



YENEPOYA

(DEEMED TO BE UNIVERSITY)

Recognized under Sec 3(A) of the UGC Act 1956

Accredited by NAAC with 'A' Grade

3.1.5 University has the following facilities*

Any other related documents

| Sl. No. | Content |
|---------|--|
| 1. | a) Descriptions about facilities |
| | b) Museums of Materials Used in Dentistry – A Review Article |

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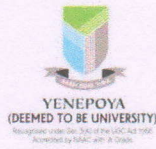
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DESCRIPTIONS ABOUT FACILITIES



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Research Facilities of Yenepoya (Deemed to be University) listed

In

Indian Science Technology and Engineering facility Map (I-STEM)

Linking Researchers and Resources

<https://www.istem.gov.in/institutions>

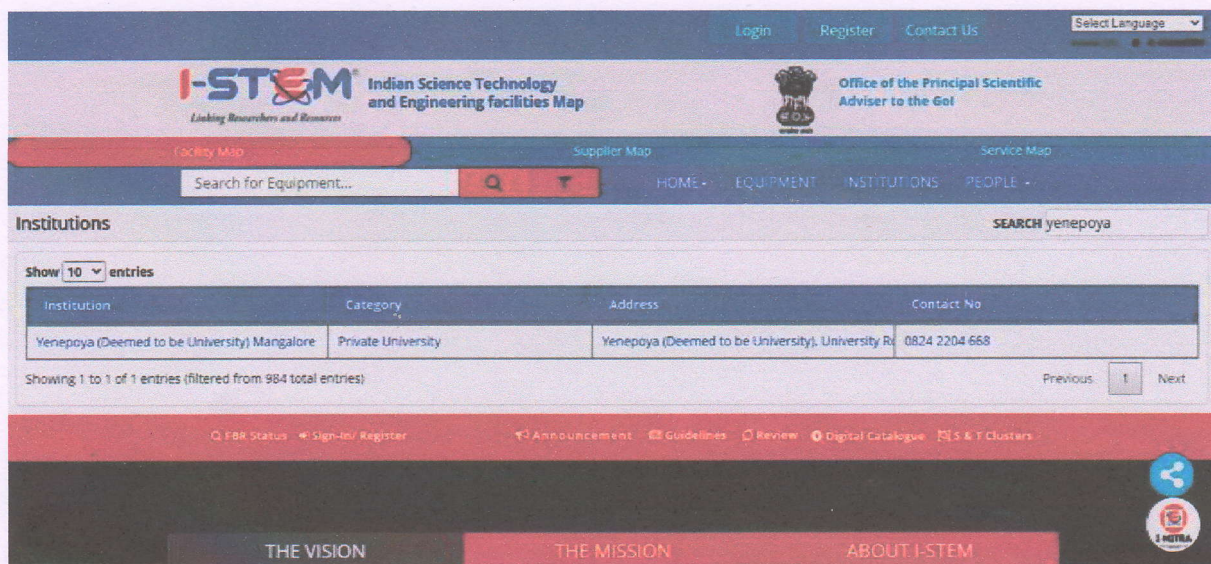
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About I-STEM

To vault in the R&D productivity and also to enhance the effectiveness of public investments on research, Government of India has introduced I-STEM portal. The I-STEM Web Portal: a National Portal that is the gateway for researchers to locate the specific facility(ies) they need for their R&D work and identify the one that is either located closest to them or available the soonest.

Yenepoya (Deemed to be University) also registered under this facility to extend some of the research facilities under resource sharing to encourage and ease the research.



The screenshot shows the I-STEM website interface. At the top, there are links for 'Login', 'Register', and 'Contact Us', along with a 'Select Language' dropdown. The main header features the I-STEM logo and the text 'Indian Science Technology and Engineering facilities Map'. Below this, there are navigation tabs for 'Facility Map', 'Supplier Map', and 'Service Map'. A search bar is present with the text 'Search for Equipment...'. The main content area is titled 'Institutions' and shows a search result for 'Yenepoya (Deemed to be University) Mangalore'. The table below shows the details of this institution.

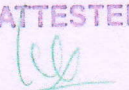
| Institution | Category | Address | Contact No |
|--|--------------------|---|---------------|
| Yenepoya (Deemed to be University) Mangalore | Private University | Yenepoya (Deemed to be University), University Road | 0824 2204 668 |

Showing 1 to 1 of 1 entries (filtered from 984 total entries)

Fig 1: Screenshot of the website showing Yenepoya (Deemed to be University)

List of Equipments available in the I-STEM portal from Yenepoya (Deemed to be University)

1. **FACS S3e Cell Sorter, Bio-Rad**
2. **Digital inverted fluorescence microscope, EVOS**
3. **Flow cytometer, Merck Millipore**
4. **Fluorescent microscope, Euromax**
5. **Brookfield Viscometer, Brookfield**
6. **FTIR-Spectrophotometer**
7. **Fluorescence Spectrophotometer, Hitachi**

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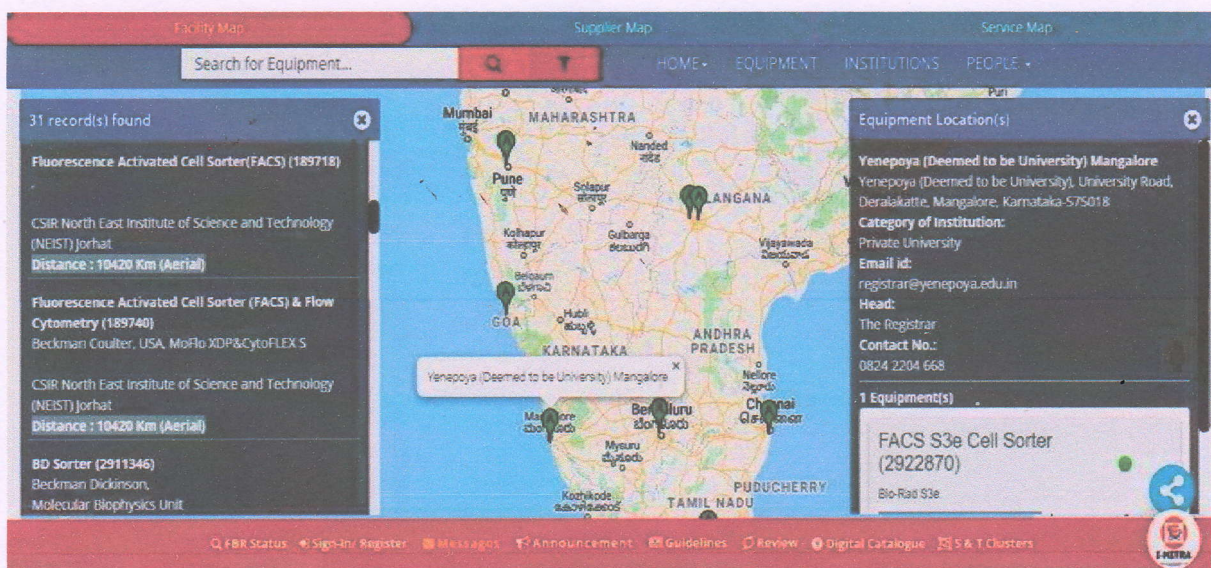


Fig 2. FACS S3e Cell sorter: <https://www.istem.gov.in/Equipment-Info/22870/FACS-S3e-Cell-Sorter>

