

R&D

Manual



**BHARATIYA VIDYA BHAVAN'S
SARDAR PATEL INSTITUTE OF
TECHNOLOGY
2022 23**

Abbreviations Used:

R&D: Research and Development

RPS: Research Proposal Submission

IEDC: Innovation and Entrepreneurship Development Centre

PRUIS: Promotion of research and innovation for undergraduate students

CDEEP: Center for Distance Engineering Education Programme

IPR : Intellectual Property Rights

DST : Department of Science and Technology

CSIR: Council of Scientific and Industrial Research

BRNS: Board of Research in Nuclear Sciences

DBT: Department of Biotechnology

ICSSR: Indian Council of Social Science Research

MoU: Memorandum of Understanding

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Preamble

At Bharatiya Vidya Bhavan's Sardar Patel Institute of Technology, Research is an integral part of the academic activity carried out within various undergraduate and postgraduate programs. The Research and Development (R&D) center facilitates various research programs by channelizing various research projects and consultancy works in various departments of the Institute. The Research activities include Academic research and funded research projects and patent in the Faculty of Engineering and Technology. The students and Staff are encouraged to innovate through quality research in emerging areas.

The advancement of laboratories is a key role of the Research and Development center of the institute. Research and Development center acts as a liaison between funding agencies and the institute to handle sponsored research projects and industrial consultancy assignments. The main objective is to maintain the quality and breadth of its research enterprise, and particularly for its openness to multidisciplinary research.

The research philosophy is to progress from inter-departmental collaboration, to inter institutional partnerships at national and international levels. The scope and scale of research has substantially evolved from the era of student to funded projects to interdisciplinary research programs at state and national level. The Centre also facilitates interaction with external agencies at national and international level.

By looking at changing requirements of industry, the objective of Research and Development Cell is to ensure that we hold on to our position at the cutting edge of innovation by encouraging interdisciplinary research.

Dr. Y. S Rao

Dean (Research and Development)

1. Vision, Mission, Objectives

Vision

“Ideate, Invent and Innovate propositions with enduring value to ecosystems”

Mission

- To inculcate a research-oriented approach to the future generation through research, scholarship, education, preservation, and excellent academic practice that can serve all sectors of society.
- To carry out free exchange of ideas in an ethical, interdependent, and diverse community of faculty, students, and alumni.

Objectives

- To encourage and promote cutting-edge research based on the proven capabilities and expertise of our faculty and students.
- To help facilitate strengthening of the Institute's research capabilities; proactively promote basic research and monitor quality of research work done.

Strategies

- Identify and develop opportunities for the faculty to engage in research.
- Define criteria and modalities for students to avail research opportunities.
- Propose roundtables, conferences and working groups on a series of thematic areas central to the research work, publication of papers and reports of the students.
- Modalities of accepting, reviewing, and benchmarking research work.
- Establish linkages with institutions and universities in India and outside to secure resources to provide facilities to scholars.

Short Term Goals

- Getting sponsorships/stipends for students to develop products.
- Improve the quality of publications in standard journals.
- Conduct student's development programs on cutting edge technologies.

Long Term Goals

- Collaborating with agencies at national/ international levels for IPR and consultancy.

2. Structure of R&D

Following are the members of the R & D Team

1. Dean R & D
2. R & D Coordinator CE Department
3. R & D Coordinator CSE Department
4. R & D Coordinator EXTC Department
5. Student Volunteers

3. Departmental Research Cell and Major Thrust Areas

- R & D is set up to provide specialized administrative and managerial support for the operation of sponsored research, consultancy and other R&D related activities of the Institute. The overall R&D structure as shown in Fig.1 encompasses the Executive Committee, Faculty Research committee and Student Research committee.
- Departmental research cells are formulated with faculties and students. Faculties of SP-IT are very much dedicated and research oriented and thus seed the same research attributes within students.
- SP-IT faculty team consists of vibrant and proactive faculty who supervise and organize activities for encouraging research culture through paper presentation and project exhibition competitions. The center has a vibrant 24x7 Culture and runs on a dedicated area measuring nearly 4000 square feet.

1. Research and Development Cell at Computer Engineering Department:

Abstract - The Department of Computer Engineering is on a mission mode to increase the number of innovative and mostly multi-disciplinary research through untiring effort of faculty members and students. This results in nurturing research activities, procurement of equipment and development of state of the art research facilities. These projects address the requirements of real-life problems. More importantly, one of the major mandates of the Department of Computer Engineering is to participate in the international conferences and publish quality research papers in reputed journals. Issues concerning society are also addressed by the faculty members and students through sponsored projects. The deliverables of the R&D endeavor are innovative and affordable technology and products.

Objectives:

1. To develop appropriate algorithms for incorporating security provisions and opportunistic networks design in different flavors of computing like Distributed, Mobile, Parallel, High Performance, Cloud and Internet of Things.
2. To develop system and applications programs by optimizing, analyzing and investigating the theoretical analysis of the algorithms.
3. To extract important insights through systematic computational analysis of data or statistics for designing intelligence systems.

Facilities:

| Research Domains | Description | Facilities / Resources |
|-------------------------|--|-------------------------------|
| Networks and Security | Internet of Things, Mobile Computing, Distributed Computing, Parallel Computing, High Performance Computing, Parallel and Distributed Systems, Cloud Computing, Information Security, Network Security, Cyber Security, Web Security, Cryptography and System Security, Digital Forensics, Cloud Security. | Networking Lab |

| | | |
|------------------------------------|--|-------------------|
| Computation & Algorithms | Algorithm, Data Structures, Discrete Structures, Theoretical Computer Science, Computer Organisation and Architecture, Operating System, System Programming, Compiler Construction, Structured and Object Oriented Programming, Digital Signal Processing, Image Processing, Computer Graphics, Multimedia Systems and Applications. | Algorithm Lab |
| Design, Intelligence and Analytics | Machine Learning, AI, Neural Networks, Soft Computing, Databases, Software Engineering, Data Warehousing, Mining and Analytics, Human Computer Interaction, Digital Logic Design and Analysis, Service Oriented Architecture, Enterprise Resource Planning. | Post Graduate Lab |

Table 1: Lab facilities in Computer Engineering department

2. Research and Development Cell at Electronics and Telecommunication Engineering Department:

Abstract – The Electronics and Telecommunication department proposes with a vision and mission to pursue and promote Research and development activities in frontier technologies. An academic environment is created in the institution and necessary facilities are provided to encourage and carry out research. Department has research groups namely VLSI and Embedded Systems, Instrumentation & Control and Signal & Image Processing. The focus is on the development of high-performance, energy efficient, customizable solutions benefitting society at large. These laboratories will develop a new wave of ideas, technologies, networks, and systems that change the ways in which people (and devices) interact, communicate, collaborate, learn, teach, and discover. Simulation and Design, PCB Fabrication, Back-end Processing, and Characterization and Measurement will also be undertaken.

Objectives:

1. To implement various algorithms and test beds in wireless networks, UWB systems, optical networks, speech, audio and video processing, develop software tools for data analysis.
2. To develop appropriate algorithms that encompasses security and encryption solutions for seamless integration of various subsystems from the application to the physical sub system.
3. To develop systems and applications by optimizing solutions in emerging areas of antennas, embedded systems and VLSI.
4. To encourage students and faculty to publish in peer reviewed research journals and patent their work.
5. To develop applications using the latest technologies available in instrumentation, signal processing and power electronics.

Facilities

| Research Domains | Description | Facilities / Resources |
|----------------------------------|---|--|
| Modern digital signal processing | Wireless networks, UWB systems, Optical networks, speech, audio and video processing | Digital communication Research Lab |
| Cyber Physical Systems | Antennas, Embedded systems and VLSI | IoT Physical System Lab |
| Systems and security | Computer Networking, Encryption, Data compression, IOT, Cloud computing | Communication system Lab |
| VLSI and Embedded System | Primarily the research is carried out in Novel circuit Design, Device Simulation, Embedded Product Design and VLSI Communication Circuits. | VLSI LAB: Visual TCAD, Vivaldo, TI MSP Board, Keil Embedded Software |
| Signal and Image Processing | primarily research is carried out in Biomedical Signal Processing, Machine Learning and Video Analytics | DSP LAB: DSP Boards, Matlab Software |
| Instrumentation and Control | research is focussed in Simulation and design of instrumentation systems, Power Electronics System, Renewable energy and Biomedical systems | Instrumentation and Control LAB: SIM, C2000 Boards, Induction Motors, (3 phase), D C Motors, Labview, NI Elvis, T.I. PMLK boards, PLC (Allen Bradly) |

Table 2: Lab facilities in Electronics and Telecommunication Engineering Department

3. Research and Development Cell at Computer Science and Engineering Department:

Abstract– Computer Science and Engineering department of S.P.I.T. stride towards improving the technical education offered to engineering aspirants thereby equipping them for the ever-evolving technology domain. The key goal of the department is to provide a creative atmosphere in which higher studies and research thrive amongst the faculty and students. The department encourages the students and faculty to undertake the research in newly emerging frontier areas of Engineering, Technology, Science, and also in multidisciplinary fields. R&D cell thrives to establish collaboration with other universities, public and private sectors and identify R&D projects including consultancy services which could be undertaken at the department/institution level.

Objectives:

1. To unify the research activities in data analytics from the perspective of both information systems and computer science.
2. To improve computing performance by harnessing the power of the graphics processing unit.
3. To illustrate concepts in image processing and analysis through actual processing of images.
4. To develop systems and applications to optimize, analyze and secure the solution using the latest technologies.
5. To design, analyze and develop a system using intelligence and analytic techniques.

