes including jointing with PVC solvent cement - 63x63x63 mm dia Tee							
		12					12.000	

						Total Quantity	12.000 no	
						Total Deducted Quantity	0.000 no	
						Net Total Quantity	12.000 no	
						Say 12.000 no @ Rs 86.10 / no	**Rs 1033.20**	
10	50.18.9.20.6 Providing and fixing PVC moulded fittings/ accessories for Rigid PVC pipes, including jointing with PVC solvent cement -63x63x63 mm dia Door Tee							
		5					5.000	
						Total Quantity	5.000 no	
						Total Deducted Quantity	0.000 no	
						Net Total Quantity	5.000 no	
						Say 5.000 no @ Rs 94.25 / no	**Rs 471.25**	
11	50.18.9.20.7 Providing and fixing PVC moulded fittings/ accessories for Rigid PVC pipes, including jointing with PVC solvent cement - 63 mm dia vent cowl							
		8					8.000	
						Total Quantity	8.000 no	
						Total Deducted Quantity	0.000 no	
						Net Total Quantity	8.000 no	
						Say 8.000 no @ Rs 76.40 / no	**Rs 611.20**	
12	50.18.9.19.1 Providing and fixing PVC pipes including fixing the pipe with clamps/ clips/ at 1.00 m spacing . This includes jointing of pipes with one step PVC solvent cement and testing of joints complete as per direction of Engineer-in-Charge 110 mm dia 6 Kgf/cm2 - External work- Exposed on wall							
	Vertical pipe from wtraps of bath and toilet	2*4	7.000				56.000	
		1	20.000				20.000	
	From wash basin to out side	1*3*2	7.5+4.4+7.5				116.400	
	From Sink	1*3*2	7.5+4.4+7.5				116.400	
	fROM STAFF TOILETS	1*3	5.4+2.5+2.5				31.201	
		1*3	5.4+2.5+2.5				31.201	
						Total Quantity	371.202 metre	

						Total Deducted Quantity	0.000 metre	
						Net Total Quantity	371.202 metre	
						Say 371.202 metre @ Rs 381.75 / metre	**Rs 141706.36**	
13	50.18.9.19.2 Providing and fixing PVC pipes including fixing the pipe with clamps/clips at 1.00 m spacing. This includes jointing of pipes with one step PVC solvent cement and testing of joints complete as per direction of Engineer-in-Charge 110 m dia 4 Kgf/cm2 - External work - Exposed on wall							
		1	50.000				50.000	
						Total Quantity	50.000 metre	
						Total Deducted Quantity	0.000 metre	
						Net Total Quantity	50.000 metre	
						Say 50.000 metre @ Rs 331.70 / metre	**Rs 16585.00**	
14	50.18.8.9.1 Providing and fixing PVC pipes, fittings including fixing the pipe with clamps at 1.00 m spacing. This includes jointing of pipes with one step PVC solvent cement and testing of joints complete as per direction of Engineer-in-Charge. Concealed work, including cutting chased and making good the wall etc. 110 mm pipe 6kgf/cm2							
	From closet waste line to out side wall	1*4*3	1.000				12.000	
						Total Quantity	12.000 metre	
						Total Deducted Quantity	0.000 metre	
						Net Total Quantity	12.000 metre	
						Say 12.000 metre @ Rs 722.90 / metre	**Rs 8674.80**	
15	50.18.9.22.2 Providing and fixing PVC moulded fittings / accessories for Rigid PVC pipes, including jointing with PVC solvent cement - 110 mm dia 45 degree Elbow							
		24					24.000	
						Total Quantity	24.000 no	
						Total Deducted Quantity	0.000 no	
						Net Total Quantity	24.000 no	
						Say 24.000 no @ Rs 105.33 / no	**Rs 2527.92**	
16	50.18.9.22.3 Providing and fixing PVC moulded fittings/ accessories for Rigid PVC pipes, including jointing with PVC solvent cement-110 mm dia Door Elbow							
		12					12.000	
						Total Quantity	12.000 no	

						Total Deducted Quantity	0.000 no	
						Net Total Quantity	12.000 no	
						Say 12.000 no @ Rs 132.03 / no	**Rs 1584.36**	
17	50.18.9.22.4 Providing and fixing PVC moulded fittings/ accessories for Rigid PVC pipes, including jointing with PVC solvent cement- 110 mm dia Bend							
		50					50.000	
						Total Quantity	50.000 no	
						Total Deducted Quantity	0.000 no	
						Net Total Quantity	50.000 no	
						Say 50.000 no @ Rs 161.08 / no	**Rs 8054.00**	
18	50.18.9.22.5 Providing and fixing PVC moulded fittings/ accessories for Rigid PVC pipes including jointing with PVC solvent cement 110x110x110 mm dia Tee							
		10					10.000	
						Total Quantity	10.000 no	
						Total Deducted Quantity	0.000 no	
						Net Total Quantity	10.000 no	
						Say 10.000 no @ Rs 174.79 / no	**Rs 1747.90**	
19	50.18.9.22.6 Providing and fixing PVC moulded fittings/accessories for Rigid PVC pipes, including jointing with PVC solvent cement - 110x110x110 mm dia Door tee							
		5					5.000	
						Total Quantity	5.000 no	
						Total Deducted Quantity	0.000 no	
						Net Total Quantity	5.000 no	
						Say 5.000 no @ Rs 187.59 / no	**Rs 937.95**	
20	50.18.9.22.7 Providing and fixing PVC moulded fittings/ accessories for Rigid PVC pipes, including jointing with PVC solvent cement - 110x110x75 mm dia Door Tee							
		5					5.000	
						Total Quantity	5.000 no	
						Total Deducted Quantity	0.000 no	
						Net Total Quantity	5.000 no	
						Say 5.000 no @ Rs 180.64 / no	**Rs 903.20**	

21	50.18.9.22.8 Providing and fixing PVC moulded fittings /accessories for Rigid PVC pipes, including jointing with PVC solvent cement -110 mm dia Vent cowl							
		4					4.000	
	Total Quantity						4.000 no	
	Total Deducted Quantity						0.000 no	
	Net Total Quantity						4.000 no	
	Say 4.000 no @ Rs 123.88 / no						**Rs 495.52**	
22	50.18.9.5.2 Providing and fixing PVC pipes includings jointing of pipes with one step PVC solvent cement, trenching, refilling & testing of joints compete as per direction of Engineer in Charge. 40 mm dia 6 Kgf/cm2							
		20					20.000	
	Total Quantity						20.000 metre	
	Total Deducted Quantity						0.000 metre	
	Net Total Quantity						20.000 metre	
	Say 20.000 metre @ Rs 234.39 / metre						**Rs 4687.80**	
23	50.18.8.3.1 Providing and fixing PVC pipes, fittings including fixing the pipe with clamps at 1.00 m spacing. This includes jointing of pipes & fittings with one step PVC solvent cement and testing of joints complete as per direction of Engineer-in-Charge. Concealed work, including cutting chases and making good the wall etc. 25 mm pipe 12 kgf/cm2							
		1	50.000				50.000	
	Total Quantity						50.000 metre	
	Total Deducted Quantity						0.000 metre	
	Net Total Quantity						50.000 metre	
	Say 50.000 metre @ Rs 440.43 / metre						**Rs 22021.50**	
24	50.18.8.4.1 Providing and fixing PVC pipes, fittings including fixing the pipe with clamps at 1.00 m spacing. This includes jointing of pipes & fittings with one step PVC solvent cement and testing of joints complete as per direction of Engineer-in-Charge. Concealed work, including cutting chases and making good the wall etc. 32 mm pipe 10Kgf/cm2							
		25					25.000	
	for basement levelling							
	bed rooms	4	3.300	2.950	0.075		2.921	
	wc	4	1.400	1.050	0.075		0.441	
	bath	4	1.400	1.050	0.075		0.441	

	commen area	4	2.030	1.700	0.075		1.036	
	kitchen	4	3.300	2.650	0.075		2.624	
	dining area	4	3.000	5.750	0.075		5.175	
	stair cabin	2	2.650	5.750	0.075		2.286	
	lobby	1	5.950	2.650	0.075		1.183	
	entrance	1	2.650	2.150	0.075		0.428	
						Total Quantity	41.535 metre	
						Total Deducted Quantity	0.000 metre	
						Net Total Quantity	41.535 metre	
						Say 41.535 metre @ Rs 446.48 / metre	**Rs 18544.55**	
25	50.18.9.8.1 Providing and fixing PVC pipes includings jointing of pipes with one step PVC solvent cement, trenching, refilling & testing of joints complete as per direction of Engineer in Charge. 75 mm dia 6 Kgf/ cm2							
		10					10.000	
						Total Quantity	10.000 metre	
						Total Deducted Quantity	0.000 metre	
						Net Total Quantity	10.000 metre	
						Say 10.000 metre @ Rs 360.40 / metre	**Rs 3604.00**	
26	od71455/2022_2023 Suppling and fixing 110 steel gratings							
	Bath room	4*3*1					12.000	
	Toilet	4*3*1					12.000	
	wash basin	4*3*1					12.000	
						Total Quantity	36.000 each	
						Total Deducted Quantity	0.000 each	
						Net Total Quantity	36.000 each	
						Say 36.000 each @ Rs 259.71 / each	**Rs 9349.56**	
27	19.7.1.1 Constructing brick masonry manhole in cement mortar 1:4 (1 cement : 4 coarse sand) with R.C.C. top with 1:2:4 mix (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size), foundation concrete 1:4:8 mix (1 cement : 4 coarse sand : 8 graded stone aggregate 40 mm nominal size,) inside plastering 12 mm thick with cement mortar 1:3 (1 cement : 3 coarse sand) finished with floating coat of neat cement and making channels in cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size) finished with a floating coat of neat cement complete as per standard design:Inside size 90x80 cm and 45 cm deep including C.I. cover with frame (light duty) 455x610 mm internal dimensions, total weight of cover and frame to be not less than 38 kg (weigh of cover 23 kg and							