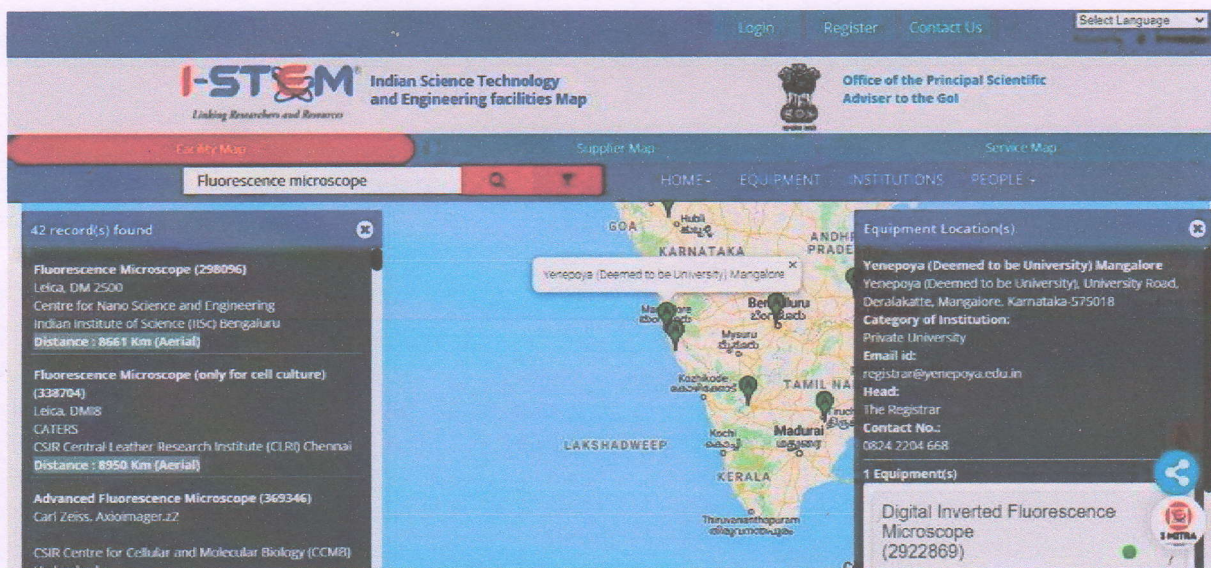



Fig 3. Digital inverted fluorescence microscope, EVOS:
<https://www.istem.gov.in/Equipment-Info/22869/Digital-Inverted-Fluorescence-Microscope>

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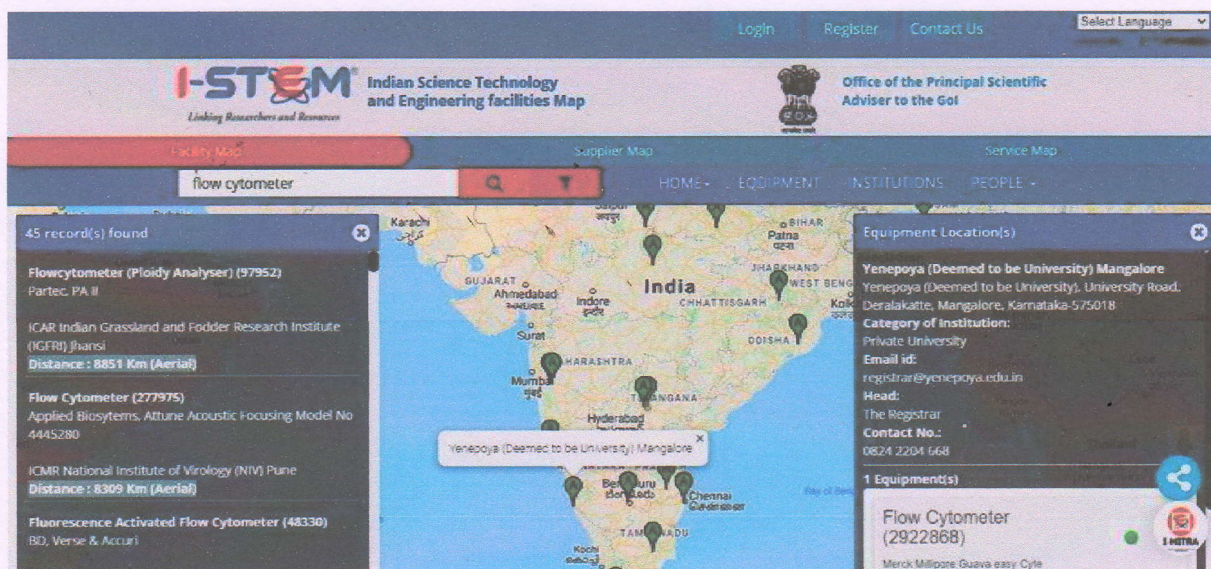


Fig 4. Flow cytometer, Merk Millipore: <https://www.istem.gov.in/Equipment-Info/22868/Flow-Cytometer>

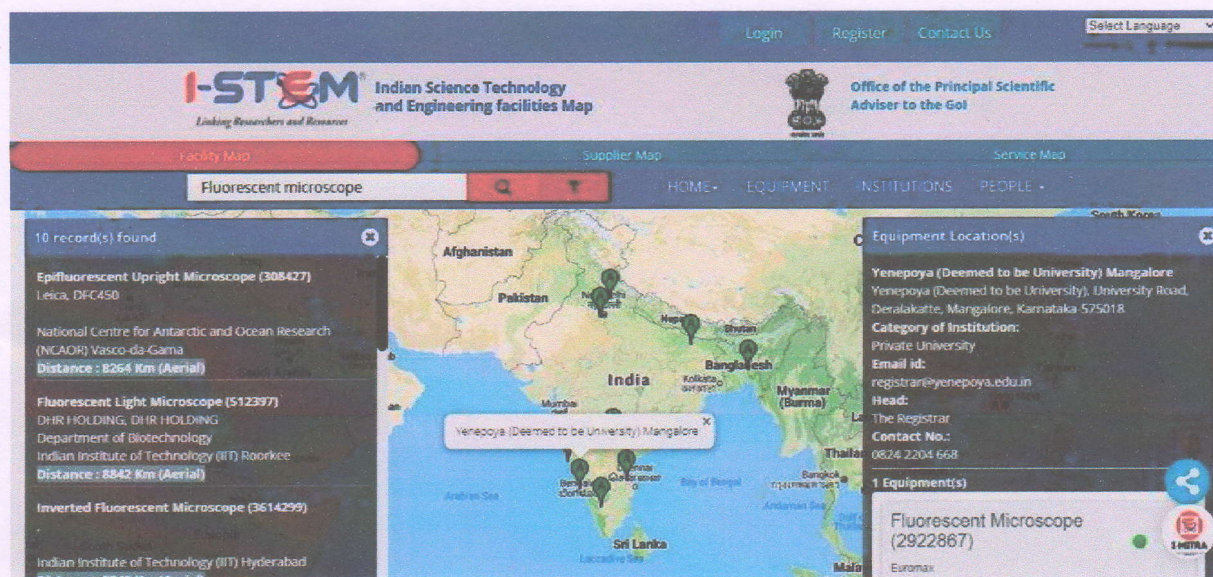



Fig 5. Fluorescent microscope, Euromax: <https://www.istem.gov.in/Equipment-Info/22867/Fluorescent-Microscope>

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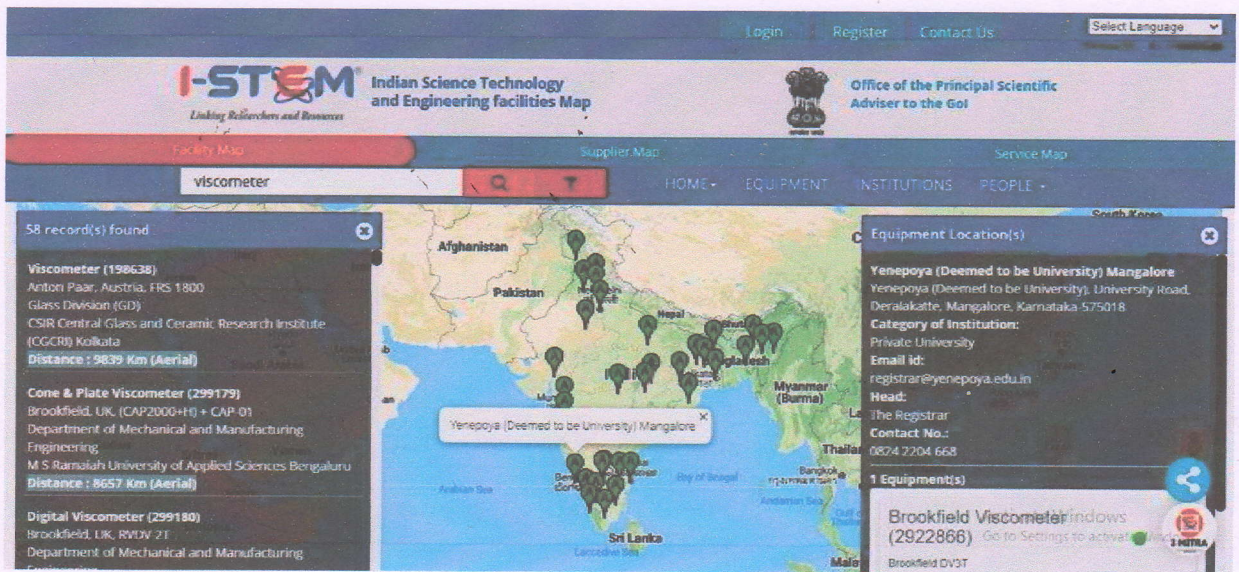