Facilities:

| Research Domains | Description | Facilities / Resources |
|------------------------------------|--|---|
| Data Analytics | To process and analyze a huge volume of data sets using Hadoop. Working with mining concepts for large volumes of data. | Database Lab |
| Distributed System | A private cloud was setup to understand benefits of virtualization Reusable application components for uses in cloud solutions. CUDA Lab for high performance computing using parallel processing. | Cloud Computing Lab, CUDA Lab, Networking Lab |
| Image Processing | To enhance and process images for various applications. Projects are undertaken which focus on biometric applications. | Multimedia/Image Processing Lab |
| Security | Information Security, Network Security, Cyber Security, Cryptography and System Security. | Networking & Database Lab |
| Design, Intelligence and Analytics | Soft computing, Machine Learning, Data Mining, Big Data Analytics (Proposed), Service Oriented Architecture, Natural Language Processing. | Operating System & Programming Technology Lab |

Table 3: Lab facilities in Information Technology Department

4. S.P.I.T. R&D Initiatives

1. Promotion of Research and Innovation for Undergraduate Students (PRIUS) (Proposed)

To promote and support research and innovation based projects amongst undergraduate students; R&D Centre has proposed a new scheme through which it supports:

- undergraduate students in the research laboratories
- undergraduate students for international collaborative research projects, and
- encouraging projects leading to innovation

The scheme is applicable for undergraduate students enrolled at S.P.I.T. and a part of the PRIUS project must be carried out at S.P.I.T. For the implementation of this scheme, the student who wishes to pursue an undergraduate research project must identify a faculty supervisor from S.P.I.T. PRIUS undergraduate projects should typically run for a period of at least six months and it is to be understood that these projects will not in any way come in the way of the student's regular academic obligations and requirements for fulfilling the requirements for the award of degree. Undergraduate students identified to utilize this opportunity must finish their work before the end of final semester of the coursework. The proposed maximum funding per annum for a research proposal is Rs. 25,000/-

2. Innovation and Entrepreneurship Support Cell (IEDC)

Department of Science and Technology (DST), Government of India, funded Innovation and Entrepreneurship Development Centre (IEDC) has been setup at S.P.I.T. IEDC grant was sanctioned on 15th April 2010 for the establishment of IEDC at S.P.I.T. The total sanctioned amount was Rs.44,55,000/- for a period of five years with the following mission and objectives.

Mission: Develop Institutional mechanism to create Entrepreneurial culture in academic institutions to foster growth of innovation and entrepreneurship amongst the faculty and students.

Objectives:

- To act as an institutional mechanism for providing various services including information on all aspects of enterprise building to budding entrepreneurs.
- To create Entrepreneurial culture in the Parent Institution and other institutions in the region and to promote entrepreneurship including programmes related to women and weaker sections of the society.
- To inculcate a culture of innovation driven entrepreneurship through student projects
- To promote development of knowledge-based enterprises and employment opportunities in innovative areas.
- To respond effectively to the emerging challenges and opportunities both at national and international level relating to SMEs and micro enterprises.

3. Center for Distance Engineering Education Programme (CDEEP)

S.P.I.T. has established a center for distance engineering education on 7th March 2012 as a CDEEP, RC center of IIT-Bombay and also NPTEL local chapter of IIT-K on 25th Jan. 2017. CDEEP organized several continuing Education Programmes (CEPs) and Short Courses for students and faculty with IIT-Bombay. This will enable faculty and students to update their knowledge and skills, and also to train them in state-of-the-art facilities.

4. Intellectual Property Rights (IPR)

S.P.I.T. Promotes innovations and facilitates protection of Intellectual Property (IP) of its faculty and students. While a formal framework to guide the implementation is an evolving process, S.P.I.T. has an IEDC cell to help the innovator for successful filling of the patent application. Parties engaged in creations of original and innovative work at S.P.I.T. include undergraduate and postgraduate students, and faculty members. Provision has been made for IPRs and Copy Rights in the budget.

5. Sponsored Research Projects

The research and development section facilitates the submission of sponsored research projects by faculty members to various funding organizations such as Department of Science and Technology (DST), Council of Scientific and Industrial Research (CSIR), Board of Research in Nuclear Sciences (BRNS), Department of Biotechnology (DBT), Indian Council of Social Science Research (ICSSR), and many more. An important strategy to facilitate Research and development activities was the creation of a substantial reserve of research fund to facilitate research work of students. This fund enables the students to apply for resources to the Research committee by submitting a research proposal so as to reduce dependence on sponsored research. Each research proposal received by the centre is sent for a blind review to a referee (a panel of senior and experienced researchers in the relevant field) who comments on the clarity and focus including rationale of the proposed study, logical flow of ideas, methodology, feasibility, originality and contribution to knowledge. The reviewer's comments are shared with the researcher to help strengthen the proposal.

6. Industrial Research and Consultancy

In order to foster strong links with industry for collaborative research, technology transfer, and specialized human resource development, consultancy services are offered to industrial partners, government organizations, and other agencies in niche areas of expertise available within the institute. The services at S.P.I.T. are categorized as Testing and Consultancy. For obtaining expert services from S.P.I.T. In the concerned fields, contacts may be made with:

- Concerned faculty member directly, or
- Head of the Department of the department concerned, or
- Dean, Research & Development (especially, in case of interdisciplinary projects)

7. Conferences, Workshops and Seminars

S.P.I.T. has organized several conferences, workshops and seminars at national and international levels to facilitate interaction and sharing of the latest results and findings in various specialized areas. Such events also act as an interface between industry, academia and government organizations and promote exchange of ideas. Research scholars gain much needed exposure through these events which are critical to their educational experience and preparing for the future research endeavors.

8. Memorandum of Understanding (MoU)

Research and Development (R & D) center facilitates the signing of MoU related to research activities with different organizations on topics of mutual interests. S.P.I.T. has signed MoUs with the following organizations/universities/institutes for conducting training programs, availing R&D facilities etc. Texas Instruments, Bangalore, DPLM Software Solutions Limited, Geometric Ltd., Mumbai, Simtek Medico System Pvt. Ltd, Microtech Inductions Pvt. Ltd, Mumbai, D Link India Ltd. Indian Institute of Technology, Bombay, Gadhia Solar Energy System Pvt. Ltd. Valsad, Ministry of Science and Technology, New Delhi, Xilinx, XUDP, USA, Erricsion India Pvt. Ltd, Haryana, Secure Matrix India Pvt. Ltd, Mumbai, Visvasvaraya National Institute of Technology, Nagpur, Infosys, Pune, Wipro Technologies , Pune, IBM India Ltd., Tata Consultancy Services Ltd, Mumbai.

9. Research Scholars Colloquium and Awards

Research colloquium is the proposed activity conducted at S.P.I.T. The activity is proposed to be conducted annually. The presentations on ongoing research project at S.P.I.T. are given. The sponsored/funded projects are included in this activity. The activity is open to all faculty, students and research scholars. The goal is to make aware and facilitate interaction and sharing of the latest results and findings in faculty and interested students about on-going research projects in S.P.I.T. This event promotes exchange of ideas. Research scholars gain much needed exposure through this event which is required for educational experience and preparing for the future research endeavors. The award is given to the best presentation.

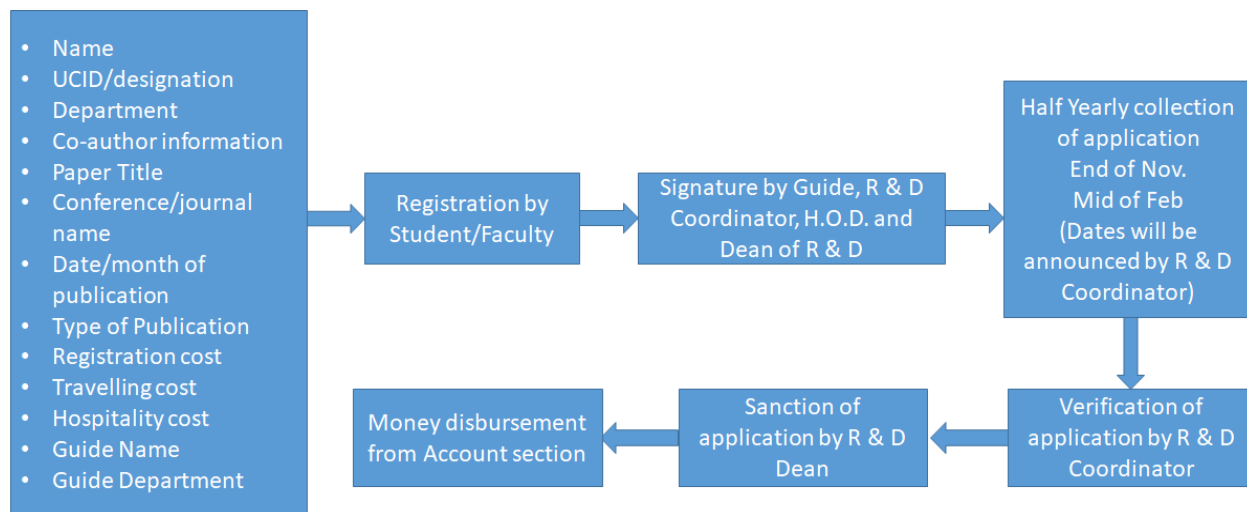
10. Faculty Award for Excellence in Research

Dean R & D initiates award of excellence for all departments of S.P.I.T. for the best faculty (R&D perspective) award. The motivated teachers deserve recognition and encouragement. The R & D research center appreciates excellent research activities conducted by faculty members by granting a faculty award. This appreciation will be measured against specific criteria such as publications in national and international journals, conferences and transactions including book chapter; patent applications; organizing value added courses; external recognitions for carrying research activity; consultancy and including other criteria which have national or international level significance. Such criteria are measured in quantitative as well as qualitative analysis.