	weight of frame 15 kg):With common burnt clay F.P.S. (non modular) bricks of class designation 7.5							
		5					5.000	
						Total Quantity	5.000 each	
						Total Deducted Quantity	0.000 each	
						Net Total Quantity	5.000 each	
						Say 5.000 each @ Rs 12836.64 / each	**Rs 64183.20**	
28	od71456/2022_2023 Supplying approved make PVC gully trap of size 160 x 110mm and CI grating 150mmx150mm size and light duty C.I cover with frames 300mmx300mm size(inside) the weight of cover to be not less than4.5kg and frame to be not less than2.7kg (CI MH cover and frame as per IS:1726) single sealed of size conveying to size the above mentioned items and constructing 30cmx30cm internal size gully trap chamber and depth upto 60cm,115 thk brick wall in CM 1:6 on a foundation of PCC 1:4:8.100mm thick plastering inside with CM 1:3,12mm thk with a neat cement flushing coat and conveying to site,cleaning ,installing and testing approved make PVC gully trap with 160mm outlet(Fabricated),surrounding with CC 1:1.5:3, 150x150mmm,top with CI grating above the PVC gulley trap and light duty CI cover and frame over the chamber including cost of all materials, etc complete as per approved drawing and as directed by Engineer-in- Charge.							
	Bath room	4*3*1					12.000	
	Toilet	4*3*1					12.000	
	wash basin	4*3*1					12.000	
						Total Quantity	36.000 each	
						Total Deducted Quantity	0.000 each	
						Net Total Quantity	36.000 each	
						Say 36.000 each @ Rs 3020.69 / each	**Rs 108744.84**	
29	18.18.3 Providing and fixing ball valve (brass) of approved quality, High or low pressure, with plastic floats complete:25 mm nominal bore							
		5					5.000	
						Total Quantity	5.000 each	
						Total Deducted Quantity	0.000 each	
						Net Total Quantity	5.000 each	
						Say 5.000 each @ Rs 463.79 / each	**Rs 2318.95**	
30	18.19.2.2 Providing and fixing gun metal non-return valve of approved quality (screwed end):32 mm nominal boreVertical							
		5					5.000	
						Total Quantity	5.000 each	

						Total Deducted Quantity	0.000 each	
						Net Total Quantity	5.000 each	
						Say 5.000 each @ Rs 834.15 / each	**Rs 4170.75**	
31	18.48 Providing and placing on terrace (at all floor levels) polyethylene water storage tank :ISI 12701 marked, with cover and suitable locking arrangement and making necessary holes for inlet, outlet and overflow pipes but without fittings and the base support for tank.							
		1	12000.000				12000.000	
						Total Quantity	12000.000 Litre	
						Total Deducted Quantity	0.000 Litre	
						Net Total Quantity	12000.000 Litre	
						Say 12000.000 Litre @ Rs 10.37 / Litre	**Rs 124440.00**	
Sl No	Description	No	L	B	D	CF	Quantity	Remark
	4 septic tank							
1	2.2.1 Earth work in rough excavation, banking excavated earth in layers not exceeding 20 cm in depth, breaking clods, watering, rolling each layer with 1/2 tonne roller or wooden or steel rammers, and rolling every 3rd and top-most layer with power roller of minimum 8 tonnes and dressing up in embankments for roads, flood banks, marginal banks and guide banks or filling up ground depressions, lead up to 50 m and lift up to 1.5 m:All kinds of soil							
		2	26+22				96.000	
						Total Quantity	96.000 cum	
						Total Deducted Quantity	0.000 cum	
						Net Total Quantity	96.000 cum	
						Say 96.000 cum @ Rs 879.03 / cum	**Rs 84386.88**	
2	4.1.8 Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:4:8 (1 cement : 4 coarse sand : 8 graded stone aggregate 40 nominal size)							
	pcc	2	1.500				3.000	
						Total Quantity	3.000 cum	
						Total Deducted Quantity	0.000 cum	
						Net Total Quantity	3.000 cum	
						Say 3.000 cum @ Rs 6814.89 / cum	**Rs 20444.67**	
3	5.1.2 Providing and laying in position specified grade of reinforced cement concrete, excluding the cost of centering, shuttering, finishing and reinforcement - All work up to plinth level:1:1:5:3 (1 cement 1.5 coarse							

	sand :3 graded stone aggregate 20 mm nominal size							
	base slab	2	1.500				3.000	
	cover slab	2	1.500				3.000	
						Total Quantity	6.000 cum	
						Total Deducted Quantity	0.000 cum	
						Net Total Quantity	6.000 cum	
						Say 6.000 cum @ Rs 9085.14 / cum	**Rs 54510.84**	
4	5.2.2 Reinforced cement concrete work in walls (any thickness), including attached pilasters, buttresses, plinth and string courses, fillets, columns, pillars, piers, abutments, posts and struts etc. up tot floor five level excluding cost of centering, shuttering, finishing and reinforcement :1:1.5:3(1 cement : 1.5 coarse sand : 3 graded stone aggregate 20 mm nominal size)							
	side walls	2	5.000				10.000	
						Total Quantity	10.000 cum	
						Total Deducted Quantity	0.000 cum	
						Net Total Quantity	10.000 cum	
						Say 10.000 cum @ Rs 10954.04 / cum	**Rs 109540.40**	
5	5.22.6 Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete upto plinth levelThermo - Mechanically Treated bars of grade Fe-500D or more							
	steel bars	2	1050.000				2100.000	
						Total Quantity	2100.000 kilogram	
						Total Deducted Quantity	0.000 kilogram	
						Net Total Quantity	2100.000 kilogram	
						Say 2100.000 kilogram @ Rs 98.30 / kilogram	**Rs 206430.00**	
6	13.3.1 20 mm cement plaster of mix:1:4 (1 cement : 4 fine sand)							
	wall plastereing	76					76.000	
	top of cover slab	11					11.000	
						Total Quantity	87.000 sqm	
						Total Deducted Quantity	0.000 sqm	
						Net Total Quantity	87.000 sqm	
						Say 87.000 sqm @ Rs 429.96 / sqm	**Rs 37406.52**	
7	6.23 Honey-comb brick work 10/11.4 cm thick with common burnt clay bricks of class designation 7.5 in super structure above plinth level upto floor V level with cement mortar 1:4 (1 cement : 4 coarse sand).							

	side wall of soak pit	10					10.000	
						Total Quantity	10.000 sqm	
						Total Deducted Quantity	0.000 sqm	
						Net Total Quantity	10.000 sqm	
						Say 10.000 sqm @ Rs 699.37 / sqm	**Rs 6993.70**	
8	19.19.1.1 Providing and fixing in position Pre-cast R.C.C. manhole cover and frame of required shape and approved quality.L D - 2.5Rectangular shape 600x450 mm internal dimensions							
		2					2.000	
						Total Quantity	2.000 each	
						Total Deducted Quantity	0.000 each	
						Net Total Quantity	2.000 each	
						Say 2.000 each @ Rs 1446.54 / each	**Rs 2893.08**	
Sl No	Description	No	L	B	D	CF	Quantity	Remark
5 APPENDIX B RETAINING AND COMPOUND WALL								
1	2.3.1 Banking excavated earth in layers not exceeding 20 cm in depth, breaking clods, watering, rolling each layer with 1/2 tonne roller, or wooden or steel rammers, and rolling every 3rd and top-most layer with power roller of minimum 8 tonnes and dressing up, in embankments for roads, flood banks, marginal banks, and guide banks etc., lead up to 50 m and lift up to 1.5 m :All kinds of soil							
		1	10.000				10.000	
						Total Quantity	10.000 cum	
						Total Deducted Quantity	0.000 cum	
						Net Total Quantity	10.000 cum	
						Say 10.000 cum @ Rs 553.89 / cum	**Rs 5538.90**	
2	2.8.1 Earth work in excavation by mechanical means (Hydraulic excavator) /manual means in foundation trenches or drains (not exceeding 1.5 m in width or 10 sqm on plan), including dressing of sides and ramming of bottoms, lift up to 1.5 m, including getting out the excavated soil and disposal of surplus excavated soil as directed, within a lead of 50 m.All kinds of soil							
		1	90.000				90.000	
						Total Quantity	90.000 cum	
						Total Deducted Quantity	0.000 cum	
						Net Total Quantity	90.000 cum	
						Say 90.000 cum @ Rs 296.94 / cum	**Rs 26724.60**	
3	2.25							