Fig 6. Brookfield Viscometer, Brookfield: <https://www.istem.gov.in/Equipment-Info/22866/Brookfield-Viscometer>

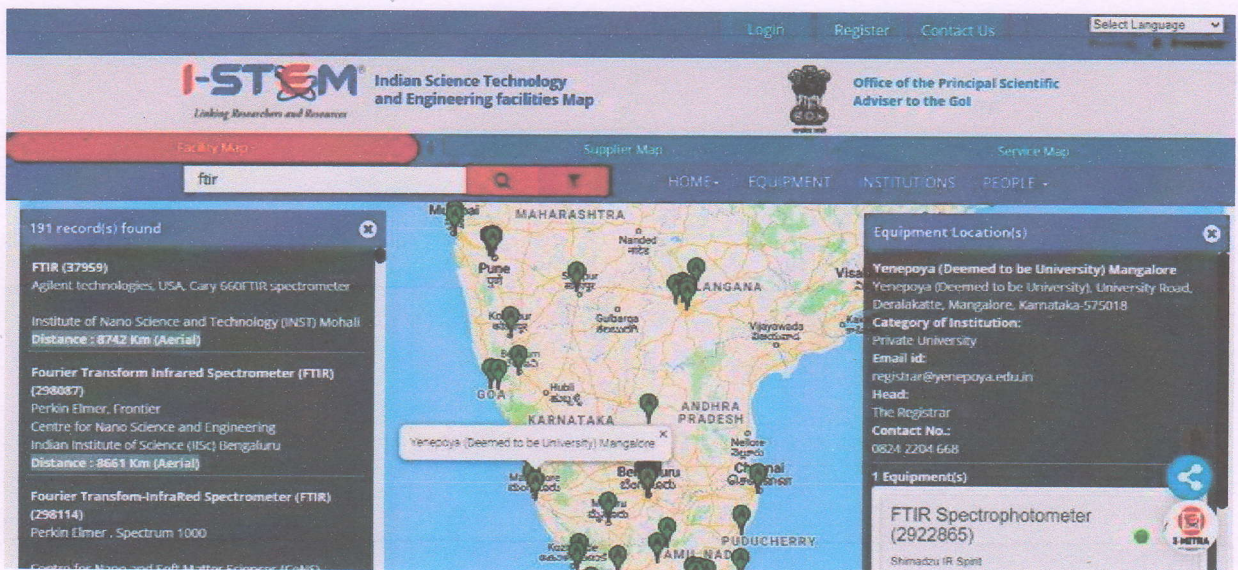
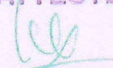
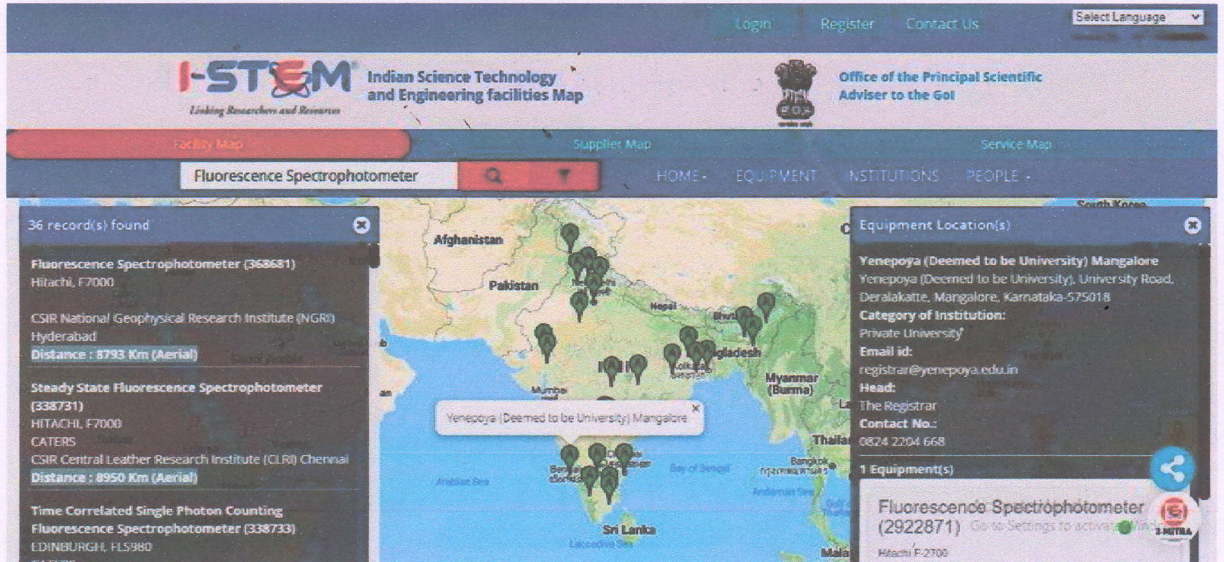


Fig 7. FTIR-Spectrophotometer, Shimadzu: <https://www.istem.gov.in/Equipment-Info/22865/FTIR-Spectrophotometer>

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The screenshot shows the I-STEM website interface. At the top, there are navigation links for 'Login', 'Register', 'Contact Us', and a 'Select Language' dropdown. The main header includes the I-STEM logo and the text 'Indian Science Technology and Engineering facilities Map'. Below this, there are tabs for 'Facility Map', 'Supplier Map', and 'Service Map'. A search bar contains the text 'Fluorescence Spectrophotometer'. The search results are displayed in a list on the left, with a map in the center showing the location of the selected equipment. On the right, a detailed information panel for the equipment is shown.

Search Results:

- 36 record(s) found
- Fluorescence Spectrophotometer (369681)
Hitachi, F7000
- CSIR National Geophysical Research Institute (NGRI)
Hyderabad
Distance : 8793 Km (Aerial)
- Steady State Fluorescence Spectrophotometer (338731)
HITACHI, F7000
CATERS
- CSIR Central Leather Research Institute (CLRI) Chennai
Distance : 8950 Km (Aerial)
- Time Correlated Single Photon Counting Fluorescence Spectrophotometer (338733)
EDINBURGH, FLS980
CATERS

Equipment Location(s):

Yenepoya (Deemed to be University) Mangalore
 Yenepoya (Deemed to be University), University Road,
 Deralakatte, Mangalore, Karnataka-575018
Category of Institution:
 Private University
Email id:
 registrar@yenepoya.edu.in
Head:
 The Registrar
Contact No.:
 0824 2204 668

1 Equipment(s)

Fluorescence Spectrophotometer (2922871)
 Go to Settings to activate link
 Hitachi F-2700

Fig 8. Fluorescence Spectrophotometer, Hitachi: <https://www.istem.gov.in/Equipment-Info/22871/Fluorescence-Spectrophotometer>

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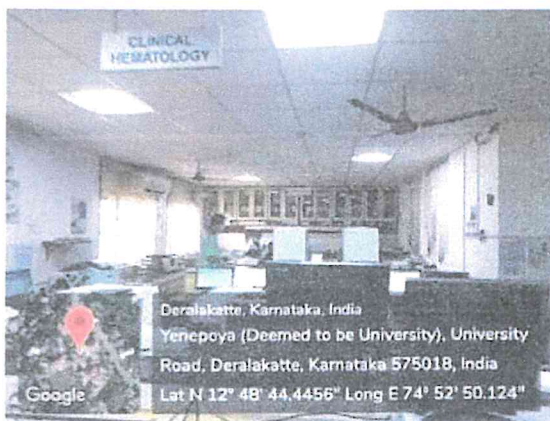
Yenepeya (Deemed to be University)

3.1.5 Facilities in the University

1. Central Research Laboratory/Central research facility

1.a. Central Research and Diagnostic Laboratory

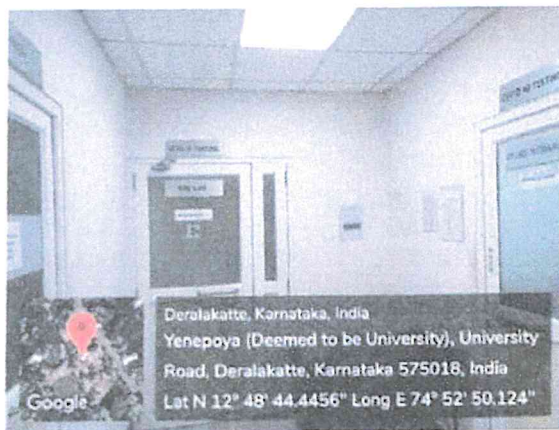
Central Research and Diagnostic Laboratory is established in 2000 at Yenepeya Medical College Hospital (YMCH). It has different sections including clinical hematology, clinical biochemistry, blood bank and pathology. Recently University also started the COVID-19 RTPCR testing lab in 2020. It is well equipped with high end imported instruments like fully automated cell counter, biochemical analyser, cooling centrifuge, refrigerators and deep freezers, microscopes, thermal cycler (RT-PCR) etc...