5. R & D Processes

- a. Technical Research Paper Participation (Reimbursement)
- b. Project Exhibition
- c. Promotion of Research and Innovation for Undergraduate Students
- d. Technical Research Paper Presentation Competition
- e. Best Research award – Faculty and Students
- f. IEDC - The Innovation and Entrepreneurship Development Center
- g. Patent -IPR
- h. Consultancy / Grant
- i. PDC - Product Development Center

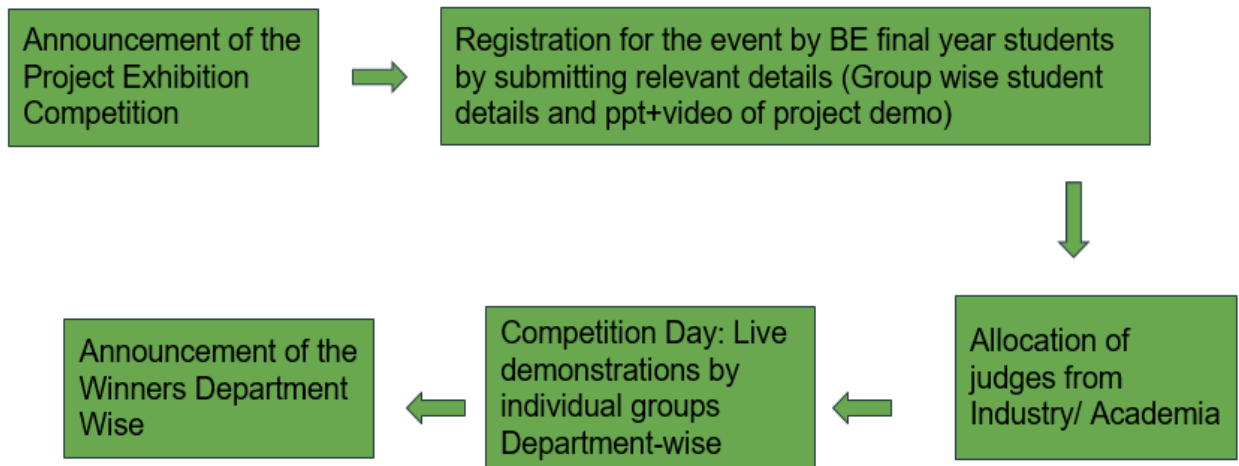
a. Technical Research Paper Participation (Reimbursement)



This process collects all research paper details from students and faculty for reimbursement. Data collection includes information about the paper like title, conference/journal information.

- Registration: Fetch Data for the papers as per student / faculty
 - Name of the Student, UCID, Dept / Name of the Faculty, Dept, Designation
 - Name of the Co-author (Student with their name, UCID, dept)/name of the co-author faculty (Name, dept, designation)
 - Name of the guide (Dept, name)
 - Title of the paper
 - Name of the conference, date, hosting institute name and venue, type of conference/name of the journal, date of publication, type
 - Reimbursement details like registration cost, traveling cost, stay cost(both for student/faculty)
- Reimbursement Application:
 - Collected requests will be sanctioned for research paper reimbursement by both (faculty/ Student)
 - admin shall sanction/decline the application
- Report generation: based on the type (year, dept, program)
- Choose the type of reports needed (Comparison total strength for last 1/3/5 years)
- Generate Excel Sheet of the Statistics based on the above selections.
- Analyzing the data and creating visualizations for understanding the static and growth percentage compared to past data
- Year wise amount utilized for UG/PG/Ph.D should be declared

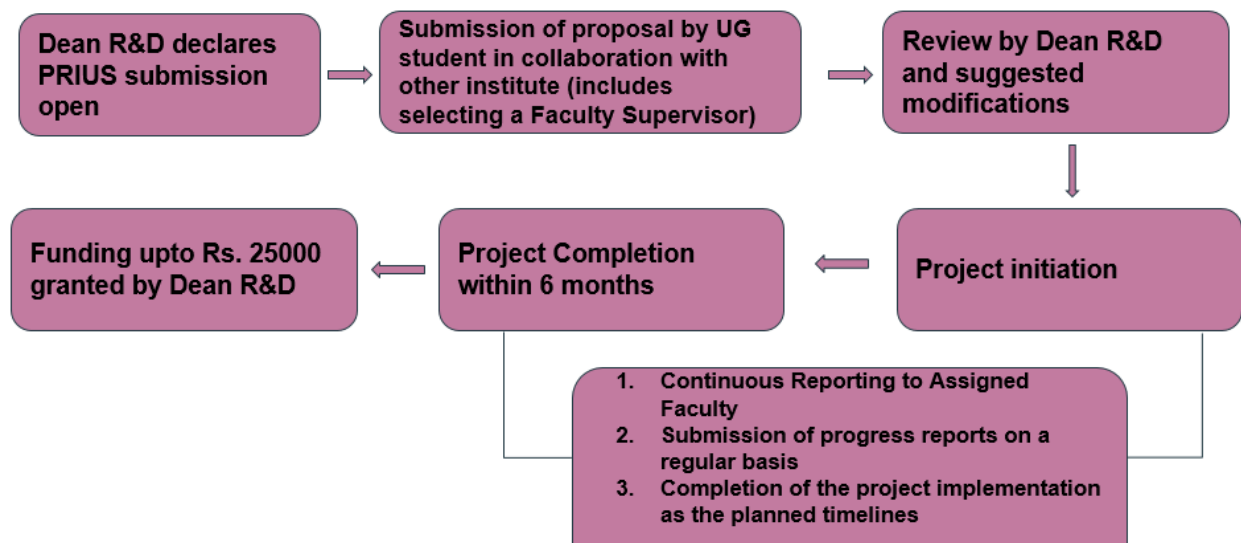
b. Project Exhibition



This process is an event for organizing yearly project competition among final year students (UG) across all branches of the institute.

1. Announce the date for the competition.
2. Registration link of teams for the event with the following provisions: Choose the type (year, dept, program)
3. Form for registration must contain:
 - Academic year
 - Department
 - Group No. and provision for adding 2-4 students: UCID, Name, Email details
 - Project Title
 - Video upload link
 - PPT upload link
 - or bulk upload option with the above fields
4. External Judges for the competition must be allocated
5. Generate different reports based on the following categories.
 - Winners year-wise
 - Winners department-wise year-wise list
 - Winners for last 2 years/3 years/ 5 years customizable
 - Students participated list-Category-wise department-wise/ Category-wise overall/ overall count category-wise/overall list/count under each heading-pie-chart/bar-chart (Statistical Reports)
 - No. of groups list year wise department wise
6. Year wise amount utilised for the competition should be declared
7. Sponsorship from SP-TBI should be accommodated

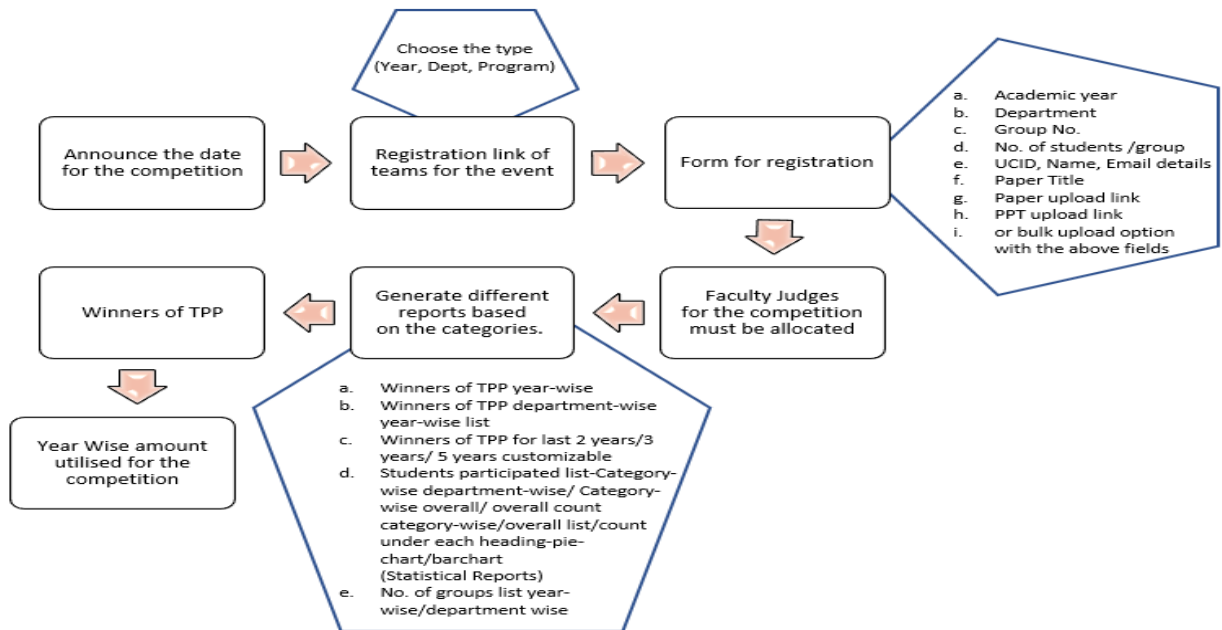
c. Promotion of Research and Innovation for Undergraduate Students (PRIUS)



This process is for providing financial assistance to UG students for national/ international collaborative research work with other institutes. The UG student has to identify a faculty supervisor from S.P.I.T. and must work with the faculty towards completion of the research project undertaken. PRIUS Projects should typically run for a period of at least 6 months.

1. Students must register the project undertaken specifying details
2. Registration form must contain:
 - Academic year
 - Department
 - Student details: UCID, Name, Email
 - Project Title
 - Details of the collaborating institute/company
 - Faculty Supervisor Details
 - Funding details from collaborating institute
3. Student to be provided facility to add monthly/weekly project progress report approved by faculty supervisor
4. Faculty supervisor should be able to approve monthly/ weekly progress report
5. Generate different reports based on the following categories.
 - Project details year-wise
 - Projects department-wise year-wise list
 - Project details for last 2 /3 / 4/ 5 years customizable
 - Pie-chart/barchart (Statistical Reports) for previous n years
6. Amount sanctioned for each project to be approved by Dean R&D

d. Technical Paper Presentation



This process is an event for organizing yearly project competition among final year students (UG) across all branches of the institute.