	Filling available excavated earth (excluding rock) in trenches, plinth, sides of foundation etc. in layers not exceeding 20 cm in depth, consolidating each deposited layer by ramming and watering, lead up to 50 m and lift up to 1.5 m.							
		1	72.000				72.000	
						Total Quantity	72.000 cum	
						Total Deducted Quantity	0.000 cum	
						Net Total Quantity	72.000 cum	
						Say 72.000 cum @ Rs 258.57 / cum	**Rs 18617.04**	
4	2.28.1 Surface dressing of the ground including removing vegetation and in-equalities not exceeding 15 cm deep and disposal of rubbish, lead up to 50 m and lift up to 1.5 m.All kinds of soil							
		1	100.000				100.000	
						Total Quantity	100.000 sqm	
						Total Deducted Quantity	0.000 sqm	
						Net Total Quantity	100.000 sqm	
						Say 100.000 sqm @ Rs 28.68 / sqm	**Rs 2868.00**	
5	4.1.3 Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:2:4 (cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size)							
		1	9.000				9.000	
						Total Quantity	9.000 cum	
						Total Deducted Quantity	0.000 cum	
						Net Total Quantity	9.000 cum	
						Say 9.000 cum @ Rs 7990.86 / cum	**Rs 71917.74**	
6	4.1.10 Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:5:10 (1 cement : 5 coarse sand : 10 graded stone aggregate 40 mm nominal size)							
		1	29.000				29.000	
						Total Quantity	29.000 cum	
						Total Deducted Quantity	0.000 cum	
						Net Total Quantity	29.000 cum	
						Say 29.000 cum @ Rs 6497.88 / cum	**Rs 188438.52**	
7	5.9.1 Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of							

	columns, etc for mass concrete							
		1	156.000				156.000	
						Total Quantity	156.000 sqm	
						Total Deducted Quantity	0.000 sqm	
						Net Total Quantity	156.000 sqm	
						Say 156.000 sqm @ Rs 335.31 / sqm	**Rs 52308.36**	
8	5.9.2 Centering and shuttering including strutting, etc. and removal of form for:Walls (any thickness) including attached pilasters, butteresses, plinth and string courses etc.							
		1	700.000				700.000	
						Total Quantity	700.000 sqm	
						Total Deducted Quantity	0.000 sqm	
						Net Total Quantity	700.000 sqm	
						Say 700.000 sqm @ Rs 717.20 / sqm	**Rs 502040.00**	
9	5.9.5 Centering and shuttering including strutting, etc. and removal of form for:Lintels, beams, plinth beams, girders bressumers and cantilevers							
		1	27.000				27.000	
						Total Quantity	27.000 sqm	
						Total Deducted Quantity	0.000 sqm	
						Net Total Quantity	27.000 sqm	
						Say 27.000 sqm @ Rs 649.82 / sqm	**Rs 17545.14**	
10	5.9.6 Centering and shuttering including strutting, etc. and removal of form for:Columns, Pillars, Piers, Abutments, Posts and Struts							
		1	50.000				50.000	
						Total Quantity	50.000 sqm	
						Total Deducted Quantity	0.000 sqm	
						Net Total Quantity	50.000 sqm	
						Say 50.000 sqm @ Rs 863.64 / sqm	**Rs 43182.00**	
11	5.22.6 Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete upto plinth levelThermo - Mechanically Treated bars of grade Fe-500D or more							
		1	15600.000				15600.000	
						Total Quantity	15600.000 kilogram	

						Total Deducted Quantity	0.000 kilogram	
						Net Total Quantity	15600.000 kilogram	
						Say 15600.000 kilogram @ Rs 98.30 / kilogram	**Rs 1533480.00**	
12	5.23 Smooth finishing of the exposed surface of RCC work with 6mm thick cement mortar 1:3 (cement : 3 fine sand).							
		1	20.000				20.000	
						Total Quantity	20.000 sqm	
						Total Deducted Quantity	0.000 sqm	
						Net Total Quantity	20.000 sqm	
						Say 20.000 sqm @ Rs 267.59 / sqm	**Rs 5351.80**	
13	5.33.1 Providing and laying in position machine batched and machine mixed design mix M-25 grade cement concrete for reinforced cement concrete work, using cement content as per approved design mix, including pumping of concrete to site of laying but excluding the cost of centering, shuttering, finishing and reinforcement, including admixtures in recommended proportions as per IS: 9103 to accelerate, retard setting of concrete, improve workability without impairing strength and durability as per direction of Engineer - in-charge. Note:- Cement content considered in this item is @ 330 kg/ cum. Excess or less cement used as per design mix is payable or recoverable separately.All work upto plinth level							
		1	156.000				156.000	
						Total Quantity	156.000 cum	
						Total Deducted Quantity	0.000 cum	
						Net Total Quantity	156.000 cum	
						Say 156.000 cum @ Rs 9413.54 / cum	**Rs 1468512.24**	
14	5.33.2 Providing and laying in position machine batched and machine mixed design mix M-25 grade cement concrete for reinforced cement concrete work, using cement content as per approved design mix, including pumping of concrete to site of laying but excluding the cost of centering, shuttering, finishing and reinforcement, including admixtures in recommended proportions as per IS: 9103 to accelerate, retard setting of concrete, improve workability without impairing strength and durability as per direction of Engineer - in-charge. Note:- Cement content considered in this item is @ 330 kg/ cum. Excess or less cement used as per design mix is payable or recoverable separately.All work above plinth level upto floor V level							
		1	55.000				55.000	
						Total Quantity	55.000 cum	
						Total Deducted Quantity	0.000 cum	
						Net Total Quantity	55.000 cum	
						Say 55.000 cum @ Rs 11065.64 / cum	**Rs 608610.20**	

15	5.35 Add for using extra cement in the items of design mix over and above the specified cement content therein							
		1	60.000				60.000	
	Total Quantity						60.000 quintal	
	Total Deducted Quantity						0.000 quintal	
	Net Total Quantity						60.000 quintal	
	Say 60.000 quintal @ Rs 792.52 / quintal						**Rs 47551.20**	
16	5.22A.6 Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete above plinth level.Thermo - Mechanically Treated bars of grade Fe-500D or more							
		1	5500.000				5500.000	
	Total Quantity						5500.000 kg	
	Total Deducted Quantity						0.000 kg	
	Net Total Quantity						5500.000 kg	
	Say 5500.000 kg @ Rs 98.30 / kg						**Rs 540650.00**	
17	6.34.2 Brick work with non modular fly ash lime bricks (FALG Bricks) conforming to IS: 12894, class designation 10 average compressive strength in super structure above plinth level up to floor V level in:Cement mortar 1:6 (1 cement : 6 coarse sand)							
		1	25.000				25.000	
		1	33.440				33.440	
	Total Quantity						58.440 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						58.440 cum	
	Say 58.440 cum @ Rs 8570.03 / cum						**Rs 500832.55**	
18	7.1.1 Random rubble masonry with hard stone in foundation and plinth including levelling up with cement concrete 1:6:12 (1 cement : 6 coarse sand : 12 graded stone aggregate 20 mm nominal size) up to plinth level with:Cement mortar 1:6 (1 cement : 6 coarse sand)							
		1	2.000				2.000	
	Total Quantity						2.000 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						2.000 cum	
	Say 2.000 cum @ Rs 7204.78 / cum						**Rs 14409.56**	
19	10.25.2							

	Item Shifted to head 14 as item 14.74Steel work welded in built up sections/framed work, including cutting, hoisting, fixing in position and applying a priming coat of approved steel primer using structural steel etc. as required.In gratings, frames, guard bar, ladder, railings, brackets, gates and similar works							
		1	2680.000				2680.000	
	Total Quantity						2680.000 kg	
	Total Deducted Quantity						0.000 kg	
	Net Total Quantity						2680.000 kg	
	Say 2680.000 kg @ Rs 154.17 / kg						**Rs 413175.60**	
20	13.1.2 12 mm cement plaster of mix:1:6 (1 cement : 6 fine sand).							
		1	255.000				255.000	
	Total Quantity						255.000 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						255.000 sqm	
	Say 255.000 sqm @ Rs 299.25 / sqm						**Rs 76308.75**	
21	13.2.2 15 mm cement plaster on the rough side of single or half brick wall of mix:1:6 (1 cement : 6 fine sand)							
		1	255.000				255.000	
	Total Quantity						255.000 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						255.000 sqm	
	Say 255.000 sqm @ Rs 344.67 / sqm						**Rs 87890.85**	
22	13.52.1 Finishing with Epoxy paint (two or more coats) at all locations prepared and applied as per manufacturer's specifications including appropriate priming coat, preparation of surface, etc. complete.On steel work							
		1	550.000				550.000	
	Total Quantity						550.000 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						550.000 sqm	
	Say 550.000 sqm @ Rs 223.32 / sqm						**Rs 122826.00**	
23	13.48A.1 Finishing walls with 100% Premium acrylic emulsion paint having VOC lessthan 50 gm/litre and UV resistance as per IS 15489:2004, Alkali & fungalresistance, dirt resistance exterior paint of required shade (Company DepotTinted) with silicon additives.New work (Two or more coats applied @ 1.43 litre/ 10 sqm. Over and includingpriming coat of exterior primer applied @ 0.90 litre/10 sqm.							

		1	175.000				175.000	
						Total Quantity	175.000 sqm	
						Total Deducted Quantity	0.000 sqm	
						Net Total Quantity	175.000 sqm	
						Say 175.000 sqm @ Rs 172.13 / sqm	**Rs 30122.75**	
24	od78676/2022_2023 Providing and laying factory made chamfered edge Cement Concrete paver blocks in footpath, parks, lawns, drive ways or light traffic parking etc, of required strength, thickness & size/ shape, made by table vibratory method using PU mould, laid in required colour & pattern over 50mm thick compacted bed of 6mm metal, compacting and proper embedding/laying of inter locking paver blocks into the bedding layer through vibratory compaction by using plate vibrator, and cutting of paver blocks as per required size and pattern, finishing etc. complete all as per direction of Engineer-in-Charge. 80 mm thick C.C. paver block of M-30 grade with approved color design and pattern.							
		1	100.000				100.000	
						Total Quantity	100.000 sqm	
						Total Deducted Quantity	0.000 sqm	
						Net Total Quantity	100.000 sqm	
						Say 100.000 sqm @ Rs 1058.07 / sqm	**Rs 105807.00**	
Sl No	Description	No	L	B	D	CF	Quantity	Remark
	6 Appendix C							
1	2.6.1 Earth work in excavation by mechanical means (Hydraulic excavator)/manual means over areas (exceeding 30 cm in depth, 1.5 m in width as well as 10 sqm on plan) including disposal of excavated earth, lead up to 50 m and lift up to 1.5 m, disposed earth to be levelled and neatly dressed.All kinds of soil							
		180					180.000	
						Total Quantity	180.000 cum	
						Total Deducted Quantity	0.000 cum	
						Net Total Quantity	180.000 cum	
						Say 180.000 cum @ Rs 214.03 / cum	**Rs 38525.40**	
2	2.25 Filling available excavated earth (excluding rock) in trenches, plinth, sides of foundation etc. in layers not exceeding 20 cm in depth, consolidating each deposited layer by ramming and watering, lead up to 50 m and lift up to 1.5 m.							
		30					30.000	
						Total Quantity	30.000 cum	
						Total Deducted Quantity	0.000 cum	