Clinical Hematology lab



Clinical Biochemistry lab




COVID-19 testing lab




COVID - 19 test procedure room

1.b. Central Research Facility / Yenepeya Research Centre

The Central Research facility has 1424.44 sq.mt. area and houses sophisticated next generation equipment's like Orbitrap Fusion Tribrid Mass Spectrophotometer and High Resolution Spectrophotometers to carry out Proteomics, Genomics, Metabolomics and Transcriptomics research. Centre also has facility for regenerative medicine (FACS), tissue engineering, computational biology and Biostatistics, Molecular Microbiology, Cell culture and toxicology related experiments.

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Yenepoya Research Centre (YRC) was established in 2008 in Yenepoya University. YRC strives towards strengthening the research activities, establishing the research facilities and building capacity among students and research scholars. The centre has the major aim of engaging in high-quality research activities in the interdisciplinary/multidisciplinary areas and training human resource to take up research studies to meet contemporary challenges.

The research centre has been nurturing several PhD scholars, with alumni having placements in established national and international organizations. In fulfilling its objectives, it has established a state of the art facilities for carrying out research in the forefront areas of proteomics, molecular medicine, stem cell and regenerative medicine. The centre with its internationally trained faculty having multidisciplinary expertise is involved in research and training in emerging areas of the biomedical field.

Research areas

Biotechnology, Toxicology, Cancer Therapeutics, Stem cells and regenerative medicine, Bioinformatics, Nanobiotechnology, Genetics and molecular biology, Infectious diseases, Neuropharmacology, Polymers for drug design, Application of statistics in research, Image analysis and machine learning, Omics technologies and molecular diagnosis, Cell signalling, Disease biology, Systems biology, Molecular medicine and Novel biomarkers.

Facilities available

- Mass Spectrometer for proteomic (Orbitrap Fusion Tribrid)
- Mass Spectrometer for MRM (AB SCIEX QTRAP 6500 – ACA Mass Spectrometer)
- Fluorescence Activated Cell Sorter (FACS S3e cell sorter- Bio-Rad)
- Guava easy Cyte Flow Cytometer with two laser and six colours
- RT- PCR / Regular Thermocycler
- Gel Documentation system, multimode multiwall plate readers, spectrophotometers
- CO2 incubators
- Class II, Type A2 Biological Safety Cabinet of various capacities
- Ultra - High Performance Liquid chromatography System (U-HPLC SYSTEM)
- Advanced microscope and imaging systems
- Ultra deep freezers and other laboratory equipments
- Animal housing facilities (with IVC system)/ Imaging/histology and immunohistochemistry facilities

1.b.1. Centre for Systems Biology and Molecular Medicine (CSBMM)

The Center for Systems Biology and Molecular Medicine (CSBMM) at Yenepoya Research Centre has State-of-the-Art mass spectrometry facilities and houses several researchers with expertise in global proteomic and metabolomic analysis.

CSBMM provides proteomic and metabolomic services listed below:

1. Identification of proteins in gel bands/spots, in solution, and IP pull-down samples
2. Global proteomic analysis
3. Global metabolomic analysis
4. Quantitative proteomic analysis – label-free as well as TMT-labeling based
5. Targeted proteomic analysis by MRM/PRM protocols

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6. Analysis of post-translational modifications – phosphorylation, acetylation, ubiquitination, methylation, succinylation

1.b.2. Stem Cells and Regenerative Medicine Centre (SCRMC)

Stem Cells and Regenerative Medicine Centre (SCRMC) was established in the Yenepoya (Deemed to be University) for basic and translational research in this area. SCRMC is passionately committed to work towards respective research findings eventually leading to cell therapy products for degenerative/non-communicable diseases and cancer. Second goal of SCRMC is to develop highly talented pool of scientists who believe and are committed towards the mission of SCRMC.

1.b.3. Nano Material Research Lab (NMRL)

NMRL is mainly interested in the development of paper-based nanobiosensors for clinical and environmental applications, and synthesis of nano-carbon materials, photoluminescent nano-carbons, graphene based materials, core-shell nano-crystals and studying their various applications in bio-imaging, catalysis, drug delivery and electroanalytical chemistry. In addition, fabrication and development of versatile biosensors for clinically important biomarkers using nanotechnology and modern electronics tools.

This young group with six graduate researchers with Biochemistry, Microbiology, Chemistry, Electronics and Biotechnology background. We also work with our hospital clinicians (Yenepoya Medical College Hospitals) for development of affordable sensors to address geriatric health care, neonatal sepsis and bio-compatible nano-materials for glaucoma management.

1.b.4. Polymer Nanobiomaterial Research Laboratory (PNRL)

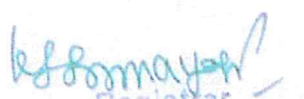
The Polymer Nanobiomaterial Research Laboratory at Yenepoya Research Centre, Yenepoya (Deemed to be University) focuses on the development of functional polymers for broad range of applications in material science and biomedicine. Specific interest focused in the design and synthesis of bioresponsive polymeric architectures, polymeric prodrugs, polymer nanogel/hydrogels by utilizing synthetic chemistry and modern macromolecular synthesis tools. The self-assembly of macromolecules into functional nano-scale particles with controllable shapes, sizes and properties are investigating for various biomedical applications.

1.c. Centre for Ethics

Established in April 2011, the Centre for Ethics at Yenepoya University will foster a renaissance movement in the field of ethics thereby leading to a paradigm shift in the approach of the various stakeholders towards ethics in health care and research and enrich the curriculum of other academic fields.

The Centre for Ethics, Yenepoya deemed to be University will

- Promote ethical concepts among the various stakeholders in the University, and foster a sense of ethical practices that will enhance the quality of health care.
- Train interested individuals in the fields of Bioethics, Medical Ethics, Health Care Ethics, Clinical Ethics, Research Ethics and other interdisciplinary areas, empowering them with skills necessary for resolving ethical problems.


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- Give support to clinical staff in the form of clinical ethics consultation
- Encourage trans-cultural explorations of ethical practices and will assist the stakeholders in accepting every view point, however digressive.
- Provide a platform for interdisciplinary dialogue in ethics and thereby promote the national values of professional and ethical leadership.
- Explore the possibilities of conducting research in different fields of ethics and encouraging collaborative research.
- Seek out similar centres/departments and enter into partnerships with them for a broader interaction and cooperation

1.d. Center for Nutrition Studies

Established October 2017, the Center for Nutrition Studies at YenePOYA (Deemed to be University) aims to foster nutrition related activities relevant to India. Problems of nutrition are the largest single contributor to the burden of disease both at the global level and at the national level. There is need for any academic institution to engage with nutrition as a core and cross-cutting issue with a focus on research, capacity building and evidence-based inputs for policy. The Center for Nutrition Studies is being launched to address this need. The faculty at the Center has generated a body of research over a decade, which has proved that undernutrition in adults in India is the most important contributor to over half of new cases of tuberculosis and is a significant contributor to the high number of deaths occurring in patients with TB. This work has informed policy at a national level, leading also to the government's initiative in launching a direct benefit transfer scheme for all TB patients to enable access to a better diet. The Center is engaging with Ministry of Health and Family Welfare, UNICEF, National Center for Excellence and Advanced Research on Diets (NCEARD) in field of Maternal Nutrition advocacy, implementation, policy and planning.