1. Announce the date for the competition.
2. Registration link of teams for the event with the following provisions: Choose the type (year, dept, program)
3. Form for registration must contain:
 - a. Academic year
 - b. Department
 - c. Group No. and provision for adding 2-4 students: UCID, Name, Email details
 - d. Paper Title
 - e. Paper upload link
 - f. PPT upload link
 - g. or bulk upload option with the above fields
4. Faculty Judges for the competition must be allocated
5. Generate different reports based on the following categories.
 - a. Winners of TPP year-wise
 - b. Winners of TPP department-wise year-wise list
 - c. Winners of TPP for last 2 years/3 years/ 5 years customizable
 - d. Students participated list-Category-wise department-wise/ Category-wise overall/ overall count category-wise/overall list/count under each heading-pie-chart/barchart (Statistical Reports)
 - e. No. of groups list year-wise/department wise
6. Year Wise amount utilised for the competition should be declared

e. RESEARCH AWARD PROCESS- For Faculty and Student

1. Applications will be invited from teachers and students regarding the activities done in the current academic year.
2. Evaluation criteria for teacher / students need to framed separately
3. Formation of the Evaluation team will be done. (suggestion)
4. Evaluation analysis needs to be carried out.
5. Announcement of the results (winner).
6. Following factors may be considered (tentative) which may be revised from time to time.**

****Research award - Criteria for Student**

Criteria I: Research Publications

1. Publication of technical papers in national and international journals (Preference will be given for publications in SCI & SCOPUS journals) (International/ National)
2. Presentation and publication of technical papers in referred national and international seminars, conferences, symposiums, etc. (International / National)

Criteria II: Sponsored projects handled

1. University Grant for Minor/ Major project
2. AICTE Grants

Criteria III: Other Professional Recognitions & Contributions

1. Patents awarded (International / National)
2. Professional recognitions: Awards / best papers
3. Professional body memberships

Research award - Criteria for Faculty

Criteria I: Research Publications

1. Publication of technical papers in national and international journals (Preference will be given for publications in SCI & SCOPUS journals) (International/ National)
2. Presentation and publication of technical papers in referred national and international seminars, conferences, symposiums, etc. (International / National)

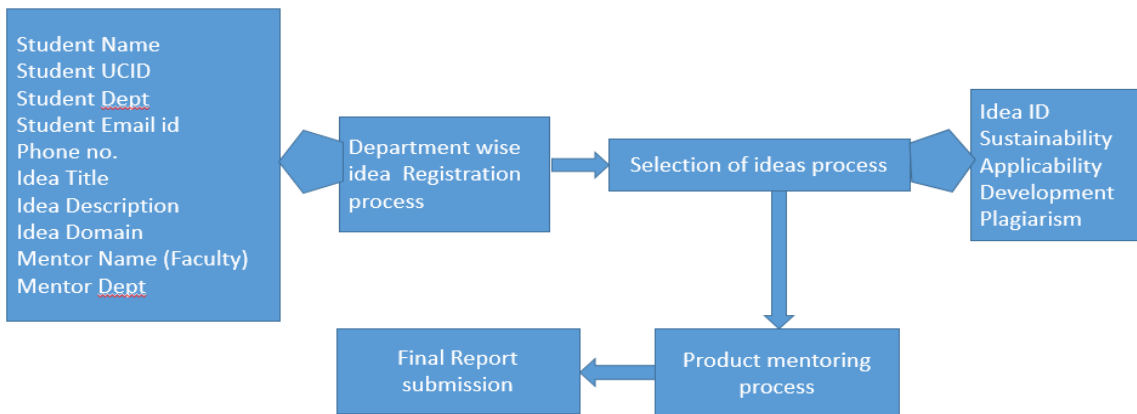
Criteria II: Research Guidance

1. Research Guidance of PhD Thesis (supervisor / Co supervisor)
2. Research Guidance of PG Dissertations (guide / co Guide)

Criteria III: Sponsored projects handled

1. Externally funded R&D Projects Handled: For Principal Investigators: / co-investigator)
2. Industry Sponsored Projects (Consultancy Works)
3. University Grant for Minor/ Major project
4. AICTE Grants

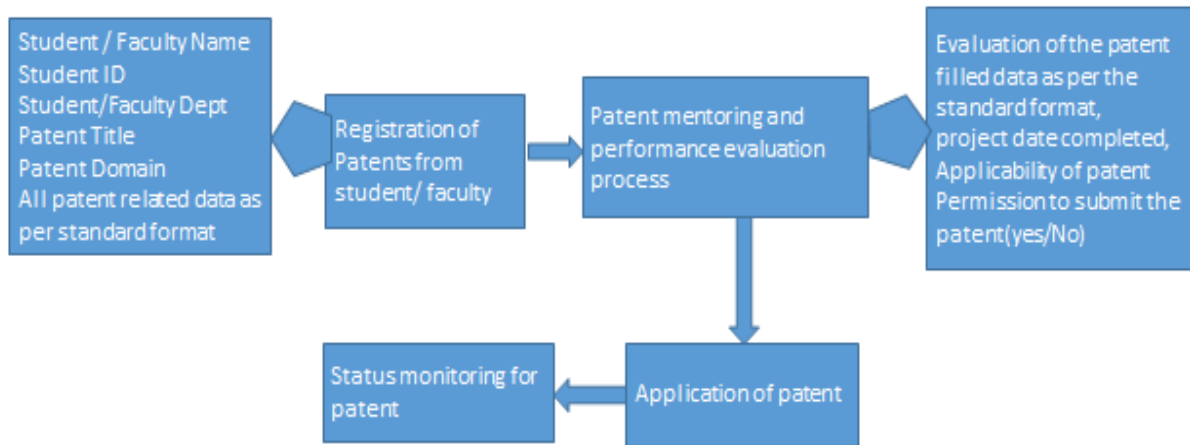
f. IEDC (The Innovation & Entrepreneurship Development Center)



IEDC will work for the development of innovative ideas. It takes a few students' ideas under its wing through the Student Startup Programme. These ideas will be purely tech-based ideas. Student ideas will be pitched with criteria such as product development, service development. Students will be required to participate in events or mentoring sessions organized by SPTBI.

1. Department wise Registration process: Fetch Data from the students related to product idea
 - a. Student Name and UCID
 - b. Student Dept
 - c. Student Email id and Phone no.
 - d. Idea Title
 - e. Idea Description
 - f. Idea Domain
 - g. Mentor Name (Faculty Name)
 - h. Mentor Dept
2. Selection of ideas process: Based on following parameter (Per dept 2 ideas)
 1. Idea ID
 2. Sustainability
 3. Applicability
 4. Development
 5. Plagiarism
3. Product mentoring process:
 1. Idea Id
 2. weekly progress report
4. Report Generation
 1. Choose the type (year, dept, program)
 2. Generate Excel Sheet of the Statistics (year, dept, program)
 3. Analyzing the data and creating visualizations for understanding the static and growth percentage compared to past data

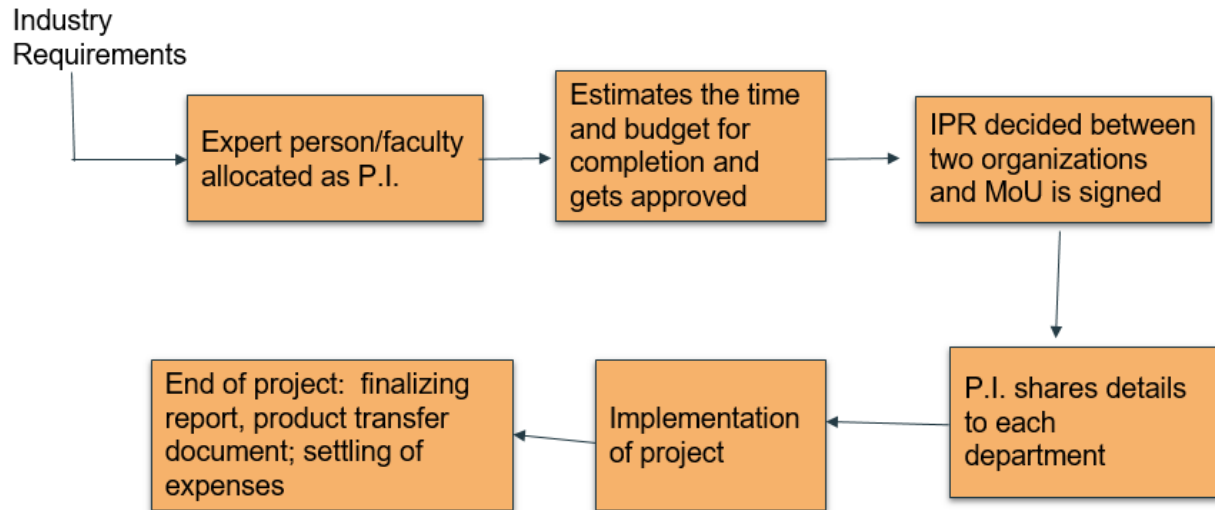
g. Patent-IPR



Patent related information will be collected at institute level. Sponsored patent and non-sponsored patent information will be collected. Report will be generated to apply, grant and publish patent.

1. Registration of Patents from student/ faculty
 1. Student / Faculty Name
 2. Student ID
 3. Student/Faculty Dept
 4. Patent Title
 5. Patent Domain
 6. All patent related data as per standard format
2. Patent mentoring and performance evaluation process
 1. Evaluation of the patent filled data as per the standard format
 2. project date completed
 3. Applicability of patent
 4. Permission to submit the patent(yes/No)
3. Application of patent
 - a. All collected idea submitted to IPR office
 - b. final patent id
4. Status monitoring for patent
 - a. Final Patent Id
 - b. Status of patent
5. Report generation
 1. Choose the type (year, dept, program)
 2. Generate Excel Sheet of the Statistics based on (year, dept, program)
 3. Analyzing the data and creating visualizations for understanding the static and growth percentage compared to past data

h. Consultancy



MoU signed with industry

Cat-1: Consultancy Projects being executed externally without any SPIT Lab Assistance (Off-Campus)

Cat-2: Consultancy Projects being executed internally on-campus with SPIT Lab Assistance and assistance of human resource like college-staff, student-interns and special-recruits (On-Campus)

1. The requirement originates from the industry/other organizations.
2. The faculty is expected to estimate the time and cost required to accomplish the task.
3. All consultancy proposals must be sent under signature of the PI to Dean R&D for endorsement and approval by the Principal of SPIT.
4. IPR related issues are agreed between the PI and the funding agency and should be cleared by the Principal.
5. Signing MoU/agreement
6. Assigning unique internal number to the project
7. Faculty shares the outline of the project to the respective department.
8. System should have provision to update the MoU signed with Industry
9. System should have provision to upload the expenditure details
10. After the end of project: (a)Preparation of final financial report and technical report; (b) transfer letter of consumables & non-consumables

i. PDC – Product Development Center

- To convert project to prototype for commercialization
- To develop and test hardware/Software products
- To provide technology support for creative product development
- To develop skills required for end to end product development
- To offer a platform to Alumni, students and faculties for converting their ideas into marketable products

Services by PDC

- (1) Technology support for Marketable product development
- (2) Mentorship for competitive product development
- (3) Infrastructure support and guidance for students group awarded by industry
- (4) Undertake product development jointly with Alumni & industry experts

6. R&D Policies and Regulations at S.P.I.T.

Consultancy Projects

Requests for consultancy services come to the institute due to a variety of factors, such as (i) the professional status, reputation, and expertise in niche areas, associated with specific individual faculty members (ii) and the Institutional reputation. The roles of the individual and the institution are complementary and most often value addition arises from this. The individual provides the intellectual inputs and skills and harnesses his expertise and experience towards meeting the client's requirements. The Institution, on the other hand, provides a diverse range of infrastructural facilities and services which facilitate consultancy and related activities. The effective costs of such facilities and services, reckoned in terms of major initial investments, periodic upgradation etc. cannot be underestimated.

