

A Joint Proposal to Establish Faculty Development Centre for Engineering Teachers (FDC-ET)

P
M
M
M
N
M
T
T

**Dr. Babasaheb Ambedkar Technological University
(Lead Institute)
Theme: Product Design Engineering**



**Veermata Jijabai Technical Institute -Mumbai
(Sub-Centre)
Theme: Geo-Informatics, Spatial Computing & Big Data
Analytics**



Covering Letter

Table of Contents/Check List

Sr. No	Topic	Included	Note
1	Covering Letter	Yes	
	Executive Summary	Yes	
	Name of the Institute	Yes	
	Name of the Component Applied for	Yes	
	Name and Contact Details of Project Coordinator	Yes	
	Duration of the Project	Yes	
	Summary of Outcome and deliverables	Yes	
2	Background of the University	Yes	
	(a) List of faculty associated with the project with their specialization	Yes	
	(b) International Partnership	Yes	
	(c) ICT facilities available	Yes	
3	Proposal	Yes	
	(a) Rationale	Yes	
	(b) Objective	Yes	
	(c) Implementation Strategy	Yes	
	(d) Activities Proposed	Yes	
	(e) Target Group	Yes	
	(f) Expected Outcome and Specific Deliverables to be achieved	Yes	
	(g) Summary of Outcome and Deliverables	Yes	
	(h) Financial Estimates	Yes	
	(i) Physical and Financial Phasing	Yes	
	(j) PFMS Certificate in case Proposal is accepted	No	
	(k) Future Sustainability	Yes	
(l) In-house monitoring mechanism	Yes		
4	Appendix -I: List of FDPs Conducted so far	Yes	
	Appendix -II: Photos of recently conducted FDPs	Yes	
	Appendix-III Details of twenty proposed FDPs	Yes	
	Appendix IV: Recommendations by RUSA	Yes	
	Appendix V: Training Calendar for next two years	Yes	
5	Course Content on Product Design Engineer	Yes	

Executive Summary

Technical Education in the State of Maharashtra has witnessed an exponential growth in the last decade. More than two thousand technical institutes have emerged within the short period of ten years. Currently about four lakhs students are enrolled in these institutes for various technical programs. Providing quality education to such a large number of job-seeking students is a major concern continuously expressed by parents, technical institutes, regulating bodies, and funding agencies.

Further, the State Project Directorate of Rashtriya Uchcharat Shiksha Abhiyan (SPD-RUSA), Government of Maharashtra, had set up a Consultative Committee under the Chairmanship of the hon'able vice-chancellor of DBATU, Dr. V G Gaikar, to propose various courses to be included in the engineering curriculum with a view to improving the skills and employability of graduates and post-graduates passing out from the state universities and colleges. The committee comprises of expert from academic and Industries background with more than 20 years of experience. The members include, Dr. Dinker, Professor in Department Mechanical Engineering from Walchand College of Engineering, Dr. Jagannath Aghav - Professor, IT & CS, at College of Engineering Pune, Dr. V.M Phalle, Professor, VJIT, Mumbai, Dr. Nitant Vishnu Mate, Partner, See Green Solutions LLP, Mr. Anand Pillai, Education Lead India and Saarc at Autodesk, Mr. Pushkaraj Kaulgud, Associate Vice President- Education Services & Initiatives, Tata Technology, Mr. Yudhisther Yadav, Regional Lead - Western India, IT-ITeS Sector Skills Council NASSCOM, Mr. Shubham N. Chatterji, Industry expert, SAS Institute (India) Pvt. Ltd. After analysing the skill gaps of the students enrolled in various courses across the state, the Committee recommended to introduce courses on **Product Design Engineering and Geo-Informatics, Spatial Computing, and Big Data Analytics** in the curriculum of all engineering programs and to design faculty development programs to train teachers on this specific topic (*Appendix-IV and V: Draft Recommendations*).

As a step towards realising State Government's policy on technical education, SPD-RUSA proposes to establish a Faculty Development Centre for Engineering Teachers (FDC-ET) under Pandit Madan Mohan Malaviya National Mission for Teachers and Teaching (PMMMNMTT). The proposed centre, will be established through *hub-spoke model of collaborations among academic institutes*. Dr. Bababsaheb Ambedkar Technological University (DBATU), the state affiliating technical university (ATU), will act as a lead institute and Veermata Jijabai Technical Institute (VJTI), an Autonomous Central Technological Institute, *Maharashtra State*, will act as one of the training sub-centers. This proposed FDC-ET, will act as the nodal agency for training engineering teachers for the entire state of Maharashtra.