2. Animal House / Medicinal Garden /Museum

2.a. Animal House: ASSEND and small animal house

2.a.1. ASSEND – Advanced Surgical Skill Enhancement Division

ASSEND started with the view to enhance the surgical skills for the budding surgeons. In current century minimal invasive surgeries are gaining upper hand day by day. The reasons behind this are minimal incision, fast healing, less tissue damage, less or no identifiable scar, less post op care and early discharge from the hospital.

In ASSEND the minimally invasive surgical techniques like Robotic, in collaboration with Intuitive surgical private limited and Laparoscopic surgical skill training, Transplantation techniques with respect to Liver and Kidneys are also being imparted. After getting the clearance from the Government of India, we started our first program on 12th June 2019. Till 8th March 2021 a total of 30 laparoscopic training sessions are conducted, out of which 3 programs were in collaboration with Verwandeln Institute, Kochi, and more than 150 surgeons from various parts of India and one from UAE have attended. On 23rd of October 2019 our first robotic skill training program was started. Till 8th March 2021, a total of 17 training programs have been conducted and in each training single surgeon has been trained.

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Currently we have approval for 5 training protocols under laparoscopic surgery, robotic surgery, liver transplantation, renal transplantation, ARDS model. This unit is under the direct supervision of our Vice Chancellor Dr. M. Vijayakumar, who is a senior surgical oncologist

2.a.2. Small animal house

Yenepoya (Deemed to be University), a teaching and research institutional with many postgraduate and doctoral students performing research on animals. As per the CPCSEA (Committee for the Purpose of Control and Supervision of Experiments on Animals) norms, the Institutional Animal House is registered (CPCSEA Registration No:- 347/PO/Re/S/01/CPCSEA & CPCSEA Reg. No. 347/PO/ReBi-S/Rc-L/01/CPCSEA) with Government of India. The Institutional Animal House has separate housing rooms for each species of experimental animal (rats, mice, rabbit, Guinea Pig, etc), acclimatization, washing, and storage rooms as per the norms of CPCSEA, Government of India. Institutional Animal Ethics Committee (IAEC) has been constituted to supervise and evaluate all aspects of the animal care. IAEC Ensures that quality and consistent ethical review mechanism for biomedical research in animal is put in place for all proposals dealt by the Committee. IAEC is also responsible for reviewing Form - B, form - C and Form- D. Before research involving animal can be undertaken, the project will have to be reviewed and approved by the IAEC.

2.b. Medicinal plant garden

The Dravyaguna Department of YAMCH has a prestigious Herbal Garden spread out in an area of 11452 sq. mt. The herbal garden is actually a gene-pool with more than 213 species of rare and endangered medicinal plants, shrubs, trees, climbers and ornamental plants like Rudraksha (*Elaeocarpus sphaericus*), Lakshmana Phala (*Annona muricata*), Ashoka (*Saraca Ashoka*), Ishwari (*Aristolochia indica*) etc., collected by conducting extensive surveys. These efforts also include certain hitherto unexplored tribal pockets, which are treasure troves of Herbal wealth.

Herbal Garden and a Herbarium of these collected plants serve as a centre of excellence to Ayurveda Doctors, Students and Research Scholars of various faculties and provide awareness to the public about our rich Herbal heritage. Highest Standards and Protocols are followed to ensure the Efficacy, Safety and Purity of our Herbs. Several rare and endangered species form a major part of our Herbal collections.

From time immemorial, various medicinal herbs are being used commercially for preparation of medicines. Needless to say those medicinal plants have wonderful curative and prophylactic uses but such plants being grown in and around our living places are off late being neglected.

We are planning to carry out promotional activities related to Medicinal Plants, by preserving a big herb garden as well as herbal nursery and growing huge numbers of medicinal plant saplings in order to distribute to the common public at nominal prices. We are committed to bring back the fading fauna and flora of Dakshina Kannada back to its bygone glory by preserving herbs of the region

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This includes initiation of programs for promoting the cultivation of medicinal plants and trees. The emphasis is given to preserve the rare species of medicinal plants which are on the verge of extinction.

2.c. Museums

All the Pre and Para clinical departments have state of art museum with collections of gross specimens, models, charts, photographs, transparency slides and other exhibits.

A Medical Illustration & Photography unit in the college is assisting the departments to develop exhibits, charts, models etc used as aids in the teaching of UG PG students and others.

3. Media Laboratory/Business lab/E-resource facilities

3.a. Media Laboratory

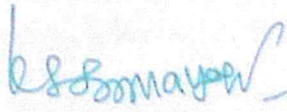
YENMEDIA Production Studio (Media Lab) provides equipment, workspace and software for students and faculty to shoot, edit and produce digital projects. Media Production Studio (Media lab) offers a number of multimedia workshops, covering topics from video editing, screen capture recording, collaborative multimedia tools, and many more and different courses will be conducted through YEN MEDIA.

YENMEDIA is also an initiative to undertake public health care through health awareness. This is the grass root level health project to improve community health & youth development through social media network. The team in the YENMEDIA project committed to educate public & young generations on drug abuse, STD's, maternal & child health care, skill development, first aid training etc. In this current generation, the antisocial events are increasing in an alarming rate. So it's our responsibility to make ourselves and others lead the right path and live in this society with peace and harmony. The Video and Audio Content in an organized form is made available to the YENMEDIA center for e- content development. The Center maintains Audio/Video quality required for the production of e-content. Computer is made available to students for research purposes and to gather information from various sites on the internet, online videos and discussion groups. Specialized class rooms with projectors have been designed for "brain-storming" sessions for the students. Details of the infrastructure are as follows


3.a.1. Aurora Yen Media Studio:

It is equipped with 7 high-definition (HD) video cameras and still cameras for photography. Non Linear Editing with editing software and hardware, Card Reader, Studio Cool Lights, Memory Card Tripod and slider, DSLR Stabilizer and Audio Recorder are available. Studio also provide Projection screen, LED Projector, sound system with 7.1 channel DTS surround sound system and sound proof hall

3.a.2. Recording studio helps to record audio lectures.


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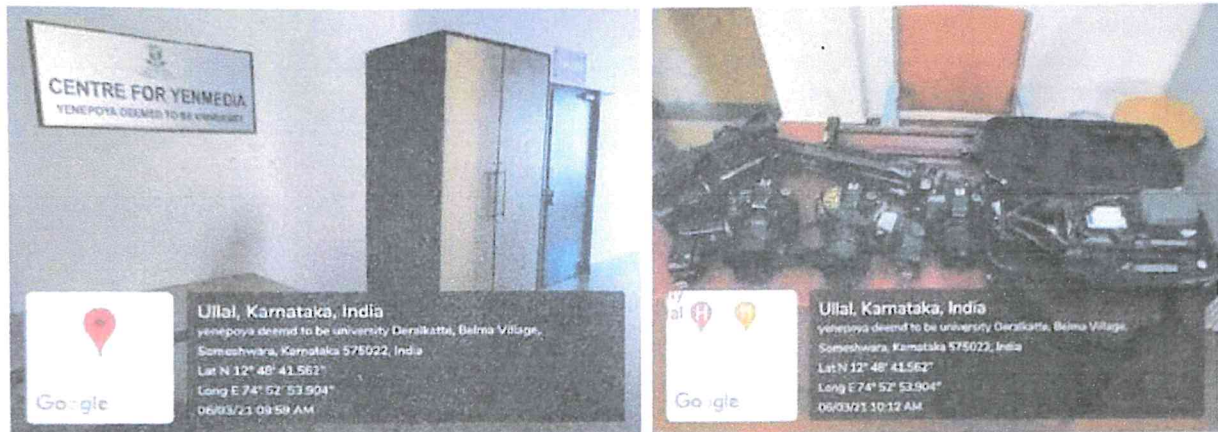
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3.a.3. Multimedia Laboratory:

All computers are equipped with the latest software for print, graphics, web, audio and simple video production.

3.a.4. Preview Theater

The Preview Theater can be used for the projection of recorded lectures and also for the video conferencing of the lectures. Theatre also has seating capacity of 125 Seats.