More importantly, the Institutional reputation for excellence, expertise and ethical practices plays a substantial role in attracting consultancy opportunities. Although the roles of the individuals and the institution are closely intertwined, it needs to be emphasized that the institution adds substantially to the stature of the individuals.

Finally, all consultancy activity is to be channeled through the institution and the institution assumes some indirect responsibility for completion of the assignments to the satisfaction of the clients. Consequently the institution has to necessarily look forward to a reasonable share of the revenues. At S.P.I.T. we envisage following categories of consultancy projects:

Category I:

- A consultancy is requested by an agency (client) from a particular Professor · The assignment to be carried out at client site
- No infrastructural requirement from institute for the assignment
- Consultant professors will be allowed to visit client sites for completion of assignments for 52 days in a year not more than one day per week during the running semester.

Category II:

- A consultancy is requested by an agency (client) from a particular Professor · The assignment to be carried out at Institute
- Institute infrastructural required for the assignment

Category III:

- Consultancy is requested by an agency (client) from Institute
- Institute assigns a consultant to complete the assignment
- Institute infrastructural required for the assignment

Consultant team will be allowed to visit client site for completion of assignment for 52 days in a year not more than one day per week during running semester.

Income Sharing Proposal

(All the payment to be made to Institute and institute manages the sharing)

Category I

Total Income Less Service Tax = A

Less Other expenditure with prior approval maximum up 10% of A = B

Institute Share = 30% of B

Consultant's Share = 70% of B

Category II

Total Income Less Service Tax = A

Overhead to Institute = 20% of A
 less other expenditure with prior approval maximum up to 10% of A = B
 Institute Share = 50% of B
 Consultant's Share = 50% of B

Category III

Total Income Less Service Tax = A
 Overhead to Institute = 20% of A
 less other expenditure with prior approval maximum up to 10% of A = B
 Institute Share = 70% of B
 Consultant's Share = 30% of B

Policy for Qualification Improvement of the Faculty

1. Sponsored study leave under all categories (including QIP) for M.E. / Ph.D. has been discontinued from the year 2013-2014. However, faculty can avail study leave of six months during their M.E. / Ph.D. period subject to signing of the bond prescribed for the same.
2. Motivating faculty to pursue PhD would be taken up with the new Board of Governance (BoG) under autonomy.

Policy for Training Program/Seminar/Workshops/FDP

Proposed Scheme for disbursement of revenue generated by training programme/ short term courses.

Training Programs

1. Faculty members can conduct value added training program within the institute or at client site
2. All such training programs will be conducted before / after the institute working hours
3. Trainer team will be allowed to visit the client site for completion of assignment for 52 days in a year, not more than one day per week during the running semester.

Income Sharing Proposal

Total Income Less Service Tax = A
 Less other expenditure with prior approval maximum up to 10% of A = B
 Institute Share = 50% of B
 Trainer's Team share= 50% of B = C
 Training Team Share:

| Sr. No. | Team Member Title | % Share |
|---------|-------------------|-----------|
| 1 | Coordinator | 10% of C |
| | Trainer | 70 % of C |
| 2 | Lab Assistant | 7 % of C |
| 3 | Class IV | 3 % of C |
| 4 | Accounts | 5 % of C |
| 5 | Principal | 5 % of C |

Policy regarding sponsorship for International Conferences

Recognizing the significance and importance of research work and its publication in peer reviewed journals both, at international and national levels, norms sponsorship for attending conferences abroad are being amended as under. The faculty member seeking sponsorship should also make efforts to get sponsorship from other bodies which offer sponsorship eg. UGC, AICTE etc. In view of the above three slots have been defined as under.

Slot 1:

Once a faculty member publishes a paper in a peer reviewed international journal, he/she will be eligible for a slot as defined below. He/She may utilize the sponsorship within a period of two years from the date of publication of the international journal paper.

Sponsorship will be under following heads:-

- Registration Fees
- Visa fee
- Conveyance - Economy fare by air
- Conveyance from residence to airport, int'l airport to hotel and similarly return journey. · Up to US \$ 80 per day (towards lodging and boarding - on days of the conference only) to be reimbursed on actuals.
- The paper should be presented at an International conference organized by a Professional body.
- The research work should not reflect the work leading to M.E., Ph. D. for which the faculty member was sponsored.
- The work may reflect research work for which the faculty member was guiding ME, Ph.D. dissertation work.
- The total expenses reimbursable would be **restricted to Rs.1,10,000** which would be inclusive of grants from other sources.

Slot 2

Once a faculty member publishes a paper in a peer reviewed national journal, he/she will be eligible for Sponsorship to the extent of 75% of the total expenses under the following heads. He/She may utilize the sponsorship within a period of two years from the date of publication of the journal paper (national level).

- o Registration Fees
- o Visa fee
- o Conveyance - Economy fare by air
- o Conveyance from residence to airport int'l airport to hotel and on journey on return.
- o Expensed toward stay up to US \$ 80 per day (towards lodging and boarding) to be reimbursed on actuals.
- o The paper should be presented at an International conference organized by a Professional body.
- o The research work should not reflect the work leading to ME, Ph.D. for which the faculty member was sponsored.
- o The work may reflect research work for which the faculty member was guiding ME, Ph.D. dissertation work.
- o The total expenses reimbursable would be **restricted to Rs.75,000** which would be inclusive of grants from other sources.

Slot 3:

If a faculty member does not qualify in slot 1 or 2 he/she may utilize sponsorship under this slot. The sponsorship may be utilized once in two years. Sponsorship will be under the following heads.

- Registration Fees
- Visa fee
- Conveyance - Economy fare by air
- Conveyance from residence to airport int'l airport to hotel and on journey on return.
- Expensed towards stay up to US \$ 80 per day (towards lodging and boarding) to be reimbursed on actuals.
- The paper should be presented at an International conference organized by a Professional body.
- The research work should not reflect the work leading to ME, Ph.D for which the faculty member was sponsored.
- The work may reflect research work for which the faculty member was guiding ME, Ph.D. dissertation work.
- The total expenses reimbursable would be **restricted to Rs.55,000 (or Rs.28000 per year)** which would be inclusive of grants from other sources.

Policy for faculty receiving Slot 3 sponsorship

- The faculty member should after returning from the conference give a presentation on his/her topic and about the visit in a faculty meeting.
- In addition to the above mentioned sponsorship a faculty member is entitled for reimbursement for a national conference conducted by a professional body as per govt. norms every year.
- A faculty member would also be entitled for sponsorship to a seminar/program of special interest to the department / college once in two years. The maximum reimbursement on different heads would be restricted to Rs.10,000.(or Rs.5,000 per year)
- To get sponsorship for international conferences faculty members should also apply to other funding agencies like AICTE/UGC/DST before seeking sponsorship from college.
- The faculty member should, before proceeding to the conference, give a complete schedule of stay abroad, clearly indicating dates of the conference travel plan etc.
- A committee will review the status of conference where the faculty is sponsored, relevance to the subject etc.

7. Terminology, Regulations for Research & Development R&D

1. Scope

These regulations shall be called “R&D Regulation” hereafter & shall be applicable to all activities stated therein. These rules supersede all existing R&D rules.

2. Terminology

- **Sponsored Research Project:** Time and cost bound projects sponsored by Government, public, private, national / international agencies and autonomous bodies. The project cost including cost towards contractual manpower, deputed manpower, equipment, consumables and supporting services of the Institute are borne by the sponsor.
- **Sponsor:** The organization that Sponsored the Project to the Institute and gives necessary financial support for successful completion of the project in time.
- **Principal Investigator / Investigator in charge (PI):** A faculty member of the Institute with necessary expertise and competence to conduct a Sponsored Research / Industrial Consultancy work. Normally, the faculty member who submits the project proposal and discusses / negotiates it with the sponsor and is instrumental in getting the project is the Principal Investigator. For administrative reasons, the Principal Investigator of some projects may be appointed by the Dean (R&D) in consultation with concerned HoD if the original Principal Investigator leaves or his/her service are not available to the project for any other reason.
- **Co-Investigator (Co-PI):** A faculty member co-opted by the Principal Investigator to work jointly with him. If the PI leaves the Institute or goes on leaves, a Co-Investigator assumes the power of the PI with the approval of the Dean (R&D).
- **Consultancy Project:** Time bound specific problem solving projects sponsored by funding agencies with payment of consultancy fee / honorarium to the Investigator(s) in addition to all other expenses.
- **Individual Research and Development Grant Fellowship:** Research and Development grants-in-aid offered to individual faculty, research fellows from the sponsors and executed using Institute facilities with financial support from the granting agencies towards equipment, contingency, overhead, fellowship etc.
- **Dean R&D:** The Dean (R&D) has full responsibility for project administration including
 - Acceptance of sponsored research and consultancy projects from the sponsor on behalf of the Institute;
 - The recruitment, extension, assessment, termination and invoking disciplinary procedure against project staff and
 - The full financial power related to all projects covered under the R&D Regulations.