The proposed centre, FDC-ET, aims to attain three objectives. The first, short term goal is to undertake massive training programs in which more than 2000 engineering teachers will be trained to enhance their domain specific, and professional skills through about 59 proposed FDPs in the three years. The teachers shall be trained in specific areas of Product Designs and *Geo-Informatics, Spatial Computing, and Big Data Analytics* covering allied disciplines of Engineering and Technology, as suggested by the expert committee constituted by RUSA, Maharashtra.

The second, long term objective is to develop a course curriculum for engineering disciplines centered around the speclized themes. The curriculum has been defined by the RUSA consultative committee. This aims towards improving the skill development and campus placement of the students in the universities.

The third objective is to build a network of trainers from academia and industry with practical experience to conduct the training for the engineering teachers.. A few experts, with minimum experience of at least 15 years in innovation and passion for sharing their expertise with students, have been already identified as resource persons for the Centre who shall be invited as adjunct faculty.

The activities initiated by the proposed FDC-ET can be sustained over a long period through the resources generated and reputation built by conducting quality programs during its initial years. Support under PMMMNMTT is, however, a must during this gestation period not only for financial reasons but most importantly being a central government scheme, it will build trust about the quality of the FDPs conducted by the Centre, among the engineering teachers who are mostly from private institutes.

The major deliverables of the proposed FDPs include: (i) Curriculum Development along with ready-to-use course materials for training programs in emerging technologies that are relevant for next ten years and, (ii) availability of more than two thousand teachers trained in the emerging areas of technology to transfer the knowledge to the next

generation of engineers and (iii) improved campus placement and employability of the students in the engineering colleges.

The SPD-RUSA has already taken few steps towards implementing the proposed FDC-ET by identifying thrust areas for teacher's training. Skill gap reports prepared by NSDC for the state of Maharashtra, training capacity of engineering institutes in the state of Maharashtra, and the training requirements of engineering teachers from the colleges affiliated to DBATU were considered to define the thrust areas. The thrust areas decided for training includes: (i) Product Design Engineering, (ii) Industrial Automation (iii) Big Data Analytics (iv) Process Safety and (v) Spatial Data Analysis. The SPD-RUSA has started promoting synergistic collaboration with local industries and academic institutes to promote the training of the faculty members. Organizations like, Centre for Chemical Process Safety, USA, and Industries like BOSCH, GEXCON, Tata Technologies Ltd., NASSCOM and local Chambers of Industries and Commerce have agreed to share their expertise in these areas.

DBATU and VJTI with its rich experience of conducting FDPs and its strength of quality faculty members, most of them with doctoral degree from IITs, will successfully implement the project of establishing faculty development centre within the time-frame and guidelines stipulated by PMMMMNMTT.

1. Introduction

Name of the Institute:	Dr. Babasaheb Ambedkar Technological University Lonere Tal. Mangaon Dist. Raigad 402 104
Name of the Component Applied for	Forwarding Authority: Dr. Vilas G Gaikar, Vice-Chancellor Component 4: Faculty Development Centre Title of the Project: Faculty Development Centre for Engineering Teachers
Name and Contact Details of the Project Coordinator	(1) Dr. Arvind W Kiwelekar, Coordinator DBATU Associate Professor Computer Engineering Dr. Babasaheb Ambedkar Technological University Lonere Tal. Mangaon Dist. Raigad 402104 Email: awk@dbatu.ac.in Mobile: 9890456659 (2) Dr. Valmik B. Nikam Coordinator VJTI Associate Professor Computer Engineering and Head Veermata Jijabai Technical Institute, Matunga, Mumbai Email: vbnikam@vjti.org.in Mobile: 7666259200
Duration of Project	The duration of the proposed project will be of THREE years beginning from April 18 to March 2020 . The Centre will be self-sustaining after three years of initial funding.
Summary of Outcomes and Deliverables	<p>The Faculty Development Centre for Engineering Teachers for Product Design (FDC-ET) proposed to be established under Pandit Madan Mohan Malaviya National Mission on Teachers and Teaching (PMMMNTT) aims to develop course curriculum for engineering disciplines centred around the specialized themes identified by SPD-RUSA to enhance employability of engineering graduates.</p> <p>The proposed centre, will be established through <i>hub-spoke model of collaborations</i> among academic institutes. Dr. Bababsaheb Ambedkar Technological University (DBATU), the state affiliating technical university (ATU), will act as a lead insitute and Veermata Jijabai Technical Institute (VJTI), a premier technical institute, will act as one of the sub-centers. The geographical scope of the institute shall be the State of Maharashtra.</p> <p>The main objectives set for this project are:</p> <ul style="list-style-type: none">• To undertake a massive training program to enhance domain specific, pedagogical, and professional skills of engineering teachers. <p>One of the recommendations of the consultative committee of SPD-RUSA is to undertake massive training program of the engineering teachers on various specialized topics and pedagogical skills.</p> <p>Hence, we propose to conduct at least Fifty-Seven faculty development programs on curriculum development in specified areas with emphasis on Product design, GIS, subject-domain topics, pedagogical theories, technology enhanced teaching and learning methodologies and professional courses to build the capacities of next generation of</p>