	Net Total Quantity						30.000 cum	
	Say 30.000 cum @ Rs 258.57 / cum						**Rs 7757.10**	
3	2.26.1 Extra for every additional lift 1.5 m or part there of in excavation / banking excavated or stacked materials.All kinds of soil							
		102					102.000	
	Total Quantity						102.000 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						102.000 cum	
	Say 102.000 cum @ Rs 106.37 / cum						**Rs 10849.74**	
4	4.1.10 Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:1:5:10 (1 cement : 5 coarse sand : 10 graded stone aggregate 40 mm nominal size)							
		9					9.000	
	Total Quantity						9.000 cum	
	Total Deducted Quantity						0.000 cum	
	Net Total Quantity						9.000 cum	
	Say 9.000 cum @ Rs 6497.88 / cum						**Rs 58480.92**	
5	5.9.1 Centering and shuttering including strutting, etc. and removal of form for:Foundations, footings, bases of columns, etc for mass concrete							
		13					13.000	
	Total Quantity						13.000 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						13.000 sqm	
	Say 13.000 sqm @ Rs 335.31 / sqm						**Rs 4359.03**	
6	5.9.2 Centering and shuttering including strutting, etc. and removal of form for:Walls (any thickness) including attached pilasters, butteresses, plinth and string courses etc.							
		200					200.000	
	Total Quantity						200.000 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						200.000 sqm	
	Say 200.000 sqm @ Rs 717.20 / sqm						**Rs 143440.00**	
7	5.9.3							

	Centering and shuttering including strutting, etc. and removal of form for:Suspended floors, roofs, landings, balconies and access platform							
		37					37.000	
						Total Quantity	37.000 sqm	
						Total Deducted Quantity	0.000 sqm	
						Net Total Quantity	37.000 sqm	
						Say 37.000 sqm @ Rs 815.78 / sqm	**Rs 30183.86**	
8	5.9.5 Centering and shuttering including strutting, etc. and removal of form for:Lintels, beams, plinth beams, girders bressumers and cantilevers							
		25					25.000	
						Total Quantity	25.000 sqm	
						Total Deducted Quantity	0.000 sqm	
						Net Total Quantity	25.000 sqm	
						Say 25.000 sqm @ Rs 649.82 / sqm	**Rs 16245.50**	
9	5.22.6 Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete upto plinth levelThermo - Mechanically Treated bars of grade Fe-500D or more							
		5000					5000.000	
						Total Quantity	5000.000 kilogram	
						Total Deducted Quantity	0.000 kilogram	
						Net Total Quantity	5000.000 kilogram	
						Say 5000.000 kilogram @ Rs 98.30 / kilogram	**Rs 491500.00**	
10	5.33.1 Providing and laying in position machine batched and machine mixed design mix M-25 grade cement concrete for reinforced cement concrete work, using cement content as per approved design mix, including pumping of concrete to site of laying but excluding the cost of centering, shuttering, finishing and reinforcement, including admixtures in recommended proportions as per IS: 9103 to accelerate, retard setting of concrete, improve workability without impairing strength and durability as per direction of Engineer - in-charge. Note:- Cement content considered in this item is @ 330 kg/ cum. Excess or less cement used as per design mix is payable or recoverable separately.All work upto plinth level							
		50					50.000	
						Total Quantity	50.000 cum	
						Total Deducted Quantity	0.000 cum	
						Net Total Quantity	50.000 cum	
						Say 50.000 cum @ Rs 9413.54 / cum	**Rs 470677.00**	

11	5.35 Add for using extra cement in the items of design mix over and above the specified cement content therein							
		15					15.000	
						Total Quantity	15.000 quintal	
						Total Deducted Quantity	0.000 quintal	
						Net Total Quantity	15.000 quintal	
						Say 15.000 quintal @ Rs 792.52 / quintal	**Rs 11887.80**	
12	5.22A.6 Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete above plinth level.Thermo - Mechanically Treated bars of grade Fe-500D or more							
		150					150.000	
						Total Quantity	150.000 kg	
						Total Deducted Quantity	0.000 kg	
						Net Total Quantity	150.000 kg	
						Say 150.000 kg @ Rs 98.30 / kg	**Rs 14745.00**	
13	6.27.1 Brick work with common burnt clay modular bricks of class designation 7.5 in exposed brick work including making horizontal and vertical grooves 10 mm wide 12mm deep complete in cement mortar 1:6 (1 cement : 6 coarse sand).From ground level upto plinth level							
		3					3.000	
						Total Quantity	3.000 cum	
						Total Deducted Quantity	0.000 cum	
						Net Total Quantity	3.000 cum	
						Say 3.000 cum @ Rs 6284.61 / cum	**Rs 18853.83**	
14	6.34.2 Brick work with non modular fly ash lime bricks (FALG Bricks) conforming to IS: 12894, class designation 10 average compressive strength in super structure above plinth level up to floor V level in:Cement mortar 1:6 (1 cement : 6 coarse sand)							
		3.2					3.200	
						Total Quantity	3.200 cum	
						Total Deducted Quantity	0.000 cum	
						Net Total Quantity	3.200 cum	
						Say 3.200 cum @ Rs 8570.03 / cum	**Rs 27424.10**	
15	9.96.1 Providing and fixing aluminium sliding door bolts, ISI marked anodised (anodic coating not less than							

	grade AC 10 as per IS : 1868), transparent or dyed to required colour or shade, with nuts and screws etc. complete:300x16 mm							
		1					1.000	
						Total Quantity	1.000 no	
						Total Deducted Quantity	0.000 no	
						Net Total Quantity	1.000 no	
						Say 1.000 no @ Rs 302.70 / no	**Rs 302.70**	
16	9.97.1 Providing and fixing aluminium tower bolts, ISI marked, anodised(anodic coating not less than grade AC 10 as per : 1868), transparent or dyed to required colour or shade, with necessary screws complete:300x10 mm							
		1					1.000	
						Total Quantity	1.000 no	
						Total Deducted Quantity	0.000 no	
						Net Total Quantity	1.000 no	
						Say 1.000 no @ Rs 137.49 / no	**Rs 137.49**	
17	9.97.4 150x10 mm							
		4					4.000	
						Total Quantity	4.000 no	
						Total Deducted Quantity	0.000 no	
						Net Total Quantity	4.000 no	
						Say 4.000 no @ Rs 88.27 / no	**Rs 353.08**	
18	9.100.1 Providing and fixing aluminium handles, ISI marked, anodised (anodic coating not less than grade AC 10 as per IS : 1868) transparent or dyed to required colour or shade, with necessary screws etc. complete:125 mm							
		1					1.000	
						Total Quantity	1.000 no	
						Total Deducted Quantity	0.000 no	
						Net Total Quantity	1.000 no	
						Say 1.000 no @ Rs 70.17 / no	**Rs 70.17**	
19	9.101.1 Providing and fixing aluminium hanging floor door stopper, ISI marked, anodised (anodic coating not less than grade AC 10 as per IS: 1868) transparent or dyed to required colour and shade, with necessary screws etc. complete.Single rubber stopper							

		1					1.000	
	Total Quantity						1.000 no	
	Total Deducted Quantity						0.000 no	
	Net Total Quantity						1.000 no	
	Say 1.000 no @ Rs 39.93 / no						**Rs 39.93**	
20	10.16.1 Steel work in built up tubular (round, square or rectangular hollow tubes etc.) trusses etc., including cutting, hoisting, fixing position and applying a priming coat of approved steel primer, including welding and bolted with special shaped washers etc. complete.Hot finished welded type tubes							
		135					135.000	
	Total Quantity						135.000 kg	
	Total Deducted Quantity						0.000 kg	
	Net Total Quantity						135.000 kg	
	Say 135.000 kg @ Rs 168.81 / kg						**Rs 22789.35**	
21	10.19 Providing and fixing mild steel round holding down bolts with nuts and washer plates complete.							
		20					20.000	
	Total Quantity						20.000 kg	
	Total Deducted Quantity						0.000 kg	
	Net Total Quantity						20.000 kg	
	Say 20.000 kg @ Rs 98.64 / kg						**Rs 1972.80**	
22	11.41.2 Providing and laying vitrified floor tiles in different sizes (thickness to be specified by the manufacturer) with water absorption less than 0.08% and conforming to IS : 15622, of approved make, in all colours and shades, laid on 20 mm thick cement mortar 1:4(1 cement : 4 coarse sand), including grouting the joints with white cement and matching pigments etc., complete.Size of Tile 600 x 600 mm.							
		8					8.000	
	Total Quantity						8.000 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						8.000 sqm	
	Say 8.000 sqm @ Rs 1766.26 / sqm						**Rs 14130.08**	
23	11.46.2 Providing and laying Vitrified tiles indifferent sizes (thickness to be specified by manufacturer), with water absorption less than 0.08 % and conforming to I.S. 15622, of approved make, in all colours & shade, in skirting, riser of steps, over 12 mm thick bed of cement mortar 1:3 (1 cement : 3 coarse sand), including grouting the joint with white cement & matching pigments etc. complete.Size of Tile 600x600 mm							