3. Manpower

- All project appointments will be contractual and on the basis of consolidated monthly emoluments.
- Automatic transfer from one project to another either on completion or midway shall not normally be permitted. However, in special cases such requests with justification by the PI may be approved by the Dean.
- The tenure of contractual appointment of a project staff will be for the duration of the project and less than five years.
- The total period of continuous contractual employment in the project(s) must be less than five years.

· A project employee shall execute a contract Agreement on non-judicial stamp paper of value at least Rs. 100/- at the time of joining with the explicit provision that contract may be terminated by either side (Staff or R&D Unit) by giving one month's notice or one month's consolidated emoluments in lieu of the notice.

· Selection of JRF / SRF / RA shall normally be made as per the guidelines provided by the sponsoring agency and with the approval of the Dean (R&D).

· All appointment letters shall be issued under signature of Assistant Registrar (R&D). · The PIs shall consider prevailing emoluments package, general qualifications and experience for staff while preparing project proposals.

· The Selection Committee for the recruitment of project staff for each project will be constituted as follows:

A. The short listing of the applications of project staff is to be done by the PI and sent to Dean (R&D) for approval.

B. Selection Committee for Project staff recruitment:

i. Dean (R&D) or his nominee - Chairman

ii. Head of the Department - Member

iii. Principal Investigator (PI) - Member

iv. Two experts (to be nominated by the PI) - Member

The Committee is to be approved by the Dean (R&D). The Dean (R&D) shall fix, on the recommendations of the selection committee, the monthly consolidated emolument and the duration of the contractual appointment. The contract is to be renewed every year on recommendation of the PI.

· On completion of each year of service during the contract period, extension in tenure and suitable enhancement of monthly emoluments, if applicable may be considered by the Dean (R&D) on recommendations of the PI of the concerned School. Application may be made in the prescribed format for approval of the Dean.

· In case of urgent requirement, on recommendation of the PI short term job contracts for 89 days may be considered by the Dean (R&D).

· All project staff shall work for the project only unless agreed to otherwise by the Dean (R&D).

· PIs shall be the sanctioning and controlling authority for all types of leaves with respect to contractual project staff.

· Conduct Rules: project employees shall

· Follow general code of conduct as approved by Dean (R&D).

· Maintain secrecy of the research findings / technical information and shall not get involved in unauthorized communication of any official document or information. · Dean (R&D) may, at his discretion, constitute committee(s) to conduct disciplinary proceedings, if necessary against project employees. On the basis of the report, suitable disciplinary action may be initiated and punishment will be imposed by the Dean (R&D).

· Project employees may be allowed to register for the ME/Ph.D. programme if he / she fulfils all the requirements prescribed by the University and Institute.

4. Finance and accounts

· A separate book of accounts shall be maintained for each project. R&D Unit shall be responsible for submission of statements of accounts as and when required by the sponsors. Govt. audited statements of accounts at the end of each financial year shall be provided, if required by the sponsor.

· In general, for sponsored research projects, 20% of the total project cost shall be charged towards

Institutional charges (overheads) for utilizing the infrastructural and other facilities of the Institute. However, depending on the norms of the funding agency and project budget, verification can be allowed by the Dean in consultation with the PI.

- In the event, any project utilizing the Institute's manpower and other supporting facilities beyond office hours, the expenses towards the same shall be charged to the respective project. For this purpose, on the recommendations of the PI, the Dean (R&D) may approve suitable honorarium for the supporting staff of the Institute.
- PIs shall arrange to maintain Procurement-cum-purchase Registers and Stock / Asset. These shall be verified by Govt. Auditors and R&D Unit as and when required. All purchase proposals in line with the purchase procedures of the Institute, shall be processed by the R&D Unit.
- Accounts for sponsored projects shall be maintained under five broad budget heads. They are: Salary, Equipment, Contingency & Consumables, Travel and Institutional Charges (Overhead). Minor adjustment in approved budget heads may be permitted by the Dean (R&D) without violating the norms of the funding agency significantly.
- Cash advance shall be drawn in the name of PI/ Co-PI of the project.
- All expenditures shall normally be made within the proposed date of completion of the project. Exceptions may be permitted with the consent of the sponsor.
- PIs shall normally be allowed to draw another advance only after adjusting the previous one taken by them unless otherwise agreed by the Dean (R&D).
- In the event of non-availability of funds in a project, excess expenditure (if any) due to unforeseen reasons, the Sponsoring Agency will be approached to sanction additional fund or to permit the expenditure from another project of the same sponsor.
- TA and DA Rules: The Government of India TA & DA rules will be applicable to the PIs and project employees for all sponsored research / consultancy projects. However, there could be some relaxation in the TA & DA rules for the PIs and project staff, subject to the availability of funds and with prior approval of the Dean (R&D).

5. Intellectual Property Rights:

- Unless otherwise agreed with the Sponsor in the project agreement, Intellectual property Rights for any discovery or invention originating from the Sponsored Research and Consultancy Project shall jointly rest with the Institute, Investigator (s) and the Sponsoring Agency unless the Sponsoring Agency authorizes the Institute in writing to have the exclusive right. Patent / copyright application before the Registrar / Controller of Patents shall be filed by the R&D Unit on the basis of the recommendations made by the patent / Copyright Committee.
- For the effective protection of IPR, it is necessary that the PIs should maintain a register that gives the details of the work done and salient findings on a daily / weekly basis. This register should be signed by the PI and by at least one other faculty / project employee as witness to the result.
- For the copyright protection of software / technology, registration of the software at the Department level shall be made and properly documented. The list shall be centrally made available to the R&D Unit.

6. Technology transfer:

The PIs shall not independently transfer technology either on exclusive or non-exclusive basis to any party without the consent of the IPR owners. The terms and conditions for each of such technology transfers shall be worked out on a case to case basis with approval of the Dean (R&D)/ Principal.

7. Retainer ship (Proposed):

With the permission of the Dean (R&D) / Director, the faculty members of the Institute can accept retainership of the reputed organizations. The fees thus earned shall be shared by the Institute and the Individual in the ratio of 3: 7 only after payment of service tax, etc. as applicable. For this purpose, the faculty concerned may utilize one day per week of four days in a month during an academic year with the specific approval of the Dean (R&D) provided alternate arrangements for classes and other commitments are made by faculty members. This applies to research and consultancy projects too.

8. Software marketing (Proposed):

All software duly copyrighted may be marketed and the sale proceeds thus accrued shall be shared between the Institute and the software consultant(s) as per Industrial Consultancy rules for the first copy and in the ratio (3:7) for the subsequent copies after payment of applicable taxes like service tax. If the subsequent copies sales involve training and their supporting services, the rules of consultancy (with no contribution towards use of Institute computing facilities) shall be applicable. If the marketing rights are transferred, the terms and conditions shall be determined as per Technology Transfer Rules.

9. Duties and responsibilities of the Principal Investigators (PIs):

- Sponsored Research and Consultancy projects shall be undertaken only with the prior approval of the Dean (R&D). All research project proposals are to be submitted to the R&D Unit for endorsement of the Dean (R&D) before onward transmission to the funding agency. In case of on-line submission, the PI needs to submit a copy of the proposal to the R&D Unit for endorsement of the Dean before on-line submission.
- It shall be the responsibility of the PI to get the project work completed satisfactorily within the sanctioned grant and duration.
- The PI shall ensure that the head-wise expenditure does not exceed the budgetary allocation. For effective control, periodic (or as and when required) expenditure details shall be made available to PIs by the R & D Unit.
- The PI shall maintain the details of equipment purchased out of project funds separately for each project. He / She shall send a copy of it to Dean (R&D) for placing the same before the Govt. Audit for verification.
- The PIs shall be responsible for submission of periodical and / or final technical report (s) of the project work as may be required by the sponsoring agency. He / She shall also send a copy of the final technical report to Dean (R&D).
- The PI shall write to the sponsor for timely release of funds with a copy to the Dean (R&D) for follow up. R&D Unit will provide the un-audited /audited statement of accounts to PIs for forwarding the same to the sponsor.
- The PIs shall sanction / control the leaves due to the contractual employees working in their projects under intimation to the R & D Unit.

10. Financial benefits to PIs / Co-PIs and project staff:

- Within the framework of a sponsored project, PIs shall be permitted to have consultancy fee / honorarium, if the sponsor so approves. The consultancy fee / honorarium thus received shall be shared between the PIs and the Institute in the ratio approved by the Institute.
- PIs shall be allowed to work full time during the vacation in the projects and get suitable

honorarium as approved by the Institute (in lieu of vacation) for such period, provided the funds under salary provided by the funding agency so permits.

- Depending on availability of funds under Travel head and with the approval of the Dean (R&D), expenses (TA, DA, Registration Fee, etc.) for presenting papers in National Conferences in fields relevant to the project, shall be given to PIs/ Co-PIs from the project fund provided such visits are approved by the Dean.
- On recommendations of PIs, contractual project staff and students working in projects may be permitted with approval of the Dean (R&D) to present papers in national Conferences with TA, DA and Registration Fee support provided the funds are available under Travel head of the project.
- The PIs shall prepare project proposals keeping
- The prevailing scholarship/ consolidated salary,
- General qualifications and experience for staff required,
- Rules of the R&D in mind. All such proposal requires approval by the Dean (R&D).

11. Exception clause:

These R&D Regulations shall normally be applicable to all research projects, consultancies, testing services retainership, software marketing, technology transfer, intellectual property rights. Any exception / deviation to these rules may be considered by the Principal / Competent Authority for approval depending on the merits of the case.