academic leaders. The course design for the FDP program have been proposed by the consultative committee constituted under the directive of RUSA, Maharashtra (Appendix). The year-wise breakdown of FDPs to be conducted and teachers to be trained are given below.

FDPs to be conducted	2018		2019		2020	
	DBATU	VJTI	DBATU	VJTI	DBATU	VJTI
	14	5	14	5	14	5
Participants per FDP	40					
Number of Teachers to be trained	760		760		760	
Total number of Teachers to be trained	2280					

The topics for FDPs to be conducted are listed along with their course objectives and contents in Appendix V. The underlying theme of all the domain specific FDPs is to provide knowledge and skills about the technologies that will influence product design in the coming decade.

The conduct of proposed FDPs is further justifiable on the observations made in the report of *AISHE 2015-16* that the *majority of engineering teachers (80% out of total 21,050) are post-graduates without any industrial or research exposure*. Our aim is to reach as many teachers as possible to meet their training needs.

- **To improve the employability of the students and to promote product innovation and entrepreneurship.**

It is expected that the ‘Train the Trainers’ approach shall percolate to the students in colleges and make them suitable to take up challenges in the dynamic technology landscape and thus improving their employability. We should be able to increase the campus placement by 15% every year in the next three years. In addition, the courses shall promote new product design and innovation, possibly leading to new businesses and generation of employment opportunities. The faculty shall be also trained specifically in entrepreneurship, leadership skills and financial management.

- **To develop course curriculum for engineering disciplines centred around the theme of employability.**

One of the major objectives for setting Faculty Development Centre is to initiate curriculum reforms with a view to improving the *skills and employability of graduates and postgraduates*. For this purpose, RUSA, Government of Maharashtra had set up consultative committee (Appendix IV) to recommend the courses and implementation strategy. One of the recommendations of the Committee is to develop the courses on Product Design Engineering and GIS. The other courses like Data Science, Clinical Data Management, Industrial Automation and

Chemical Process Safety, which will also be a part of the FDP was recommended by DBATU.

The proposed FDC-ET aims to develop course-curriculum in which different competencies will be identified and acquired skills will be graded based on the competency levels. The courses will be designed with the involvement of experts from industries. An executive committee for FDC-ET has been constituted which includes four experts from industries having more than 15 years of industrial experience.

- **To Create technological infrastructure for conducting teacher's training program:**

We propose to create a State-of-the-Art infrastructure comprising of seminar rooms, training labs, faculty rooms, and guest house for participants to conduct faculty development programs on continuous basis for product Design in all disciplines of engineering and technology. The physical infrastructure is necessary to develop FDPs beyond the period of project duration.

- **To develop a self-sustaining mechanism for long-term functioning of the FDC-ET** A network of trainers will be built so that the activities initiated by the proposed FDC-ET can be sustained over a long period. The activities of proposed FDC-ET will be continued with the resources generated and reputation built by conducting quality programs in its gestation period.

The *major outcomes and deliverables* of the project include:

- 1) **Availability of training Modules on emerging topics.**

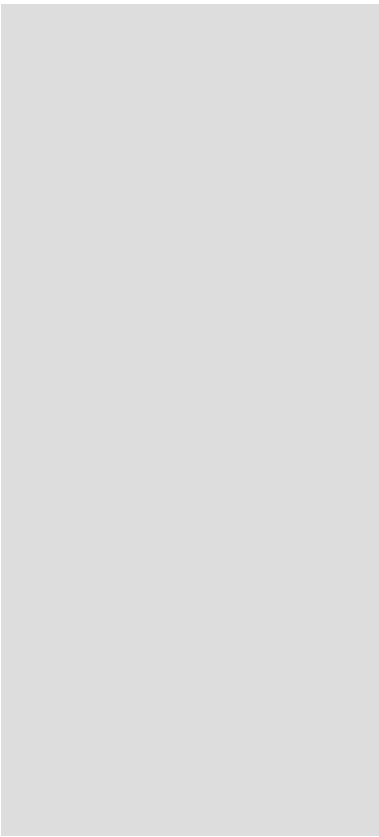
The main aim of the project is to develop course curriculum which will include instructional modules, assessment modules, and suggested teaching methodologies (e.g., Flipped classroom, collaborative learning, supervised classroom etc.) for the emerging topics on Product Design, Cybersecurity, Industrial Automation, Logistics Management, and Chemical Process Safety.

The developed training material will reduce the cost of training in future and it will also be a source of generating revenues to sustain training programs after the project duration.

- 2) **Increased availability of professionally competent engineering teachers.**

The successful conduct of planned FDPs will lead to the availability of more than two-thousand engineering teachers trained on diverse professional skills, domain specific knowledge, research and development methodologies. The trained teachers will be able to demonstrate in-depth understanding of the technological, societal, legal, and cultural issues relevant to engineering practices.

- 3) **Increased number of graduate placement through campus**



recruitments. The majority of the training programs will be conducted in the areas where greater number of job opportunity has been envisaged by National Skill Development program for the State of Maharashtra. Though the aim of proposed FDPs is to train the trainers, the trained teachers will transfer the acquired skills to their students increasing their employability.

An increase of at least 15% on year-to year basis in graduate recruitment through campus placement is targeted because graduate's competencies will match with the required skill-set for job-work and network established through the trainers invited to conduct FDPs.

4) **An infrastructure to sustain Faculty Development Programs in future.**

The project shall also establish a physical infrastructure comprising of Seminar Rooms, Faculty Rooms, Guest House, ICT infrastructure to conduct FDPs and seminars in future.

The created infrastructure will be utilized solely to offer training programs for in-service teacher, conduct induction programs to newly recruited teachers, and to host conferences for demonstrating experiences, case-studies and best educational practices.

2. Background of the University

About DBATU (Lead Institute)

Dr. Babasaheb Ambedkar Technological University (DBATU) is a Affiliating Technical University of the State of Maharashtra. The Government of Maharashtra granted the status of *affiliating technical university(ATU)* to DBATU in year 2014 and it started its functioning on 2nd March 2016. As an affiliating technical University, the role of DBATU is to bring uniformity and quality in technical education programs in the disciplines of Architecture, Engineering & Technology, Pharmacy and Hotel Management and Catering Technology (HMCT) offered by various government and private institutes across the State of Maharashtra.

The university received the UGC recognition under Section 12(B) in the year 2005 and NAAC accreditation in year 2015. Seventy-Two colleges mainly private institutes offering UG, PG, programs in Architecture, Engineering and Pharmacy are affiliated to the university to date. Within next five years, 368 engineering colleges, 180 Pharmacy, 84 Architecture and 54 HMCT colleges are expected to get affiliated to the University.

The functions of DBATU are governed by four Regional Centres (RCs) located at Aurangabad Mumbai, Nagpur, Pune, and five Sub-Centres (SC) located at Amravati, Jalgaon, Nanded, Kolhapur, and Solapur with headquarter at Lonere, Raigad. Extensive use of information and communication technology to effectively implement academic and administrative processes is the hallmark of the University, which has been recognised through awards received from National and International agencies (Appendix- II).

With more than fifty experienced and qualified engineering faculty members, most of them with PhD degree from IITs, the Main Centre at Lonere is poised to play a leading role to build the capacity of engineering faculty members from affiliated colleges. The main centre at Lonere so far has conducted more than 70 *Faculty Development Programs (FDPs)* and supported them through the grants received from ISTE/AICTE/UGC and TEQIP funds (Appendix-I). More than thousand engineering teachers were trained on diverse topics from the disciplines of Mechanical, Chemical, Civil, Electrical, Information and Computer Engineering. A strong network of domain experts willing to share their knowledge and skills with budding engineering teachers has been built as a result of this continued education programs.