		1					1.000	
	Total Quantity						1.000 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						1.000 sqm	
	Say 1.000 sqm @ Rs 1819.62 / sqm						**Rs 1819.62**	
24	12.50 Providing and fixing precoated galvanised iron profile sheets (size, shape and pitch of corrugation as approved by Engineer-in-charge) 0.50 mm (+0.05%), total coated thickness with zinc coating 120 grams per sqm as per IS: 277, in 240 mpa steel grade, 5-7 microns epoxy primer on both side of the sheet and polyester top coat 15-18 microns. Sheet should have protective guard film of 25 microns minimum to avoid scratches during transportation and should be supplied in single length upto 12 metre or as desired by Engineer-in-charge. The sheet shall be fixed using self drilling/self tapping screws of size (5.5x55mm) with EPDM seal, complete upto any pitch in horizontal/ vertical or curved surfaces, excluding the cost of purlins, rafters and trusses and including cutting to size and shape wherever required.							
		1	15.000				15.000	
	Total Quantity						15.000 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						15.000 sqm	
	Say 15.000 sqm @ Rs 738.69 / sqm						**Rs 11080.35**	
25	12.51.1 Providing and fixing precoated galvanised steel sheet roofing accessories 0.50 mm (+ 0.05%) total coated thickness, zinc coating 120 grams per sqm as per IS:mm(+0.05%) total coated thickness, Zinc coating 120 grams per sqm as per IS: 277, in 240 mpa steel grade, 5-7 microns epoxy primer on both side of the sheet and polyester top coat 15-18 microns using self drilling/self tapping screws complete:Ridges plain (500-600 mm)							
		1	8.000				8.000	
	Total Quantity						8.000 metre	
	Total Deducted Quantity						0.000 metre	
	Net Total Quantity						8.000 metre	
	Say 8.000 metre @ Rs 490.02 / metre						**Rs 3920.16**	
26	13.1.2 12 mm cement plaster of mix:1:6 (1 cement : 6 fine sand).							
		36					36.000	
	Total Quantity						36.000 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						36.000 sqm	
	Say 36.000 sqm @ Rs 299.25 / sqm						**Rs 10773.00**	

27	13.2.2 15 mm cement plaster on the rough side of single or half brick wall of mix:1:6 (1 cement : 6 fine sand)							
		31					31.000	
	Total Quantity						31.000 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						31.000 sqm	
	Say 31.000 sqm @ Rs 344.67 / sqm						**Rs 10684.77**	
28	13.9.1 Cement plaster 1:3 (1 cement : 3 coarse sand) finished with a floating coat of neat cement.12 mm cement plaster							
		1	152.000				152.000	
	Total Quantity						152.000 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						152.000 sqm	
	Say 152.000 sqm @ Rs 412.13 / sqm						**Rs 62643.76**	
29	13.42 Distempering with 1st quality acrylic distemper (ready mixed) of approvedmanufacturer, of required shade and colour complete, as per manufacturer'sspecification.							
		1	36.000				36.000	
	Total Quantity						36.000 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						36.000 sqm	
	Say 36.000 sqm @ Rs 102.57 / sqm						**Rs 3692.52**	
30	13.61.1 Painting with synthetic enamel paint of approved brand and manufacture to give an even shade:Two or more coats on new work							
		1	10.000				10.000	
	Total Quantity						10.000 sqm	
	Total Deducted Quantity						0.000 sqm	
	Net Total Quantity						10.000 sqm	
	Say 10.000 sqm @ Rs 143.05 / sqm						**Rs 1430.50**	
31	13.48A.1 Finishing walls with 100% Premium acrylic emulsion paint having VOC lessthan 50 gm/litre and UV resistance as per IS 15489:2004, Alkali & fungalresistance, dirt resistance exterior paint of required shade (Company DepotTinted) with silicon additives.New work (Two or more coats applied @ 1.43 litre/ 10 sqm. Over and includingpriming coat of exterior primer applied @ 0.90 litre/10 sqm.							

	Total RCC steel quantity	1625				14.0	22750.000	
						Total Quantity	22750.000 sqm	
						Total Deducted Quantity	0.000 sqm	
						Net Total Quantity	22750.000 sqm	
						Say 22750.000 sqm @ Rs 172.13 / sqm	**Rs 3915957.50**	
32	18.7.5 Providing and fixing Chlorinated Polyvinyl Chloride (CPVC) pipes, having thermal stability for hot & cold water supply, including all CPVC plain & brass threaded fittings including fixing the pipe with clamps at 1.00 m spacing. This includes jointing of pipes & fittings with one step CPVC solvent cement and testing of joints complete as per direction of Engineer -in-Charge. Internal work - Exposed on wall40 mm nominal outer dia pipes							
		1	10.000				10.000	
						Total Quantity	10.000 metre	
						Total Deducted Quantity	0.000 metre	
						Net Total Quantity	10.000 metre	
						Say 10.000 metre @ Rs 763.44 / metre	**Rs 7634.40**	
33	18.9.5 Providing and fixing Chlorinated Polyvinyl Chloride (CPVC) pipes, having thermal stability for hot & cold water supply including all CPVC plain & brass threaded fittings. This includes jointing of pipes & fittings with one step CPVC solvent cement, trenching , refilling & testing of joints complete as per direction of Engineer- in-Charge. External work40 mm nominal outer dia pipes							
		1	20.000				20.000	
						Total Quantity	20.000 metre	
						Total Deducted Quantity	0.000 metre	
						Net Total Quantity	20.000 metre	
						Say 20.000 metre @ Rs 631.85 / metre	**Rs 12637.00**	
34	18.17.3 Providing and fixing gun metal gate valve with C.I. wheel of approved quality (screwed end) :40 mm nominal bore							
		1					1.000	
						Total Quantity	1.000 each	
						Total Deducted Quantity	0.000 each	
						Net Total Quantity	1.000 each	
						Say 1.000 each @ Rs 798.56 / each	**Rs 798.56**	
35	18.19.3.1 Providing and fixing gun metal non-return valve of approved quality (screwed end):40 mm nominal							

	boreHorizontal							
		1					1.000	
	Total Quantity						1.000 each	
	Total Deducted Quantity						0.000 each	
	Net Total Quantity						1.000 each	
	Say 1.000 each @ Rs 932.72 / each						**Rs 932.72**	
36	21.1.1.2 Providing and fixing aluminium work for doors, windows, ventilators and partitions with extruded built up standard tubular sections/ appropriate Z sections and other sections of approved make conforming to IS : 733 and IS: 1285, fixing with dash fasteners of required dia and size, including necessary filling up the gaps at junctions, i.e. at top, bottom and sides with required EPDM rubber/ neoprene gasket etc. Aluminium sections shall be smooth, rust free, straight, mitred and jointed mechanically wherever required including cleat angle, Aluminnium snap beading for glazing /paneling, C.P. brass/ stainless steel screws, all complete as per architectural drawings and the directions of Engineer-in-charge.(Glazing, paneling and dash fasteners to be paid for separately):For fixed portionPowder coated aluminium (minimum thickness of powder coating 50 micron)							
		1	35.000				35.000	
	Total Quantity						35.000 kg	
	Total Deducted Quantity						0.000 kg	
	Net Total Quantity						35.000 kg	
	Say 35.000 kg @ Rs 537.07 / kg						**Rs 18797.45**	
37	21.1.2.2 For shutters of doors, windows & ventilators including providing and fixing hinges / pivots and making provision for fixing of fittings wherever required including the cost of EPDM rubber/ neoprene gasket required (Fittings shall be paid for separately)Powder coated aluminium (minimum thickness of powder coating 50 micron)							
		1	25.000				25.000	
	Total Quantity						25.000 kg	
	Total Deducted Quantity						0.000 kg	
	Net Total Quantity						25.000 kg	
	Say 25.000 kg @ Rs 643.10 / kg						**Rs 16077.50**	
38	21.2.1 Providing and fixing 12 mm thick prelaminated particle board flat pressed three layer or graded wood particle board conforming to IS : 12823 Grade I Type II, in panelling fixed in aluminum doors, windows shutters and partition frames with C.P. brass / stainless steel screws etc. complete as per architectural drawings and directions of Engineer - in- Charge.Pre-laminated particle board with decorative lamination on one side and balancing lamination on other side							
		1	1.200				1.200	

						Total Quantity	1.200 sqm	
						Total Deducted Quantity	0.000 sqm	
						Net Total Quantity	1.200 sqm	
						Say 1.200 sqm @ Rs 1174.41 / sqm	**Rs 1409.29**	
39	21.3.2 Providing and fixing glazing in aluminium door, window, ventilator shutters and partitions etc. with EPDM rubber / neoprene gasket etc. complete as per the architectural drawings and the directions of Engineer - in -Charge. (Cost of aluminium snap beading shall be paid in basic item):With float glass panes of 5.50 mm thickness							
		1	3.000				3.000	
						Total Quantity	3.000 sqm	
						Total Deducted Quantity	0.000 sqm	
						Net Total Quantity	3.000 sqm	
						Say 3.000 sqm @ Rs 1526.00 / sqm	**Rs 4578.00**	
40	21.8.1 nullUpto 5 mm depth and 5 mm width							
		1	15.000				15.000	
						Total Quantity	15.000 metre	
						Total Deducted Quantity	0.000 metre	
						Net Total Quantity	15.000 metre	
						Say 15.000 metre @ Rs 93.56 / metre	**Rs 1403.40**	
41	19.18.1 Supplying and fixing C.I with out frame for manholes:455 x 610 mm rectangular C.I cover (light duty) the weight of the cover to be no less than 23 kg							
		1	2.000				2.000	
						Total Quantity	2.000 each	
						Total Deducted Quantity	0.000 each	
						Net Total Quantity	2.000 each	
						Say 2.000 each @ Rs 1561.12 / each	**Rs 3122.24**	
						Provision for GST payments (in %) @	**18.0%**	
						Amount reserved for GST payments	**18996541.54**	
						Total	**124532883.54**	
						Lumpsum for round off	**0.00**	
							TOTAL Rs 124532883.54	
							Rounded Total Rs 12,45,32,884	

Rupees Twelve Crore Forty Five Lakh Thirty Two Thousand Eight Hundred and Eighty Four Only

(Cost Index Applied for this estimate is 35.59%)

CONSTRUCTION OF TRANSLATIONAL RESEARCH CENTRE

AT CUSAT THRIKKAKARA CAMPUS

DATA ANALYSIS

Data Analysis

civil works
1 Specification Code: od71454/2022_2023

od71454/2022_2023 :Providing and applying Antitermite treatment by injecting chemical emulsion Imidacloprid emulsiable concentrate .075% for pre-constructional treatment and creating a chemical barrier as per IS 6313 (Part II) 2001 for wall trenches, foundation, top surface of plinth filling, foundation of wall and floor, along the external perimeter of the building, etc. complete conforming to manufacturers specification and as directed by the Engineer-in-Charge. (Plinth area only to be measured for the payment)
Rate as per quotation

Code	Description	Unit	Quantity	Rate	Amount
MR	Rate as per quotation	per sqm	1.00000	120.00	120.00
				TOTAL	120.00
				cost for one per sqm	120.00
	say				120.00

	Add Water Charges @ 1.0%				**1.20**
	Add CPOH @15.0%				**18.18**
	Cost index **35.59 %**				0.00
	Total with Cost index				139.38
	Say				139.38

2 Specification Code: od71457/2022_2023

**od71457/2022_2023 :Providing and fixing M.S. Grills of required pattern in frames of windows etc. with M.S. flats, square or round bars etc. including priming coat with approved steel primer all complete.
Fixed to steel windows by welding (MR 2020)**
Details of cost for a grill 90x120 cm =
1.08 sqm.
MATERIAL:
M.S. bar 16 mm diameter - 11x86cm = 9.46 m.
@ 1.58 kg/m = 14.95 kg +
Add wastage @ 10% = 1.50 kg.
Total = 16.45 kg .