3.b. Business lab

Yenepoya Foundation for Technology Incubation (Business lab) is an initiative of Yenepoya (Deemed to be University) aimed towards identifying, fostering & mentoring innovators/entrepreneurs in the healthcare innovation process. It was incorporated in May 2019 with an aim to accelerate the growth of healthcare innovation and entrepreneurial ecosystem and is registered as a Section 8, not for profit organization. The incubator is strategically well placed within the vibrant ecosystem of the University leveraging on the infrastructure and expertise in the areas of Medicine, Dentistry, Public Health, Life Sciences, Biotechnology, Engineering and Management.

The incubator is supported by Department of Biotechnology - BIRAC under National Biopharma Mission for the establishment of Medical Devices Design and Rapid Prototyping Facility. The MedTech Design and Rapid Prototyping facility houses high end instruments for 3D Printing, CNC Machining, Bioprinting, PCB Fabrication, Vacuum Casting, etc. The 3D printers available at the facility will include FDM, SLA, SLS and SLM (Metal), along with high-end 3D scanners. The facility offers wide array of services which includes, Clinical Need Validation, Industrial Product Design, fabrication of thermoplastic, polymer and metal-based parts/products, Bioprinting/Tissue Engineering, PCB fabrication, Electronics Prototyping, Application Development and Product Validation.

The incubator has been recognised as one of the centres by BIRAC under Social Innovation programme for Products: Affordable & Relevant to Societal Health (SPARSH) scheme and will support 10 Social Innovators to work on the areas of Maternal and Child Health and Ageing and Health. During this fellowship, fellows will follow a structured approach wherein

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they will discover unmet clinical needs of societal relevance, design and develop affordable and scalable products and solutions with the guidance of mentors from Clinical, Technical and Business expertise.

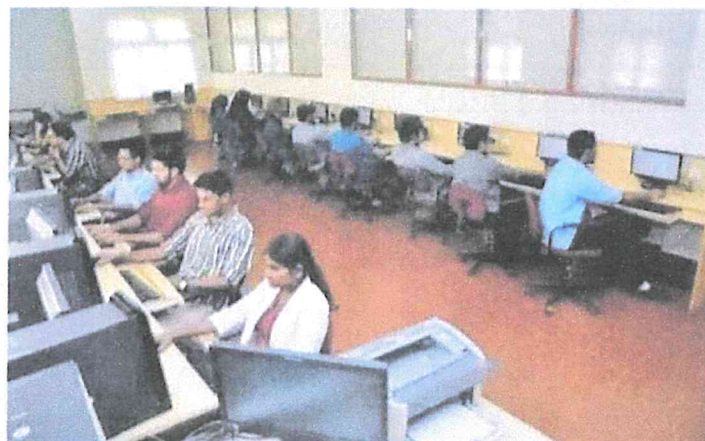
Also, the incubator has recently been supported by BIRAC for establishment of Early Translation Accelerator (ETA) in the area of healthcare and medical devices. The ETA focuses on catalysing transformation of young academic discoveries (publications/patents) with possible commercial and societal impact into economically viable ventures and technologies which will enable it to be further taken up by the industry for development and commercialisation.

Two faculty innovator teams associated with Yenepoya Technology Incubator have received Biotechnology Ignition Grant (BIG) projects from BIRAC with grant amount around 50 Lakhs each.

3.c. E-resource facilities

3.c.1. Digital library

The Yenepoya Central Library has 2406sq.mtrs area with 480 seating capacity with separate seating place for U.G., P.G., Research Scholars and Faculty. The library has 39,000+ books collections, 300+ subscribed print journals (national and international) and e-resources including full text and the bibliographical online database for health & allied science and other various subjects. The library has fully library automated and Online Public Access Catalogue (OPAC) provides a search window to the library collection. The Digital Library module enables storing of information in digital form and providing easy access to the resource. The library has a computer lab for access e-resources and e-learning centre for online training and online examination purposes. The library user's entry can be tracked through the biometric system.



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[Signature]

3.c.2 Yengage

The E-Learning centre was established in the year 2011. "Yengage" the E-Learning portal for Yenepoya University was setup by the Information Technology Section to support ICT based learning for students of Yenepoya University. This is an online service which

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facilitates the students, staff, tutors and management, a friendly and interactive environment, which will enable better learning by providing study information and learning content anytime anywhere.

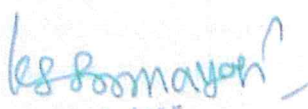
E-learning exploits interactive technologies and communication systems to improve the learning experience. It has the potential to transform the way we teach and learn across the board. It can raise standards, and widen participation in lifelong learning. It cannot replace teachers and lecturers, but alongside existing methods it can enhance the quality and reach of their teaching, and reduce the time spent on administration. It can enable every learner to achieve his or her potential, and help to build an educational workforce empowered to change. It makes possible a truly ambitious education system for a future learning society. E-learning also help improving the learning skills and making our students more competent to live in this information driven age.

Yengage is an official E-Learning portal for Yenepeya University.

At our university dedicated course content area is provided for easy access based on the year, course and department. Registered students get secure and free access to course. Faculty authors the content and keeps the course content and presentations ready before the class session is conducted. Students can access this content later from home and hostels. At the end of day the faculty would post one or more questions based on current day's class topic. Students would reply to these questions in an online forum which is evaluated by the faculty before the next class session. As the topics are completed, an online test is conducted in a dedicated 'E-Learning center' where all students would answer the test and real time evaluation and result posting is done by the system. Assignment submissions and links to external resources such as useful content posted by other universities and online steaming of video are provided. Currently I, II & III MBBS and BDS courses utilizing Yengage (e-learning). PhD and Center for Ethics programs currently making full use of e-learning platform.

Yengage programme highlights

- Course Content: Upload and manage the course content in any file format.
- Groups: Make and manage multiple groups within the groups or course.
- Forums: Ask and answer for questions, publish ideas, get peer opinion and feedback. Discuss on topics covered in class room.
- Manage Media: Share media between members. Build your own media pool or a digital library.
- Online Tests: Create and participate in online tests, get evaluated automatically and post results.
- Feedback Forms: Create and participate in online surveys and feedbacks. Get automated feedback results during seminars, class room sessions.
- Online Calendar: Manage your personal and course calendar. Synchronize course calendar from multiple departments you are part of. Synchronize Yengage calendar with your personal email calendar.

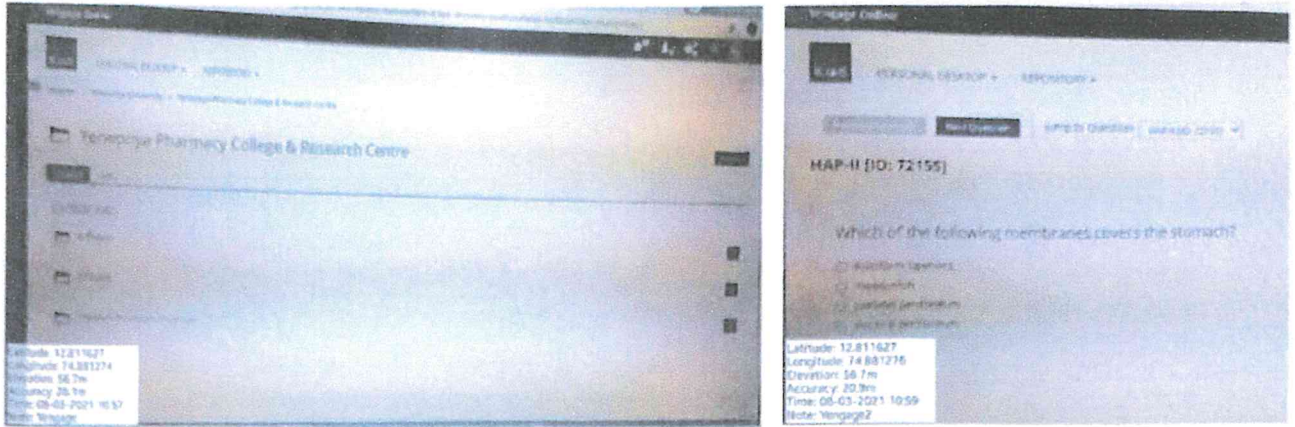

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Currently e-learning center caters to about 2000 students online.



