Best Practice -1

1. **Title: Creating Research Environment in the Institution**

Creating the research eco-system in the institution will greatly improve the knowledge. The research environment in institute is improved in the last five years through creation of additional resources, proper utilization of the research facilities, increasing activities in the emerging areas, and overall research focus of the faculty.

2. **Objectives of the Practice**

- To inculcate research culture both institutional and individual are set a clear research goal
- To devote substantial resources on promotion of research through faculty training and support.
- To create an innovative ecosystem for the fellows available research that includes the student participation.
- Drive to explore, understand, and follow one's own ideas, and to advance and contribute to society through innovation, discovery, and creative works.
- To improve the focus of the faculty on research activities progressively on par with teaching learning processes.
- Recruited retired Scientists from defense research organizations as adjunct faculty to support the research activities in the institution.
- To improve the publications and execution of sponsored projects is in an optimum away.

3. **The Context**

Create an inclusive ecosystem with established frameworks for the success of the whole team, ensuring that everyone has what they need to be their most innovative and effective researcher. Professional development opportunities are routinely and proactively offered to members to assure their continued growth and vitality.

Institute had active research and development activities in the past. However it was observed that the faculty concentrates more on teaching learning and less on research activity, partly because of non-availability of facilities and partly because of difficult nature of work. The career growth opportunities were considered as oriented more towards academic contributions as research contributions.

In this context it became essential to improve the research eco-system in the Institute through :

- Reorganize and remove the constraints in existing facilities.
- Create new research laboratories and centers of excellences in the emerging areas.
- Create a focused faculty group to concentrate on research.
- Incentives for the research activities like publications, execution of projects, innovations, startup activities.
- To encourage organization of value added courses, guest lectures, and conferences and seminars to incubate ideas and debate on the research work of various experts.

4. The Practice

Research emphasis: Research has greater or equal priority than other goals. Research is part and parcel of an institute and a faculty.

Research Culture: faculty members are bonded by shared, research-related values and practices, have a safe home for testing new ideas

To create Positive group climate: The climate is characterized by high morale, a spirit of innovation, dedication to work, receptivity to new ideas, frequent interaction, high degree of cooperation, low member turnover, good leader/member relationships, and open discussion of disagreements

Mentoring: Beginning and midlevel members are assisted by and collaborate with senior faculty and retired scientists.

Communication with professional: faculty members have a vibrant network of colleagues with whom they have frequent and substantive (not merely social) research communication, both impromptu and forma, in and outside of the institution.

Rewards: Research is rewarded equitably and in accordance with defined benchmarks of achievement; potential rewards include money, promotion, recognition, and new responsibilities.

Institute supports:

- Faculty Training and Support Programs
    - Mentoring programs
    - Continuing education courses
    - Grant-writing support and
    - Research funding
- Encouragement of Faculty Collaboration
    - Sponsoring faculty participation in conferences
    - Hosting conferences and symposia
    - Establishing institutional relationships with professional associations, and government bodies.
- Balanced Teaching and Research Responsibilities
    - Developing a culture of research within a teaching-focused unit will likely entail reducing teacher course loads to give faculty more time for scholarly productivity

Creation of new facilities and Improvement of existing facilities :

- A Mechanics of Solids/ Strength of Materials lab with UTM 20 Ton loading is created for advanced studies in Tensile and Compressive test of specimen.
- Computer Aided Design laboratory is established for creating designs for 3D printing.
- Vertical machine center for drilling, milling, forming, friction stir welding.
- Composite laboratory established to fabricate composites.
- Robotics research laboratory is created in association with e-yantra, IIT Bombay, to create awareness on robotic applications for the students and faculty.

- DST-FIST funded - LabView software with add on boards for simulations and creating designs.
- IoT lab with Arduino, Raspberry pi, Wyzbee boards procured for faculty and students research purpose.
- IBM center of excellence for learning new software technologies.
- Cisco research lab for learning advanced technologies.
- Dspace-Microlab Box of worth 16 Lakhs purchased for Matlab Interface with real systems.
- Energy management protocol software purchased.
- High end computing systems are provided in place of existing facilities.
- Online Journal subscriptions are available and remote access is provided.
- Hardcopies of journals in thrust areas are available for the faculty in Library.
- UPS facility provided for all computing labs.
- Wi-fi speed enhanced from 100 Mbps to 700 Mbps
- Given provision to the faculty to use the existing facilities at VFSTR deemed to be university
- Plagiarism software is provided.
- A biogas plant established in the campus with a capacity of producing 10 Kg of Bio Gas per day by using 100kg of food waste from hostel and canteens.

The creation of the above research facilities increased the research activities of all the departments. Faculty is really energized to bring in their new research ideas as they observed that the institute is ready to invest in the facilities.

Academic Flexible Approach:

- The faculty who are actively involved in the research are allotted research targets, and their academic load is reduced.
- The adjunct faculty act as research mentors.
- Qualified faculty are encouraged to apply as Research supervisors in various universities.
- Faculty pursuing Ph.D are given academic leaves for attending course work, review meeting and presenting papers in conferences.
- Academic leaves are given for attending workshops in their research areas.
- Digital resources, required consumables and computing facilities are provided to the faculty.

The above actions resulted in increase of publications and increased submission of project proposals.

Incentives for research activities:

- Cash incentive of Rs.10,000 for every paper published in peer reviewed SCI / Scopus (unpaid) journals.
- Cash incentives of Rs.5,000 for publishing book chapters / books.
- Financial support given to the faculty members to attend national / international conferences / workshops / membership of professional bodies.
- Financial support given for filing patents by the faculty.
- Seed money is provided to the faculty and students to develop their ideas into pre-project level. They prepare project report for submission to funding agencies based on their work

All the above incentives encouraged many faculty members and students to carryout their research activities and to publish good quality papers.

Organization of Research Events:

- To promote research culture among the students series of workshops are being organized in all the departments.
- To provide a platform to research field engineers in working on various application areas are being grouped together by conducting national / international conferences.
- To introduce the latest trend in research to the students and the faculty was conducted through guest lectures, Seminars, Webinars from reputed persons from R&D organizations across India.
- Financial supports are provided to the research events that are organized in the institution.

5. Evidence of Success:

- This resulted in increase of H-index from 5 to 18 during 2016-21.
- Projects worth Rs. 350 Lakh from various agencies MNRE, DST, AICTE, DRDO, IEEE, etc.
- Consultancy projects of worth Rs. 50 Lakh received from private and government sectors
- Obtained DST, FIST fund of worth Rs. 30 Lakh.
- Bagged NIRF ranking (201-250)
- 25 faculty obtained Ph.D and 53 faculty registered for PhD during 2016-21.
- The number of publications per faculty per year on average increased from 2.43 to 4.91.
- Total number of publications in last 5 assessment years is 1647.

Year	**2020-21**	**2019-20**	**2018-19**	**2017-18**	**2016-17**
Journals	115	547	228	138	92
Conference	132	137	62	82	54

- 21 Indian patents were filed from the institute, and 20 are published.

Overall the research eco-system in institute is improved by all the above measures which will be sound foundation for future research activities.

6. Problems Encountered and Resources Required

Hiring/retaining Faculty of excellence both in Research quality/production including conventional/innovative teaching in the institution is a challenging task.

Faculty motivation and ability: To implement research cultural change, strategic plan was developed by the administrators to tailor solutions to faculty members to gain motivations and abilities.

Decrease in teaching resources is a one of the major challenges faced while in creating a research culture is to preserve a unit's effectiveness in other areas, particularly teaching, as the dedication of additional resources to supporting research may decrease those available to support teaching.