@1.58kg/m = 14.95 kg.Say 0.165 quintal

Code	Description	Unit	Quantity	Rate	Amount
MR	Mild Steel round bar above 12 mm dia Mid steel round bar above 12 mm dia M.S. flat 25x3.15 mm 2x120cm = 2.40 m+ 2x90cm = 1.80 m + 1x120cm = 1.20 m + 2x15cm = 0.30m Total = 5.70 m s.70m @ 0.63kg/m = 3.59kg+ Add wastage @ 10% = 0.36 kg. Total = 3.95 kg. Say 4 kg. or 0.04 quintal	quintal	0.16500	5200.00	858.00
MR	Flats up to 10 mm in thickness 	quintal	0.04000	5400.00	216.00
2205	Steel Carriage of steel 0.165 +0.04 = 0.205 q = 0.0205 t Say 0.02 tonne	tonne	0.02000	92.24	1.84
MR	Sundries 	L.S	26.91000	2.50	67.28
MR	Sundries Welding charges Priming coat: Area = 1x0.9x1.2x1=1.08 sqm	L.S	19.76000	2.50	49.40
13.50.3	Rate as per item number13.50.3of SH:Finishing LABOUR:	sqm	1.08000	37.88	40.91
MR	Blacksmith 1st class 	Day	0.86000	950.00	817.00
MR	Beldar 	Day	1.10000	800.00	880.00
				TOTAL	2930.43

	cost for 18.54 kg				2930.43
	cost for one kg				158.06
	say				158.06

	Add Water Charges @ 1.0%				**1.58**
	Add CPOH @ 15.0%				**23.94**
	Cost index **35.59 %**				0.95
	Total with Cost index				184.54
	Say				184.54

3 Specification Code: od71458/2022_2023

od71458/2022_2023 :Providing and laying vitrified matt finished floor tiles 1st quality double charged Kajaria or equivalent in different sizes (thickness to be specified by the manufacturer) with water absorption less than 0.08% and conforming to IS : 15622, of approved make, in all colours and shades, laid on 20 mm thick cement mortar 1:4(1 cement : 4 coarse sand), including grouting the joints with epoxy joint filler with spacer bar in equal interval and matching pigments etc. complete as per the direction from the Engineer in charge.Size of Tile 800 x 800 mm.

Details of cost for 1 sqm.

MATERIAL:

Vitrified floor tiles 60x60 cm size = 1.00 sqm

Add for wastage & breakage @ 2.5 % =

0.025 sqm

Total = 1.025 sqm

Code	Description	Unit	Quantity	Rate	Amount
MR	Vitrified matt finished floor tile 60x60 cm	sqm	1.02500	659.72	676.21
9977	Carriage of tiles 20 mm 'thick cement mortar 1:4 (1 cement : 4 coarse sand)	L.S	6.24000	2.00	12.48
3.9	Rate as per item number3.9of SH:Mortars 20 mm thick cement mortar 1:4(1 cement: coarse sand)	cum	0.02400	4010.35	96.25
9999	Sundries Mortar for pointing in white cement Cement for slurry over bed @ 3.3 kg per sqm	L.S	3.64000	2.00	7.28
0367	Portland Cement LABOUR:	tonne	0.00330	4940.00	16.30
0123	Mason (brick layer) Ist class 	Day	0.20000	738.00	147.60
0115	Coolie 	Day	0.20000	558.00	111.60
9988	Carriage and sundries of cement etc	L.S	26.91000	2.00	53.82
				TOTAL	1121.54
				cost for one sqm	1121.54
	say				1121.54

	Add Water Charges @ 1.0%				**11.21**
	Add CPOH @ 15.0%				**169.91**
	Cost index **35.59 %**				184.08
	Total with Cost index				1486.76
	Say				1486.76

4 Specification Code: od71459/2022_2023

od71459/2022_2023 :Providing and laying vitrified floor tiles 1st quality double charged Kajaria or equivalent in different sizes (thickness to be specified by the manufacturer) with water absorption less than 0.08% and conforming to IS : 15622, of approved make, in all colours and shades, laid on 20 mm thick cement mortar 1:4(1 cement : 4 coarse sand), including grouting the joints with epoxy joint filler with spacer bar in equal interval and matching pigments etc for skirting, risers and threads of stairs etc. complete as per the direction from the Engineer in charge.Size of Tile 800 x 800 mm.

Details of cost for 1 sqm.

MATERIAL:

Vitrified floor tiles 60x60 cm size = 1.00 sqm

Add for wastage & breakage @ 2.5 % =

0.025 sqm

Total = 1.025 sqm

Code	Description	Unit	Quantity	Rate	Amount
8622	Vitrifies floor tile 80x80 cm	sqm	1.02500	850.00	871.25
9977	Carriage of tiles 20 mm 'thick cement mortar 1:4 (1 cement : 4 coarse sand)	L.S	6.24000	2.00	12.48
3.9	Rate as per item number3.9of SH:Mortars 20 mm thick cement mortar 1:4(1 cement: coarse sand)	cum	0.02400	4010.35	96.25
9999	Sundries Mortar for pointing in white cement Cement for slurry over bed @ 3.3 kg per sqm	L.S	3.64000	2.00	7.28
0367	Portland Cement LABOUR:	tonne	0.00330	4940.00	16.30
0123	Mason (brick layer) Ist class 	Day	0.20000	738.00	147.60
0115	Coolie 	Day	0.20000	558.00	111.60
9988	Carriage and sundries of cement etc	L.S	26.91000	2.00	53.82
				TOTAL	1316.58
				cost for one sqm	1316.58
	say				1316.58

	Add Water Charges @ 1.0%				**13.16**
	Add CPOH @ 15.0%				**199.46**
	Cost index **35.59 %**				544.24

	Total with Cost index				2073.45
	Say				2073.45

5 Specification Code: od71460/2022_2023

od71460/2022_2023 :Providing and laying antiskid Ceramic glazed floor tiles of size 300x300 mm (thickness to be specified by the manufacturer), of 1st quality conforming to IS : 15622, of approved make, in colours such as White, Ivory, Grey, Fume Red Brown, laid on 20 mm thick cement mortar 1:4 (1 Cement : 4 Coarse sand),using 3mm thick spacers including pointing the joints with approved quality epoxy grout mix of .7kg of organic coated filler of desired shade (.10 kg of hardner and .2 kg of resin per kg)including filling /grouting and finishing

Details of cost for 1 sqm

MATERIAL:

Glazed Ceramic floor tiles 300x300 mm size = 1.00 sqm

Add for wastage & breakage @ 2.5 % =0.025 sqm

Total = 1.025 sqm

Code	Description	Unit	Quantity	Rate	Amount
7801	Ceramic Glazed Tiles Ist quality 300 x 300 mm in all shades and designs of White, Ivory, grey, Fume Red brown etc.	sqm	1.02500	209.10	214.33
9977	Carriage Carriage of tiles20 mm thick cement mortar 1:4 (1 cement : 4 coarse sand)	L.S	6.24000	2.00	12.48
3.9	Rate as per item number3.9of SH:Mortars	cum	0.02400	4010.35	96.25
9999	Sundries Mortar for pointing in white cement Cement for slurry over bed @ 3.3 kg per sqm	L.S	20.20000	2.00	40.40
0367	Portland Cement LABOUR:	tonne	0.00330	4940.00	16.30
0123	Mason (brick layer) Ist class	Day	0.20000	738.00	147.60
0115	Coolie	Day	0.20000	558.00	111.60
9988	Carriage and sundries including carriage of cement etc.	L.S	26.91000	2.00	53.82
				TOTAL	692.78
				cost for one sqm	692.78
	say				692.78

	Add Water Charges @ 1.0%				**6.92**

	Add CPOH @ 15.0%				**104.95**
	Cost index **35.59 %**				286.37
	Total with Cost index				1091.04
	Say				1091.04

Internal drainage and water supply

1 Specification Code: od71455/2022_2023

od71455/2022_2023 :Suppling and fixing 110 steel gratings

Code	Description	Unit	Quantity	Rate	Amount
MR	110mm steel gratings	each	1.00000	223.60	223.60
				TOTAL	223.60
				cost for one each	223.60
	say				223.60

	Add Water Charges @ 1.0%				**2.23**
	Add CPOH @ 15.0%				**33.87**
	Cost index **35.59 %**				0.00
	Total with Cost index				259.71
	Say				259.71

2 Specification Code: od71456/2022_2023

od71456/2022_2023 :Supplying approved make PVC gully trap of size 160 x 110mm and CI grating 150mmx150mm size and light duty C.I cover with frames 300mmx300mm size(inside) the weight of cover to be not less than4.5kg and frame to be not less than2.7kg (CI MH cover and frame as per IS:1726) single sealed of size conveying to size the above mentioned items and constructing 30cmx30cm internal size gully trap chamber and depth upto 60cm,115 thk brick wall in CM 1:6 on a foundation of PCC 1:4:8.100mm thick plastering inside with CM 1:3,12mm thk with a neat cement flushing coat and conveying to site,cleaning

,installing and testing approved make PVC gully trap with 160mm outlet(Fabricated),surrounding with CC 1:1.5:3, 150x150mmm,top with CI grating above the PVC gulley trap and light duty CI cover and frame over the chamber including cost of all materials, etc complete as per approved drawing and as directed by Engineer-in- Charge.