3.c.3. EMR (Electronic Medical Record) Training

E-learning center undertakes on job training on usage of Electronic Medical Record keeping which is essential part of any medical hospital abroad. The EMR modules also becoming an important and required feature in Indian hospital environments too. So e-learning center at Yenepoya University started the training on EMR modules for our medical interns and the post graduates as an add-on course.

Yenepoya University received a National Award ('Certificate of Excellence' by e-INDIA Awards) for the innovative training programme on HIMS.



4. Research/Statistical database/Health informatics

4.a. Research/Statistical database

Statistical Package for Social Sciences (SPSS) is computer software that allows users to enter data, perform statistical tests such as parametric and non-parametric tests and draw graphs. Moreover, the software is user-friendly, easy to learn and compatible with a personal computer/laptop. It is therefore preferred statistical data analysis software among students and professional researchers due to its numerous modules. SPSS software importance in analyzing data since it is capable of analyzing a large amount of data. Yenepoya (Deemed to be University) has qualified Biostatistics department with experts for providing guidance and conducting continuous hands on training for faculties, researchers, students and supporting scholars in diverse health care research and academic fields to produce high-quality dissertations and theses. Use of latest version 24.0 SPSS, Graph pad Prism 8.0 for data

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analyses made a difference in applications of SPSS and use of latest technology/software for improving the quality of research.

4.b. Health informatics

Information Technology enabled Health and Demographic Surveillance System (HDSS) is ready to implement in rural and urban areas under our university. The title of the project is "Kutumba Aarogya Sarvekshana Hagu Rakshana Yojane to establish IT platform and develop health and demographic surveillance system for continuity of care". HDSS is a method of comprehensive data collection focusing on population of a defined geographical area. Initial survey followed by repeated follow-up at defined intervals to the family and special groups.

Salient features of the IT enabled HDSS:-

1. *Decision support mechanism:* - At the end of enrolment of the individuals and at after completing the data capture at every visit it generates summary report highlighting the risk factors and health related alerts. Which will empower the field staff to make decisions regarding referral and appropriate health advise

2. *Scheduling of visit :-* As a part of HDSS all the families and individuals will be visited once a year, adults more than 30 years and individuals with HT and DM will be visited twice a year, antenatal, postnatal mothers and under five children will be visited as per the health program guidelines. This IT platform will schedule the visits of the families and individuals as per the requirements.

3. *Dashboard:* - Will enable to navigate into a particular program and start capturing the data. Dashboard will show the scheduled and overdue visits.

4. *Report generation:* - We have developed this program such a way that it will generate several reports for decision making and appropriate health interventions.

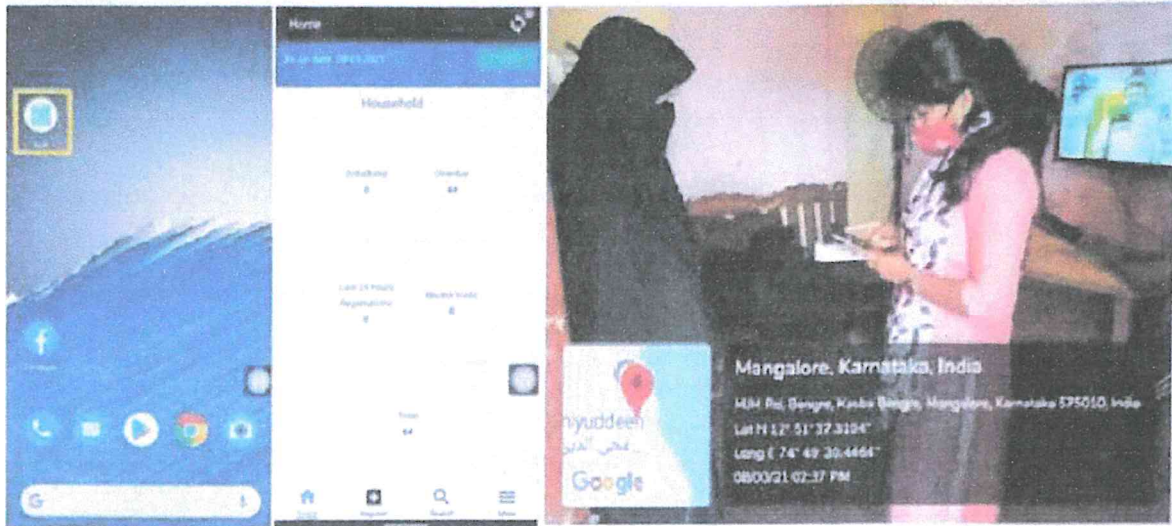
5. *Longitudinal data:* - This platform will help to manage the longitudinal data. We can study the trends over a period of time. It provides line listing of data. We can manage, view and download several indicators with respect to all study area or any defined area under study for defined duration. The programs developed by us with technology support from Samnway foundation (Household (family), Individual, NCD risk factors, Diabetes & Hypertension, Pregnancy Program and under five children) as a part of this HDSS can be made available to other institutes by signing a MoU with our university at some cost


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5. Clinical Trial Centre


Clinical research/ trial is a branch of healthcare science that determines the safety and effectiveness (efficacy) of a drug, biologicals, vaccine, device, diagnostics and treatment regimens intended for human use. These may be used for prevention, treatment, diagnosis, screening or quality of life.

Clinical trials are a kind of clinical research designed to evaluate and test new interventions such as psychotherapy or medications.

The Clinical Trial Centre was set up by the University in 2018 (vide letter dated 15.12.2018, ref: Y/REG/ACA/Clinical research/ 2018). The centre has conducted clinical trials in the areas of cardiology, respiratory medicine, dermatology, diabetes and associated conditions. The centre has completed 2 studies, 2 studies have completed recruitment and currently 2 ongoing and few upcoming. There are currently 3 employees, one site coordinator and 2 study coordinators. It is currently situated in the 5th floor of the EMD building of Yenepeya Medical college hospital.


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MUSEUMS OF MATERIALS USED IN DENTISTRY - A REVIEW ARTICLE

Museums of Materials Used in Dentistry: Our Experience and Literature Review

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Abstract

There are museums in every branches of science and technologies as well as in many other fields of fine arts, sculpture, etc., serving the societies in acquisition of deeper knowledge. However, no serious attempts have been made to establish such museums in dental sciences. The aim of this article is to create awareness of the importance of the museums in the dental institutions and to provide resource for research in different specialties. The objective is to expose our unique experiences in this area which helped the students to improve their knowledge of the dental sciences and the public dental health awareness. The methods adopted were collection of large numbers of samples, fabrications of models, charts, etc., for teaching curriculum and public education and presenting them with suitable classifications. Results of this vast effort and pains taken are very much appreciated and encouraged by the visiting dentists, dignitaries, school children, and the public. Museums of dental materials should be inseparable parts of the dental teaching institutions and are very essential for the dental students and educating the societies on dental health awareness.

Key words: Dental health awareness, dentistry, museums, resource for research, veterinary dentistry

INTRODUCTION

Museum is defined as a nonprofit permanent institution in the service of society and its development, open to the public, which acquires, conserves, researches, communicates, and exhibits the tangible and intangible heritage of humanity and its environment for the purposes of education and enjoyment (International Council of Museums).^[1] According to Frank Oppenheimer “for many people science is incomprehensible and technology frightening.”^[2] There is thus a growing need for an environment, in which people can become familiar with the details of science and technology. The purpose of a science museum and an exploration center would be to satisfy this need.^[2] Informal learning in science museums can be a major contributor in promoting public understanding of science as museums are one central medium in communicating central scientific ideas.^[3] Pedretti has highlighted the spaces for dialog or discussion terminals, which enhance the spirit of inquiry and allow for free exchange of ideas on the topics with the visitors.^[4] Knipfer has elaborated the importance and need of a discussion terminal in science museums.^[5] It could be valuable and entertaining for the public and would serve as a resource to schools and existing

adult education programs.^[2] Incorporating the recent museum technologies, museums have been developed, in anatomy, pathology forensic medicine, etc., Anatomy department is also known by its museum in medical institutions where human body parts organ, soft parts, and hard parts are presented in many ways by mounting in formaldehyde solution in acrylic jars, and special techniques have been developed for mounting the specimens.^[6] Pulvertaft has reviewed many museum techniques, especially used in pathology museums.^[7] Suarez and Tsutsui have discussed the value of museums with regard to various studies on public health and safety, environmental contaminations, agriculture, biological invasions, global climate changes, etc.^[8] There are many varieties of museums in engineering technology, historical excavations, fine arts, architecture, evolutions, etc., almost in every area.