12. Faculty Development Fund (FDF) & Department Development Fund (DDF) (Proposed):

A portion of the Institutional overhead taken from the research and consultancy projects will be available to the PIs as Faculty Development Fund (FDF) and to the Departments/ Centers as Dept. Development Fund (DDF) to meet the expenses related to professional development as given below:

- a) 10% of the Overhead charges is to be kept under the Faculty Development Fund (FDF) for the Project Investigator (PI) and the Co-project Investigator (Co-PIs). The percent distribution among the PI and Co-PI(s) will be approved by the Dean on the recommendation of the PI.
- b) 15% of the Overhead charges is to be kept under the Department Development Fund (DDF). The PI/ Co-PI is allowed to use the FDF for procurement of Laptop, Mobile Phone and Computer Accessories etc. Besides the PI/ Co-PI may also meet the expenses of official foreign travel partially from this fund, if R&D budget is inadequate and for other similar purposes.

13. Procurement Procedures:

All the purchases related to sponsored projects should be made as per the approved purchase guidelines of the Institute. However, some deviation in the purchase rules of the Institute could be made, to make the R&D related purchases faster and flexible, with the approval of the competent authority.

14. Management of Centres of Excellence:

The Centres of excellence funded by various funding agencies will operate as independent R&D cells in the institute. The Chairmen/ Heads of the centres, appointed by the competent authority will have financial and academic administration responsibility as approved by the competent authority. However, financial management of these centres will be the responsibility of the R&D Unit.

8. Product Development Centre (SP-PDC)

Vision of PDC

To bring-out the overall development of students in the sphere of innovation, to instil a sense of creativity in sync with technical aspects to harness invention and innovation.

Mission of PDC

- To convert project to prototype for commercialization
- To develop and test hardware/Software products
- To provide technology support for creative product development
- To develop skills required for end-to-end and competitive product development.
- To provide infrastructure support and guidance for students group awarded by industry

About PDC

- It has been newly established on campus to support the industries to grow and develop their businesses through innovative products and services. The main industrial electronics, power electronics, automation and Communication. The services provided by this center to industries are as follows:
 - Technology support for new Marketable product development
 - To take outsourcing system-design jobs from the existing projects in industry and deliver them promptly related to above domains
 - To take up consultancy jobs to help industries in solving specific issues
 - To work on development of next generation products in the field of renewable, electric vehicles and IOT Applications
 - Mentorships for competitive product development
 - To offer a platform to Alumni, students and faculties for converting their ideas into marketable products
- **Infrastructure Funding:** A financial support of INR **15,00,000** has been provided for establishment of **PDC** by **SP-IT Alumni Network** with the aim at undertaking product development jointly with Alumni & industry experts. The center provides working space enabled with high speed computers and other software required for product development. We encourage students and faculty to develop various products by using this facility. Presently PDC is having almost INR 50 Lakhs worth projects from industry.

8. R & D Glimpses

- **Ongoing Project under PDC**

- a) **BioMS:** Funded by TI-IIDC 2018-19

Product: Self adapting and actuating prosthetic leg for above knee amputees.

Description: BioMS utilizes state of the art machine learning methods to understand the human gait thoroughly and devised a product which is a prosthetic leg, dynamic in nature. It adapts to the user's walking style and stance, as such uses only non-invasive sensors fastened to the user's legs and thighs.

- b) **Starlyte:** Funded by TI-IIDC 2018-19

Product: Road Borne Light Powering System.

Description: Starlyte is a self-powering system that generates electricity using the movement of vehicles. This generated electricity will be stored in a storage unit that can be used to power nearby amenities.

- c) **Industrial Signal Simulator:** Funded by TI-IIDC 2018-19

Product: Integrated Multifaceted Signal D3GS (Debugger, Controller, Calibrator, Convertor, Generator, Simulator) using IoT for Industrial Usage.

Description: This device provides error detection, sensor calibration, generation of industrial standard signals, conversion of standard signals to the required industrial standard signal along with IoT features and DBMS associated with an Android App for the remote controlling and monitoring.

- d) **Aqua Care:** Funded by TI-IIDC 2018-19

Product: Aquaculture Monitoring and Feedback System.

Description: The system provides a complete solution to monitor all vital water parameters namely pH, turbidity and temperature in real time and gives the farmer immediate alerts in case of a problem

- e) **High Power Battery Charger:** Funded by General Auto Electric corporation

Product: 4.5kW Battery Charger for the Indian Railways

Description: GAEC is looking for the development of a Battery Charging Systems compatible with Railway's requirements and specifications. The proposed DC-DC converter is air cooled/naturally cooled, high conversion efficiency, safety, protection, temp, shock and vibration, as per standards (IEC/EN;UIC/AAR; and IS).

- f) **Universal Solar Pump Controller:** Funded by Sileaf Tech. Pvt Ltd, Pune

Product: Universal controller for powering any agrarian load from solar energy.

Description: Development of Universal Controller to work for water pump sets of capacities ranging from 3 HP to 10 HP and for other types of motors used in agriculture equipment.

- g) **Controller for Induction Casting Machine:** Funded by Riddhi-Heatron

Product: Controller for jewelry casting machine using induction heating

Description: The controller should provide auto-frequency tracking features with different coils and the prototype controller PCB must be tested successfully in the field at the Machine Capacity of 12kW with IGBT based High frequency Inverter.

- h) **Development of Software Applications to Maintain Service Calls:**

Funded by Suyog Telematics

Product: Application to monitor maintenance activities

Description: Mobile application for servicing maintenance calls, opening and closing of maintenance service tickets and keeping track with all the data-bases stored in cloud server

to track history and record. This application also needs to develop a maintenance-website and two mobile applications linked to that one for service people and another for an administrator.

i) **Student Attendance report:**

The S.P.I.T. The app aims to help students by providing an easy way to view and keep a track of attendance and also stay updated with all the updates or announcements regarding results, events, seminars/talks and urgent notices and also timetables. Parents can stay in loop with their ward's attendance and performance in college.

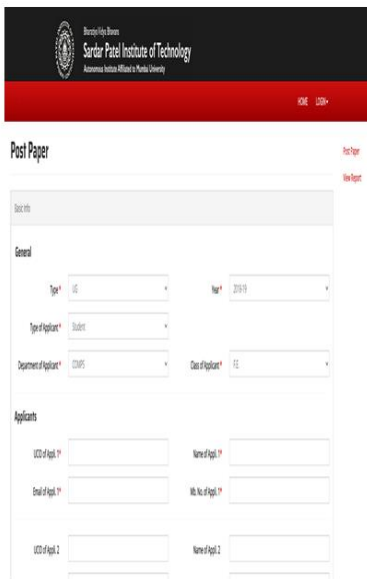
j) **Student Research Paper Evaluation:**

This is an online website which stores publication details of students, research scholars and faculty. This is a common repository of all publication data. Reports from this website helps to understand student wise, department wise faculty wise, conference wise, journal wise publication details.

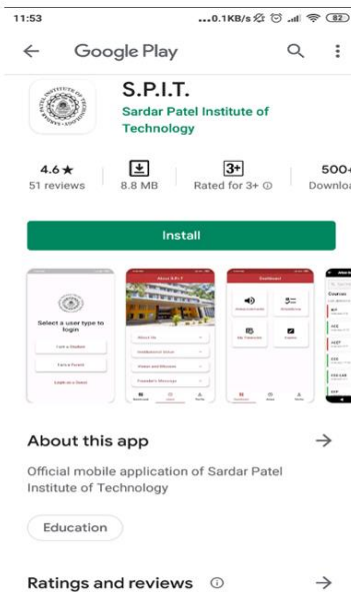
k) **Student performance evaluation:**

This is a framework based dynamic website developed to decide best student of the year. Students who wish to apply for the best student will apply giving all their information such as academic, research publication, project publication, extra-curricular activities. Based on the submission admin will give marks as per the information. Reports generated will rank the student based on their performance

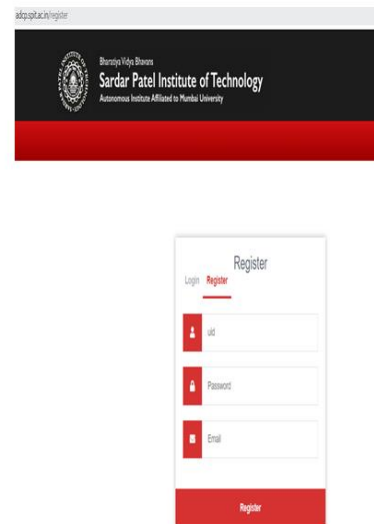
Some photos of Software Products:



PDC 1: Portal for reimbursement of paper publication



PDC 2 : S.P.I.T Mobile App for attendance



PDC 3 : portal for Student Performance

Some photos of Hardware Products:



Some photos of PDC Infrastructure



Some photos of Exhibition and Feedback from Industry:



A. Technical Research Paper Presentation and Project Exhibition

To encourage a research aptitude and provide a competitive environment, the R&D Cell Conducts Technical Paper Presentation and Project Exhibition competitions every year for final year students of the college. The Technical Paper Presentation competition evaluates the research paper writing skills and paper presentation skills of students using a set of specialized rubrics for evaluation. The purpose of this competition is to help students to actually engage in writing quality research papers and thus publish in various conferences and journals. The project exhibition competition allows students to demonstrate their projects and are generally evaluated by industry experts like Quantiphi, Capgemini, Zeuva (SP-TBI Start up), RGM Technologies Pvt. Ltd, Bitgenie Pvt. Ltd., Liminal Pvt. Ltd, etc. This gives student valuable insights to help them think and conceptualize their idea from a product based point of view.



Glimpses Technical Paper Presentation and Project Exhibition Competitions

B. Reimbursement Policy

The R&D Cell provides a reimbursement of up to INR 5000 per title to encourage students for paper publication. In the last 3 years, our students and faculty have published close to 500 papers in various reputed conferences and journals. Research patents are drafted and filed on a yearly basis by SP-IT students and faculty through the IEDC cell. Some of these patents are converted into business models, some of them converted to products.

C. Participation in Events

SP-IT encourage students to participate in various research oriented events like hackathons and other projects for exposure to real-world problems in a competitive world. Every year, about 15-20 groups consistently participate in very reputed and recognized competitions like Texas Instruments, E-Yantra, Smart India Hackathon. Our students have done us proud and have been winning prizes at several such competitions over the years.