List of Faculty with their specialization to be involved in the Project

Core Working Team (DBATU)

Sr. No	Name and Designation of faculty member	Highest Qualification	Role in the Project
1	Dr. A W Kiwelekar Associate Professor in Computer Engineering	PhD IIT Bombay	Coordinator
2	Dr. Neeraj Agrawal Associate Professor in Mechanical Engineering	PhD IIT Madras	Co-coordinator
3	Dr. Brijesh Iyer Assistant Professor in Electronics Engineering	PhD IIT Roorkee	Domain Expert
4	Dr. S M Pore Associate Professor in Civil Engineering	PhD IIT Roorkee	Civil Consultant
Core Working Team (DBATU)			
1	Dr. V B Nikam Associate Professor and Head in Computer Engineering	PhD	Coordinator
2	Dr. B B Meshara, Professor in Computer Engineering	PhD	Domain Expert
3	Dr. S Y Mhaske Professor in Civil Engineering	PhD	Domain Expert

International Partnership for

Few institutes like Department of Education at Stanford University and Institutions in Finland

schools of education	and United Kingdom have been identified as role models to develop the proposed Curriculum Development & Teachers' and Staff Training Centre (CDTSTC) and to get resource persons in pedagogy and leadership. However, a formal partnership is yet to be established.
ICT facilities available	<p>ICT infrastructure at DBATU: The University's main campus which includes hostels, residential premises and academic buildings at Lonere is completely networked through optical fibres, Ethernet and Wifi. The Internet bandwidth of 1Gbps has been made available through NKN under MHRD's project. In addition, internet services are also accessed through Reliance Jio's WiFi service. A centralized computing facility hosting 125 PCs is available. Additionally, each University Department has its own computer laboratories. Each classroom in the main building has LCD facility installed to deliver lecture sessions also the department of computer engineering has recently installed recording and web-based streaming facility. These facilities are extensively used to access learning material available at MOOC platforms such as NPTEL, Coursera.</p> <p>ICT infrastructure at VJTI: The major ICT resources available at VJTI are as below:</p> <ol style="list-style-type: none"> 1. Two internet leased lines each of 100 Mbps bandwidth for high speed and load balanced performance of huge data access. 2. Cyber room for cyber security, authentication, and flexible user access provisioning for more than 5000 users. 3. Firewall, proxy servers, and VPN services available to make secure and reliable access. 4. Teachers and students level of free access to the use of ICT in our institute 5. Educational Video Repository, and open access to global learning audio video resources

3. Proposal to establish Faculty Development Centre for Engineering Teachers in Product Design

Rationale

The establishment of a dedicated Faculty Development Centre for Engineering Teachers is motivated by following key challenges faced by Universities and Teaching institutes.

- **Outdated curriculum followed by engineering institutes.** Majority of the engineering institutes, particularly affiliated to conventional universities, face the problem of revising their curriculum to keep pace with the changes in technologies because of administrative processes and lack of flexibility required in curriculum design.

The issue can be solved by prescribing a model curriculum under CBCS which offers flexibility to choose courses based on preferences of students. The curriculum have been proposed by the consultative committee constituted under the directive of RUSA, Maharashtra. The improved the curriculum will allow the students to have better skill-sets, which will enable the students to have an added advantage during campus placement.

- **Large number of under-qualified engineering teachers** A survey conducted under Rashtriya Uchchar Shiksha Abhiyan (RUSA) and by National Skill Development Council¹ observe that a majority of college teachers in Engineering institutes has Master's degree or Bachelors' degree. Most of the technical teachers, i.e. almost 82% of surveyed teachers, also have no exposure to industry or research practices. Teachers without research and industrial experience are suitable only to disseminate information but lack capacity to generate knowledge. The minimum qualification possessed by them is hindering the professional development of the teachers as well as of the students taught by them.

In view of the large number of teachers in the need of training, and poor facilities for training of technical teachers almost all over the country including the State of Maharashtra, there is a huge gap between demand and supply of quality teachers. *It is therefore necessary to create infrastructural facilities to conduct FDPs over a long term basis.*

- **Rapid development of technologies influencing product design:** Many new technologies which will influence the product design are emerging on day-to-day basis. Few examples of technologies that will become an integral part of any engineering product in the next decade are Sensors in Healthcare, Smart Designs, Augmented Reality, Artificial Intelligence, Blockchain Technology, Brain-Computer Interaction, Nano-Robot Technology, and Quantum Computing.

Specially, manufacturing industries are gradually adopting the concept of *Smart-factories* or Industry 4.0 in which process automation will be based on Cyber-Physical Systems, Internet of Things, cloud computing and cognitive computing. The traditional issues such as process safety and ethical practices need to be addressed in this ever-evolving technology space.

To make engineering teachers aware of the changes in rapidly evolving technology landscape is the only way to address this challenge.