In 2002, the Dr. Samuel D Harris National Museum of Dentistry had arranged a dental exhibition at the University

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of Maryland's Medical and Dental Centre in Baltimore. The contents of the exhibits were photographs, charts, artifacts, memorable, etc. The materials were mostly related to the African-American activities in dental education research, patient care, general practice, dental specialties, military service, and public health.^[9]

The first Veterinary Dental School established in Lvon, France was the first step in this area, and books on this subject were published in 1905, 1938, etc. The American Veterinary Dental College determines the guidelines and conditions for the certifications.^[10] A good museum of skulls and teeth of various animals is required for introduction of P. G. course in this specialty.

Realizing this wide lacuna in the field of dentistry, building up of a museum of teaching models and materials was initiated by the newly established Department of Science of Dental Materials at the College of Dental Sciences, Manipal (India), in 1976. With the rich experience gained, a similar one was later (1999) developed with many innovations at the Yenepoya Dental Institution (Yenepoya University, Mangalore). With excellent support and encouragement from the Chancellor and the authorities, it was possible to develop our unique "learning laboratory." This has been acclaimed as perhaps the best and most useful contribution to the society at large by all visiting dentists and dignitaries. The authors want to share their experiences and experiments on this noble idea with other dental institutions [Figure 1].

Aims and objectives

Present and future dentistry requires deeper knowledge of basic sciences and information regarding the latest innovations of materials as well as technologies for updating the clinical skills of dental practitioners [Figure 2]. The recent knowledge explosion in science and technologies has resulted in causing the presently used dental materials, technologies, and clinical methods become outdated very soon. Accordingly, the subject curricula to be studied are also frequently modified. In addition, the community dentistry subject is given much importance in view of promoting the oral health awareness in society and children. The time has come for establishing museum of all the materials used in dentistry earlier, at present and updating it continuously, in every institution for dental sciences. The aim is also to create dental health and clinical treatments awareness

in the public and school children with the excellent systematic presentation of these, along with attractive colorful pictures of materials, literature, wall-posters, history of evolution stages of clinical procedures, etc. Such a well-planned developed museums become, learning laboratories for students, an excellent resource for researchers and promote dental health awareness in society. A separate section on skulls and teeth of animals has been developed which is helpful to establish specialty course in veterinary dentistry.

METHODOLOGY

Collection of samples

Collection of samples of the materials of many varieties was the first stage. This cannot be done overnight in case old materials and antiques. Since these are not available for purchase, one has to contact many elderly private dental practitioners, old clinics, dental laboratories, and dental institutions. These constitute an important aspect of a museum, required for systematic studies on the development of various materials. However, samples of all the presently used materials can be easily purchased. Similarly, very attractive transparent, semitransparent, or opaque teaching models of any desired color showing the internal structures can be secured from outside. These also can be fabricated likewise by the dental technicians with the available polymer resin techniques in the dental laboratories.

Presentation

Presentation of these materials in an attractive manner is a very important aspect. Depending on the space available, suitable glass showcases are to be designed to get maximum exposure of the materials at the eye level of the visitors, to minimize the eyestrain. Adequate illumination is to be provided. Corresponding literature, attractive brochures, relevant colored pictures of materials, and clinical treatment procedures are made easily available. All the presented articles should be suitably labeled. Details and the latest literature available should be supplemented. A library of required reference books and journals should be made easily accessible.

Classification

Classifications of materials and models are done suitably to reach them easily and quickly. The classification can be done in different manners depending on the main purpose of the museums. For example, if it is mostly used by students of dentistry, various materials, their applications, and relevant models should be presented in the sequence of learning,



Figure 1: External view of museum of dental materials in Yenepoya Dental College, Yenepoya University, Mangalore.



Figure 2: Internal view and presentations of materials and skulls in various showcases.

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i.e., subject wise, as arranged by us in the following order [Figure 3]:

- Structure, properties of matter, and testing (samples) methods
- Cast and die (auxiliary) materials
- Impression materials, verities of impressions and techniques
- Polymer resins used for dentures, miscellaneous techniques, stages of their fabrications, defects, and porosities
- Waxes: Auxiliary materials
- Metallurgy: Ores, samples of metals and alloys, appliances, and charts of their properties
- Noble and base metal alloys, steps of casting procedures
- Conservative restorative materials, cements, silver amalgam alloys, composite resins, varieties of cavity cuttings, root canal treatment materials, etc.
- Ceramics, metal-ceramics, and steps of fabrications
- Materials used in orthodontia: Active and reactive appliances, solders, and fluxes
- Implantology materials and techniques
- Cutting, abrasion and finishing materials, and instruments
- Miscellaneous items, such as antiques, dental chairs, equipments, and materials
- Charts regarding the compositions, properties, and applications of all the materials
- Power points, recordings of video and audio descriptions of the items
- Wall-posters highlighting the dental problems and health hazards
- Steps of clinical procedures to be followed
- History of evolution of dentistry
- Discussion terminal.

Public dental health education

For educating the patients, school children, and public visitors, that is, for public health dentistry, more attention is to be given to exhibit the models and materials, along with wall-posters, related to the clinical situations, treatments,



Figure 3: Presentations of materials in various showcases.

common cases of before and after treatments of restorations, surgical interventions of trauma, accidents, oral cancers, cleft palates, implants, etc. Video and audio recordings of these items can be projected at the rural dental treatment camps in the schools, villages, or the outreaches, to create awareness of dental health care.

The museums should be established in a prominent place, preferably at the entrance of the institution, and close to the patients' waiting lounge. This should attract the patients and casual visitors. Museums should be properly illuminated and always kept open to public. The persons in charge (curator) should be suitably trained in maintaining and explaining to the visitors.

Further scope

As opined by Frank Oppenheimer, museums should serve as the resources for researchers, inspire the students, and educate the community.^[2] Museums should be continuously enriched with latest material products, information regarding sophisticated fabrication technologies, and details of their impact on the clinical practices. The entire museum can be digitalized and be projected, whenever required. Since there is scarcely any dental treatment without using any dental material, institutions should give utmost importance to establish such self-educative museums or learning laboratories. Every department also should develop museums of specialized materials for advanced P. G. courses.

Skulls and teeth of animals

Recently, another unique special section has been added to this. Skulls and jaws with teeth of many domestic animals have been collected and preserved. These are also presented systematically [Figure 4]. Many detailed informations of domestic as well as wild animals, such as their scientific names, kingdom, phylum, class, order, family, genus, type, diet, lifestyles, habitat, predators, distinctive features, subspecies, verities, skin types, colors, sizes, weight, top speeds, life spans, etc., have been collected and presented. Details of the skulls and teeth for comparative anatomy, structural variations,



Figure 4: Presentations of skulls and teeth of various animals.

mono-dontics (open root systems), fio-dontics, placements, properties, etc., have been gathered for further studies.

Man had evolved as the most complex dental mechanism of all animals. Many evidences showed that the size and shape of the teeth and jaws have been reduced since 5000 years due to the changes in food habits and required functions. The elongated and interlocking canines have been reduced in length so that they can function with the rest of the teeth in lateral movements.^[11] Many research projects regarding the studies of the internal structures, mechanical properties of different teeth of animals, mono-dontics, dio-dontics, fio-dontics, etc., have been envisaged using the facilities of a materials testing laboratory.

CONCLUSIONS

The concept of an integrated museum for dental sciences is not entirely new one. Some devoted faculty in few institutions of dental sciences has collected fabricating and teaching models with respect to their specialties and presented in their departments. This systematic classification and planned projection in the museum serve as a resource to motivate the students, to assist researchers, and to educate the societies in awareness of dental health care and verities of clinical treatments.

There is also vast scope for research, perhaps, in this new area, regarding the skulls and teeth of animals. Many interesting results obtained may throw some light to the structure, properties of human teeth developments, and treatments also. This may also lead to establish veterinary dentistry specialty P. G. Diploma courses in India and elsewhere.

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Conflicts of interest

There are no conflicts of interest.

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