Details of cost for one gully trap

Code	Description	Unit	Quantity	Rate	Amount
MR	160x110mm gully trap	each	1.00000	462.30	462.30
MR	C.I. grating 150X150MM	each	1.00000	39.95	39.95
1352	C.I. Cover and frame 300X300 mm inside	each	1.00000	477.00	477.00
9977	Carriage of materialsCement concrete 1:5:10 (1 cement : 5 fine sand: 10 graded stone aggregate 40 mm nominal size)0.68x0.68x0.10 m = 0.046cumConcrete around trap0.30x0.30x0.675 m = 0.061 cumTotal = 0.107 cumDeduct:0.55/3x[0.09+0.032+(0.09x0.032)/2] = 0.008cum3.14/4x(0.182)2x0.70 = 0.018 cumTotal = 0.026 cumNet quantity = 0.107 cum (-) 0.026 cum= 0.081 cum say 0.08 cum	L.S	4.50000	2.00	9.00
4.1.11	Rate as per item number4.1.11of SH:Concrete work Brick work with 75 class designation brick in cement mortar 1:4 (1 cement :4 coarse sand)1.66x0.115x0.675m = 0.129 cum say 0.13 cum	cum	0.08000	3905.34	312.43
6.1.1	Rate as per item number6.1.1of SH:Brick Work Cement concrete 1:2:4 (1 cement: 2 coarse sand : 4 graded stone aggregate 20 mm nominal size)1.66x0.11x0.04 m = 0.008cum	cum	0.13000	4765.73	619.55
4.2.3	Rate as per item number4.2.3of SH:Concrete work 12 mm cement plaster 1:3 (1 cement: 3 coarse sand) finished with floating coat of neat cement:[1/2x0.166x(l.20+0.72)] = 0.159 sqm say0.16 sqm	cum	0.00800	6393.80	51.15
13.9.1	Rate as per item number13.9.1of SH:Finishing	sqm	0.30000	261.69	78.51
				TOTAL	2049.89
				cost for one each	2049.88
	say				2049.88

	Add Water Charges @ 1.0%				**20.49**
	Add CPOH @ 15.0%				**310.55**

	Cost index **35.59 %**				639.75
	Total with Cost index				3020.69
	Say				3020.69

APPENDIX B RETAINING AND COMPOUND WALL

1 Specification Code: od78676/2022_2023

**od78676/2022_2023 :Providing and laying factory made chamfered edge Cement Concrete paver blocks
in footpath, parks, lawns, drive ways or light traffic parking etc, of required strength,
thickness & size/ shape, made by table vibratory method using PU mould, laid in
required colour & pattern over 50mm thick compacted bed of 6mm metal, compacting and
proper embedding/laying of inter locking paver blocks into the bedding layer
through vibratory compaction by using plate vibrator, and
cutting of paver blocks as per required size and pattern, finishing etc. complete all as per direction of Engineer-in-Charge.
80 mm thick C.C. paver block of M-30 grade with approved color design and pattern.**

Details of cost for 10.00 sqm.

MATERIALS :

Code	Description	Unit	Quantity	Rate	Amount
8785	Interlocking C.C. paver block (80 mm thick, M-30)	sqm	10.00000	470.00	4700.00
0298	Stone Aggregate(single size): 06 mm nominal size	cum	0.50000	1400.00	700.00
2202	Stone aggregate below 40 mm nominal size	cum	0.50000	103.77	51.89
0123	Mason (brick layer) Ist class	Day	0.50000	738.00	369.00
0124	Mason (brick layer)2nd class	Day	0.50000	679.00	339.50
0114	Beldar	Day	1.00000	558.00	558.00
				TOTAL	6718.39

	cost for 10.0 sqm				6718.39
	cost for one sqm				671.84
	say				671.84

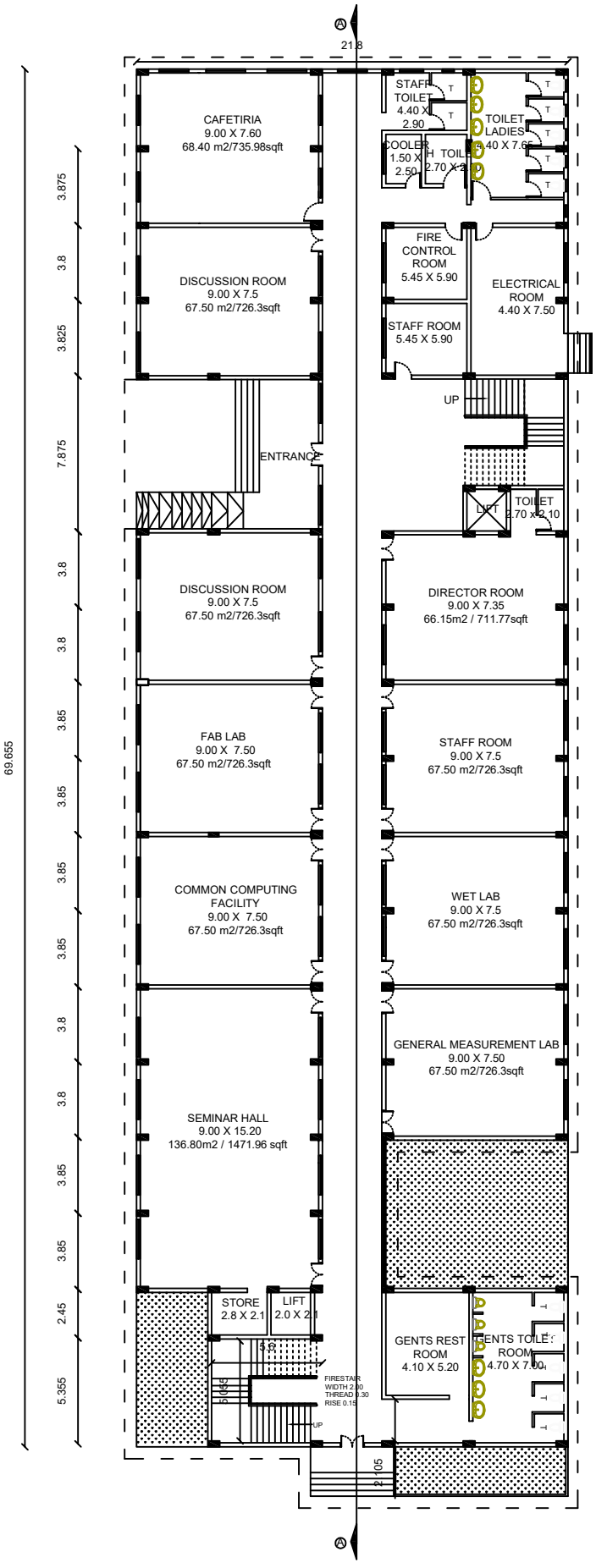
	Add Water Charges @ 1.0%				**6.71**

	Add CPOH @ 15.0%				**101.78**
	Cost index **35.59 %**				277.72
	Total with Cost index				1058.07
	Say				1058.07