- **Widespread use of ineffective teaching methodologies.** Majority of engineering teachers still follow the conventional *teacher-centric* didactic method for classroom

Objectives

teaching. One of the drawbacks of this conventional method is that it produces passive learners who fail to solve real-life problems.

This issue can only be solved by training teachers on modern *learner-centric* methods of teaching such as Collaborative learning, experiential learning, flipped classroom and blended teaching.

The **main objectives** set for this project are:

- **To undertake a massive training program to enhance domain specific, pedagogical, and professional skills of engineering teachers.**

One of the recommendations of the consultative committee of SPD-RUSA is to undertake massive training program of the engineering teachers on various specialized topics and pedagogical skills.

Hence, we propose to conduct at least **Fifty-Seven** faculty development programs on curriculum development in specified areas with emphasis on Product design, GIS, subject-domain topics, pedagogical theories, technology enhanced teaching and learning methodologies and professional courses to build the capacities of next generation of academic leaders. The course design for the FDP program have been proposed by the consultative committee constituted under the directive of RUSA, Maharashtra (Appendix). The year-wise breakdown of FDPs to be conducted and teachers to be trained are given below.

FDPs to be conducted	2018		2019		2020	
	DBATU	VJTI	DBATU	VJTI	DBATU	VJTI
	14	5	14	5	14	5
Participants per FDP	40					
Number of Teachers to be trained	760		760		760	
Total number of Teachers to be trained	2280					

The topics for FDPs to be conducted are listed along with their course objectives and contents in Appendix V. The underlying theme of all the domain specific FDPs is to provide knowledge and skills about the technologies that will influence product design in the coming decade.

The conduct of proposed FDPs is further justifiable on the observations made in the report of *AISHE 2015-16* that the *majority of engineering teachers (80% out of total 21,050) are post-graduates without any industrial or research exposure*. Our aim is to reach as many teachers as possible to meet their training needs.

- **To improve the employability of the students and to promote product innovation and entrepreneurship.**

It is expected that the 'Train the Trainers' approach shall percolate to the students in colleges and make them suitable to take up challenges in the dynamic technology landscape and thus improving their employability. We should be able to increase the campus placement by 15% every year in the next three years. In addition, the courses shall promote new product design and innovation, possibly leading to new businesses

Implementation Strategy

and generation of employment opportunities. The faculty shall be also trained specifically in entrepreneurship, leadership skills and financial management.

- **To develop course curriculum for engineering disciplines centred around the theme of employability.**

One of the major objectives for setting Faculty Development Centre is to initiate curriculum reforms with a view to improving the *skills and employability of graduates and postgraduates*. For this purpose, RUSA, Government of Maharashtra had set up consultative committee (Appendix IV) to recommend the courses and implementation strategy. One of the recommendations of the Committee is to develop the courses on Product Design Engineering and GIS. The other courses like Data Science, Clinical Data Management, Industrial Automation and Chemical Process Safety.

The proposed FDC-ET aims to develop course-curriculum in which different competencies will identified and acquired skills will be graded based on the competency levels. The courses will be designed with the involvement of experts from industries. An executive committee for FDC-ET has been constituted which includes four experts from industries having more than 15 years of industrial experience.

- **To Create technological infrastructure for conducting teacher's training program:**
We propose to create a State-of-the-Art infrastructure comprising of seminar rooms, training labs, faculty rooms, and guest house for participants to conduct faculty development programs on continuous basis for product Design in all disciplines of engineering and technology. The physical infrastructure is necessary to develop FDPs beyond the period of project duration.
- **To develop a self-sustaining mechanism for long-term functioning of the FDC-ET** A network of trainers will be built so that the activities initiated by the proposed FDC-ET can be sustained over a long period. The activities of proposed FDC-ET will be continued with the resources generated and reputation built by conducting quality programs in its gestation period.

An *Executive Committee* will coordinate and monitor the activities of FDC-ET. The prime responsibilities of the executive committee includes:

- to design course content for thrust areas for training,
- to identify various additional sources for funding,
- to approve training proposals and
- to evaluate the progress of activities initiated by FDC-ET.

The implementation strategy to be followed during this project involves following stages.