D. Funded projects

SP-IT faculty members work on funded projects and collaborate with industry for consultancy opportunities every year. Every department has professional forums who organize and assist several activities within the department and institute.

E. Workshop

Several workshops/talks based on research related activities like paper writing, patent drafting are arranged and organized by the R&D Cell on a regular basis. Such workshops help with improving the overall research environment and creating opportunities for publishing research papers, articles in conferences and journals and drafting patents.



F. Grant (DST / SICOM/SP-TBI)

- With continuous follow up with DST and by showcasing our suitable environment we were able to get support from DST for setting up a full-fledged TBI and received grant for Recurring/Non recurring expenditure to the tune of 4-17CR for period 5 years 2015/2016.
- The setting up infrastructure and sharing of progress report of TBI resulted in getting approval of SEED FUND of INR 10CR towards NIDHI Fund for encouraging start up for which the first installment of 2CR has been received
- Due to SP-IT great interaction and consistent follow up SPIT were able to get CSR support from SICOM for INR 50 Lakhs.

Revenue generated from consultancy and corporate training during the last five years

| Name of the faculty consultant or trainer | Organization to which consultancy or corporate training provided | Dates/duration of consultancy | Amount generated in INR Lakh |
|---|--|--------------------------------------|-------------------------------------|
| 2022-23 | | | |
| Dr. Rajendra Sawant | Design and development of Digital Controller for Induction Casting Machine) DST fund | 1 year | 70.2 |
| Dr. Reena Sonkusre , Dr. R.R.Sawant , prof. Priya Deshpande | KPEC (smart energy meter) | 6 months | 2 |
| 2021-22 | | | |
| Dr. Rajendra Sawant , Dr. Y.S.Rao | General Auto Electric Corporation | 1 year | 1.5 |
| Dr. Rajendra Sawant, Dr. Y. S. Rao | Sileaf Technologies, Pune | 1 yr | 2 |
| Dr. Rajendra Sawant , Dr. Y.S.Rao Dr. G.T.Haldankar | Riddhi Heatron | 1 yr | 1 |
| 2020-21 | | | |
| | NIL | | |
| 2019-20 | | | |
| Dr. Pooja Raundale | Indian Daily times Mumbai | 1 year | 0.54 |
| Dr. Arti Karande | smartly built | 1 year | 0.06 / student per month |
| 2018-19 | | | |
| Dr Rajendra Sawant, Dr Y S Rao, Dr Rajendra Sutar | HardCarb | 1 year | 1.85 |
| Dr Rajendra Sawant | Suyog Telematics | 1 year | 1 |
| Dr Rajendra Sawant | Zeuva Automotive Pvt. Ltd. | 1 year | 1 |

Number of research projects per teacher funded by government, non-government , industry, corporate houses, international bodies during the last five years

| year | 17-18 | 18-19 | 19-20 | 20-21 | 21-22 |
|-----------------------------------|--------------|--------------|--------------|--------------|--------------|
| amount | 2.44 | 2.12 | 4.95 | 0 | 0 |
| of teachers who received g | 7 | 7 | 16 | 0 | 0 |

Teachers receiving national/ international fellowship/financial support by various agencies for advanced studies/ research during the last five years

| | | | | | | |
|--------------------|-------|-------|-------|-------|-------|-------|
| year | 17-18 | 18-19 | 19-20 | 20-21 | 21-22 | 22-23 |
| number of teachers | 90 | 89 | 87 | 68 | 71 | |
| received awards | 1 | 1 | 0 | 2 | 0 | 0 |

Journal Publications

| | | | | | | | |
|--------|------|------|------|------|------|------|------|
| Year | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 |
| papers | 24 | 22 | 21 | 29 | 26 | 12 | 15 |

Number of functional MoUs/linkages with institutions/ industries in India and abroad for internship, on-the-job training, project work, student / faculty exchange and collaborative research during the last five years

| Year of signing MoU | Name of the organization with whom MOU/Collaboration being signed | Duration | Purpose of MOU/Collaboration |
|---------------------|--|-----------------|--|
| 2017-18 | | | |
| 2016-17 | Centre of Excellence in Basic Sciences, University of Mumbai-Dept.of Atomic Energy(UM-DAE-CEBS) and S.P.I.T. | 5 Years | for academic and research collaboration. |
| 2017-18 | Aps GmbH European centre for mechatronics | | Consultancy Project |
| 2017-18 | SKIN and VD Department Seth GS Medical college and KEM Hospital | 2 years | for academic and research collaboration. |
| 2017-18 | Riddhi Heatron | 1 Year | Consultancy Project |
| 2017-18 | Imagin XP | 3 years | PG Diploma |
| 2017-18 | Alma shines technologies ltd. | 2 years | portal services |
| 2018-19 | | | |
| 2018-19 | Fontys university of applied sciences | on yearly basis | faculty-student exchange project development |
| 2018-19 | north-south foundation | 3 years | providing scholarship Research and Development |
| 2018-19 | XinFin Fintech Pte-Ltd. | 3 years | expert accesses to block chain technologies |
| 2018-19 | Credit Suisse Business Analytics Pvt. Ltd. | 3 years | research and development |
| 2018-19 | digital Dojo | 3 years | research and development |
| 2018-19 | Suyog Telematics Mumbai | 1 Year | Consultancy Project |
| 2018-19 | Zeuva Automotive Private Limited | 1 Year | Consultancy Project |

| | | | |
|-----------------|--|---------------|---|
| 2018-19 | Hardcarb Tech Pvt Ltd | 1 Year | Consultancy Project |
| 2018-19 | General Auto Electronic Corporation | 1 Year | Consultancy Project |
| 2018-19 | Sileaf Technologies Private Limited | 1 Year | Consultancy Project |
| 2019-20 | | | |
| 2019-20 | ZARGUN Electronics and Science pvt. Ltd. | 9 months | internships |
| 2019-20 | SGGS intitute of Engineering and Technology | 5 years | Research and Development |
| 2019-20 | Smartly Built | 3 to 6 months | Research and Development web designing |
| 2020-21 | | | |
| 2020-21 | G.H.Raisoni cOE | 3 years | faculty-student exchange project development |
| 2021-22 | | | |
| 29 June 2022 | crypto university | 3 years | internship,R&D projects |
| 2021-22 | Datagami technologies | 3 yeras | rolling specialised programs |
| 2021-22 | COEP | 3 yeras | faculty-student exchange project development |
| 2021-22 | Bombay College iof Pharmacy and UoM | 5 Years | faculty-student exchange project development |
| 2022-23 | | | |
| 2022-23 | VJTI | 3 years | faculty-student exchange project development |
| 2022-23 | Fr. CRCE | 3 years | faculty-student exchange project development |
| 2022-23 | Walchand College of Engineering | | |
| 2022-23 | Thakur college of Engineering and Technology | 3 years | faculty-student-internship-IOT- lab-interactionn |
| 2022-23 | Ramdeobaba College of Engineering Nagpur | 3 years | faculty-student-exchange-lab- development |
| 2022-23 | S.P.C.E.-SPTBI | 5 years | Idea lab development , innovative ideas exchange |
| 2022-23 | A.G. Patil Solapur | 3 years | faculty-student exchange project development |
| 2022-23 | Bombay College of Pharmacy | 3 years | strengthen the academic interaction for knowlege and research |
| 2022-23 | KPEC Engineering and Contractors pvt Ltd. | 6 months | Development of Smart energy meter for Residential , industrial , commercial |

Reimbursement Process

| Dept | Section | No. of application received | No. of application accepted | Total Amount Sanctioned |
|---------|---------|-----------------------------|-----------------------------|-------------------------|
| 2018 19 | | | | |
| ETRX | UG | 2 | 2 | 8000 |
| EXTC | UG | 2 | 2 | 9500 |
| COMP | UG | 1 | 1 | 5000 |
| IT | UG | 12 | 10 | 50000 |
| EXTC | PG. | 7 | 7 | 33850 |
| 2019 20 | | | | |
| ETRX | UG | 5 | 3 | 15000 |
| EXTC | UG | 18 | 16 | 80000 |
| COMP | UG | 13 | 11 | 55000 |
| IT | UG | 22 | 16 | 80000 |
| EXTC | PG | 2 | 2 | 70000 |
| COMP | PG | 2 | 2 | 10000 |
| MCA | PG | 5 | 5 | 25000 |
| 2020 21 | | | | |
| ETRX | UG | 5 | 4 | 19500 |
| EXTC | UG | 14 | 12 | 60000 |
| COMP | UG | 20 | 18 | 89500 |
| IT | UG | 29 | 25 | 123907 |
| EXTC | PG | 11 | 1 | 48500 |
| COMP | PG | 0 | 0 | 0 |
| MCA | PG | 10 | 6 | 20000 |
| 2021 22 | | | | |
| ETRX | UG | 6 | 6 | 30000 |
| EXTC | UG | 20 | 18 | 80707 |
| COMP | UG | 43 | 40 | 189202 |
| IT | UG | 36 | 36 | 178500 |
| ETRX | PG | 2 | 2 | 7600 |
| COMP | PG | 8 | 8 | 31500 |
| MCA | PG | 8 | 7 | 34600 |
| EXTC | PG | 1 | 1 | 4500 |
| 2022 23 | | | | |
| EXTC | UG | 6 | 6 | 34000 |
| COMP | UG | 21 | 20 | 100000 |
| IT | UG | 27 | 24 | 118446 |
| COMP | PG | 1 | 1 | 5000 |
| MCA | PG | 5 | 5 | 25000 |
| EXTC | PG | 4 | 3 | 15000 |
| ETRX | PhD | 1 | 1 | 8701 |
| COMP | PhD | 0 | 0 | 0 |
| MCA | PhD | 1 | 1 | 9000 |
| EXTC | PhD | 4 | 4 | 26600 |

No. of Student Research Paper Publications

| | No. of Publication |
|-------------|---------------------------|
| 2018 | 20 |
| 2019 | 33 |
| 2020 | 62 |
| 2021 | 104 |
| 2022 | 90 |
| 2023 | 14 |