CONSTRUCTION OF TRANSLATIONAL RESEARCH CENTRE

AT CUSAT THRIKKAKARA CAMPUS

DRAWINGS

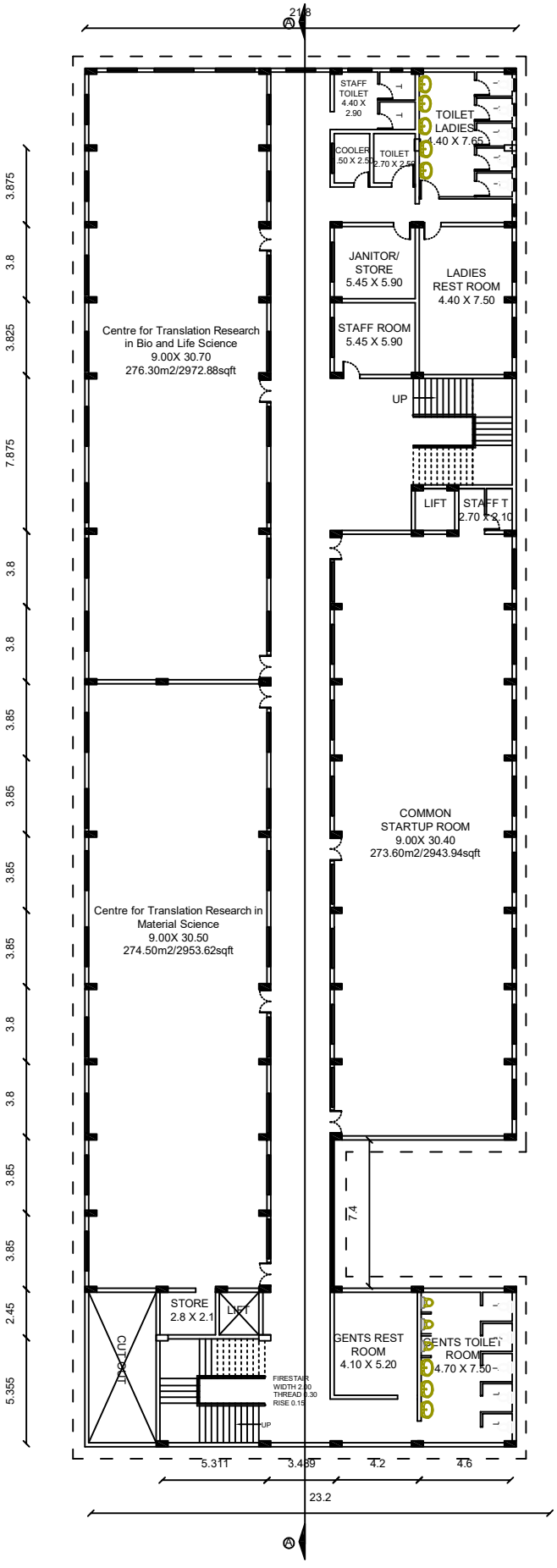


GROUND FLOOR PLAN

NAME OF WORK : CONSTRUCTION OF TRANSALATIONAL RESEARCH CENTRE AT CUSAT THRIKKAKARA CAMPUS

Plinth Area

GF	- 1380.15 m2
FF	- 1422.30m2
SF	- 1422.30m2
Total	- 4224.75 m2

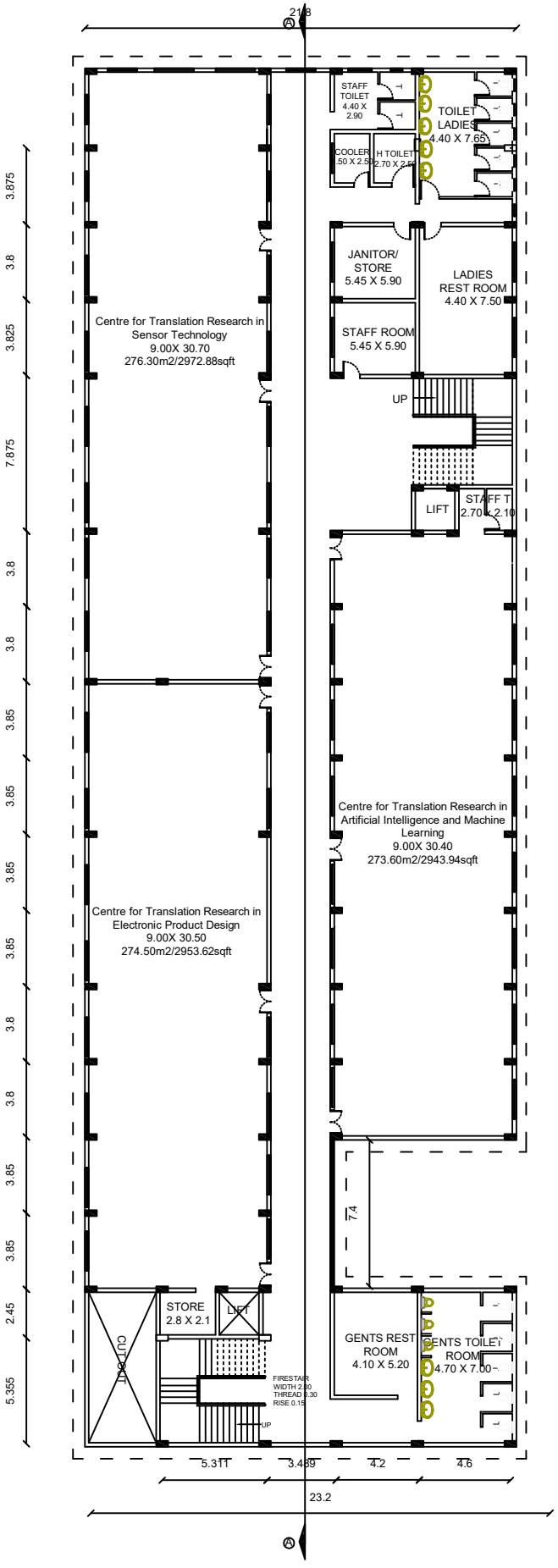


FIRST FLOOR PLAN

NAME OF WORK : CONSTRUCTION OF TRANSALATIONAL RESEARCH CENTRE AT CUSAT THRIKKAKARA CAMPUS

Plinth Area

GF	- 1380.15 m2
FF	- 1422.30m2
SF	- 1422.30m2
Total	- 4224.75 m2

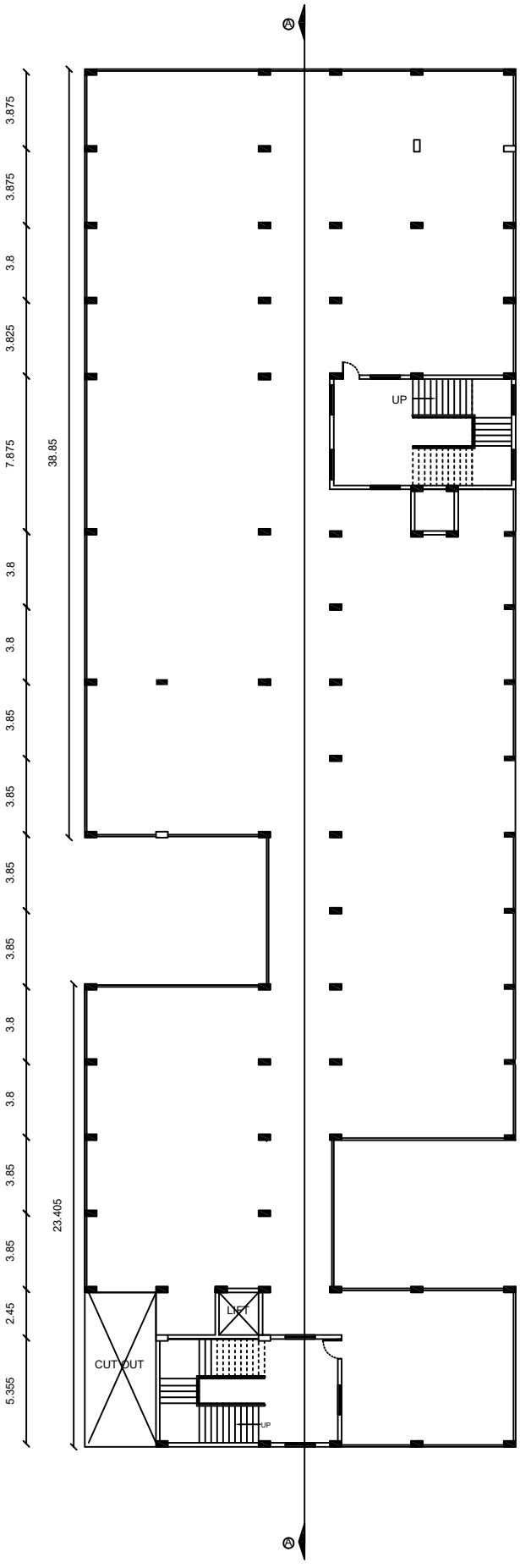


SECOND FLOOR PLAN

NAME OF WORK : CONSTRUCTION OF TRANSALATIONAL RESEARCH CENTRE AT CUSAT THRIKKAKARA CAMPUS

Plinth Area

GF	- 1380.15 m2
FF	- 1422.30m2
SF	- 1422.30m2
Total	- 4224.75 m2



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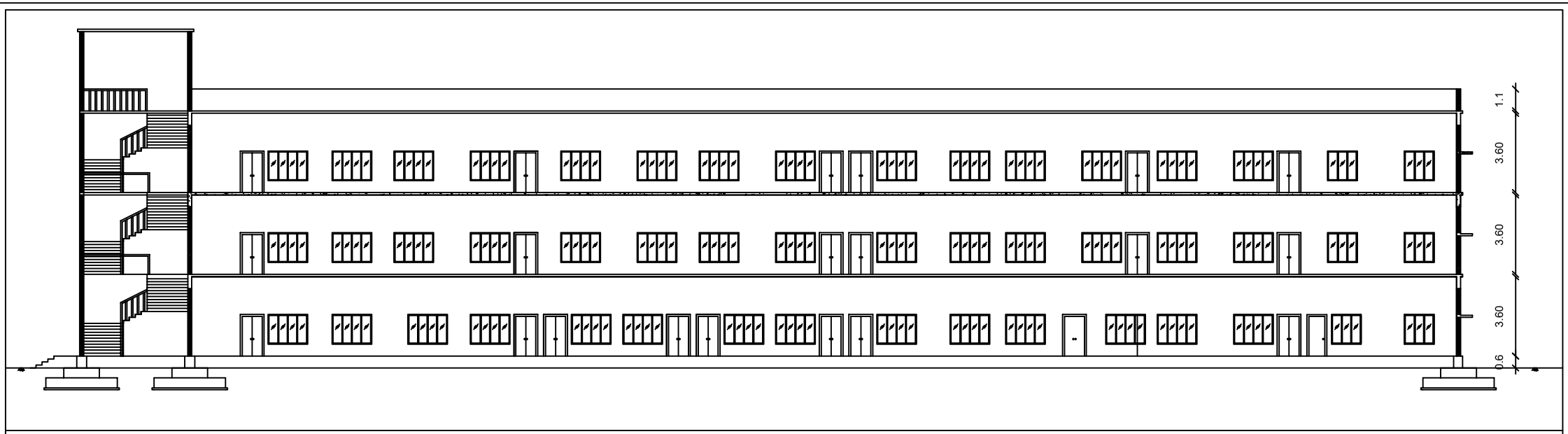
TERRACE FLOOR PLAN

NAME OF WORK : CONSTRUCTION OF
TRANSALATIONAL RESEARCH CENTRE AT CUSAT
THRIKKAKARA CAMPUS

Plinth Area

GF	- 1380.15 m2
FF	- 1422.30m2
SF	- 1422.30m2
Total	- 4224.75 m2



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SECTION @ A-A

NAME OF WORK : CONSTRUCTION OF TRANSALATIONAL RESEARCH CENTRE AT CUSAT THRIKKAKARA CAMPUS

Plinth Area

GF	- 1380.15 m2
FF	- 1422.30m2
SF	- 1422.30m2
Total	- 4224.75 m2