- **Define the thrust areas for training.** The expert committee, constituted under the directive of RUSA, Maharashtra during its various meetings has identified the areas of to professionally develop teachers. The other courses mentioned below have been identified after reviewing skill gap reports prepared by NSDC for the state of Maharashtra, expertise available around collaborating institutes and the training requirements of engineering teachers. The identified areas for training are
 - **Product Design Engineering**
 - **Geographical Information System**

Activities Proposed

- **Advanced Automation Technology**
- **Information Technology (IT) and IT enabled Services**
 - Artificial Intelligence
 - Blockchain Technology
 - Cyber-Physical Systems
 - Big-Data Analysis
 - Software Design
- **Plan and Conduct FDPs:** The core working committee of the FDC plans and approves the proposals, and monitor the actual conduct of FDPs. The proposals received from internal faculty members are attached in Appendix III. A training calendar for next two years is also attached in Appendix V.
- **Evaluate the conducted FDPs:** The core working team will devise the proper mechanism to evaluate the impact of FDPs through participants’ feedback and their performance.
- **Develop Physical infrastructure:** The core working team will jointly work with University’s Building and Works Committee (BWC) to develop physical infrastructure. The FDC-ET will undertake following activities to implement the project.
- **Faculty training and capacity building:** **Fifty-Five** FDPs are planned specially to upgrade the knowledge and skills in the identified thrust areas of engineering teachers.
- **Professional Development via Workshop/Conferences/Seminars** Few short duration workshops are planned specially on pedagogical methods and theories such as Bloom’s Taxonomy, English for Teaching Purposes, English for Academic Writing, Research Methodology, Flipped Classroom, Experiential Learning and Cognitive Psychology of Engineering Students, Computational Thinking,
- **Development of teaching resources:** The teaching material will be developed for all the FDPs conducted by the Centre. The teaching material will include course module, assessment module and teaching methodologies to be adopted for a particular course.
- **Developing and incorporating the curriculum based on the above mentioned courses in the Universities.**

Target Group

The engineering teachers from the colleges affiliated to DBATU, Government aided institutes from the state of Maharashtra will be the main target group for all FDPs. Faculty members from private engineering colleges and not affiliated engineering colleges are also be participants. The following Table lists out the **Key Performance Indicators** and their specific targets to be attained at the end of project duration.

Expected Outcome and specific deliverables to be achieved

Sr. No.	Key Performance Indicators	Target
1	Number of Engineering faculty to be trained through FDPs	2280
2	Minimum number of FDPs to be conducted	57
3	Minimum number of Course material to be developed	40
4	Outreach in terms of number of affiliated colleges covered through FDPs	100
5	Total built up area to be constructed at DBATU	1000 Sqm
6	Number of well equipped Seminar Rooms to be developed	3
7	Outreach in terms of number of external resource persons contacted for delivering lectures.	100
8	Number of Staff members recruited on adhoc basis	2
9	Number of Industrial Visits arranged	55

10	Number of Lecture Studios facilitating live video streaming developed	1
11	Curriculum for New courses on emerging topics under CBCS	10
12	Percentage increase in placement through campus recruitment	15% per year

Summary of Outcome deliverables

The *major outcomes and deliverables* of the project include:

1) **Availability of training Modules on emerging topics.**

The main aim of the project is to develop course curriculum which will include instructional modules, assessment modules, and suggested teaching methodologies (e.g., Flipped classroom, collaborative learning, supervised classroom etc.) for the emerging topics on Product Design, GIS, Cybersecurity, Industrial Automation, Logistics Management, and Chemical Process Safety.

The developed training material will reduce the cost of training in future and it will also be a source of generating revenues to sustain training programs after the project duration.

2) **Increased availability of professionally competent engineering teachers.**

The successful conduct of planned FDPs will lead to the availability of more than two-thousand engineering teachers trained on diverse professional skills, domain specific knowledge, research and development methodologies. The trained teachers will be able to demonstrate in-depth understanding of the technological, societal, legal, and cultural issues relevant to engineering practices. The framework of the FDP have been created by the consultative committee constituted under the directive of RUSA, Maharashtra.

3) **Increased number of graduate placement through campus recruitments.**

The majority of the training programs will be conducted in the areas where greater number of job opportunity has been envisaged by National Skill Development program for the state of Maharashtra. Though the aim of proposed FDPs is to train the trainers, the trained teachers will transfer the acquired skills to their students increasing their employability.

An increase of at least 15% per year in graduate recruitment through campus placement is targeted because graduate's competencies will match with the required skill-set for job-work and contacts established through the trainers invited to conduct FDPs.

4) **An infrastructure to sustain Faculty Development Programs in future.**

The main deliverable of the project will be a physical infrastructure comprising of Seminar Rooms, Faculty Rooms, Guest House, ICT infrastructure to conduct FDPs and conferences in future.

The created infrastructure will be utilized solely to offer training programs for in-service teacher, conduct induction programs to newly recruited teachers, and to host conferences for demonstrating experiences, case-studies and best educational practices.

Non-Recurring Expenditure

It is proposed to house the Faculty Development Centre for Engineering Teachers (FDC-ET) in a self-contained building with all state-of-the art- facilities and amenities. Their financial estimates are given below.

Financial Estimates

Sr. No.	Facility	Total Estimated Cost in lakhs
DBATU Component		
1	Setting up of ICT infrastructure, furnishing seminar rooms, guest house rooms required for the FDC-ET at main campus of 1000 sqm area	200
2	High end Digital media Room with Audio video recording facility	25
3	One number of Well equipped SMART seminar rooms with multimedia projection facility.	10
4	Three Cabins for faculty and resource persons	1
5	Total	236
10	The funds requested under PMMMNMTT (A)	236
VJTI Component		
1	Infrastructure Setup	
(a)	Refurbishment of Conference Room, Office Room and Lab	75
(b)	Furniture	50
(c)	PCs for office and Content Development	40
(d)	Color printers, scanners, sensors, camera, GPS device, sensor, projectors, PA System	20
2	Creation of Learning Resources	
(a)	Books	2
(b)	Membership of digital Library	5
	The funds requested under PMMMNMTT (A)	192
	The funds requested under PMMMNMTT (A +B)	428

Recurring Expenditure

It is proposed to conduct Fifty Seven FDPs spanned over three years of project duration. The financial estimates are given below.

Table gives typical estimated cost of running one FDP of *two weeks* duration with 40 participants as per AICTE guidelines

Table 1		
Sr. No.	Item	Cost in Rs.
1	Boarding & Lodging to the participants	2,40,000/-
2	TA to outstation invited/nominated participants	82,500/-
3	Honorarium to Course coordinator	5,775/-
4	Reading material to participants	52,500/-
5	Honorarium to Resource Persons	1,50,000/-
6	TA/DA to resource persons including two outstations resource persons	63,000/-
7	Working expenses (reprographic services, services, postage, transport, daily wages, tea/coffee etc.)	1,06,225/-
8	Total	7,00,000/-
9	Total number of Planned FDPs during the project period	57
10	Total cost for running FDP	3,99,00,000/-
11	The funds requested under PMMMNMTT (80%)	3,19,20,000
12	20 % amount planned to be generated out of registration fee	79,80,000/-

Physical and Financial Phasing

Calculation = (No of Courses in a year *7,00,000*0.8	2018		2019		March 2020	
	DBATU	VJTI	DBATU	VJTI	DBATU	VJTI
	7840000	2800000	7840000	2800000	7840000	2800000
	1,06,40,000/-		1,06,40,000/-		1,06,40,000/-	
Non-Recurring in Rs	2,28,00,000/-		2,00,00,000/-			

Cost Per Participant Per Day: Rs. 1250

PFMS certificate in case proposal is accepted Future

Not Applicable

The following main deliverables of this two years long project will be utilized to sustain and

Sustainability

enhance the tempo of faculty development generated during this period.

- **Physical infrastructure:** The main deliverable of the project will be a physical infrastructure comprising of Seminar Rooms, Faculty Rooms, Guest House, ICT infrastructure to conduct FDPs and conferences in future.
- **Learning Material:** The developed training material will reduce the cost and effort of training programs after the project duration. It will also be a source of generating revenues.
- **Trained Teachers:** One of the aims of FDPs is to build the capacity of a participant in specific disciplines so that he/she can act as resource person in any training programs conducted after project duration.

These deliverables are expected to reduce the cost of training programs to be conducted after project duration which will train more participants. It may be made mandatory for the new entrants to the teaching professions to undergo the training program before joining the college. Also faculty members must train themselves on regular basis every three years. The preparation of a new course should be mandatory for a faculty member who shall be supported through the training programs. The participant shall have to earn a proficiency certificate and not just the participation certificate during these training programs.

The support under PMMMNMTT is must during this gestation period not only for financial reasons but most importantly being a central government scheme it will build trust among the engineering teachers who are mostly from private institutes about the qualities of the FDPs conducted by the centre. The support will helpful in attracting the large number of teachers in future.

Two committees i.e. Core Working Committee and Executive Committee whose composition are given in Table 1 and 2 respectively will ensure the quality of implementation of the scheme.

In-house monitoring mechanism to ensure quality of implementation of the scheme.