



Project Proposal for Ph.D.

Project Details (The research problem must clearly indicate the need for an interdisciplinary approach)

Project Title	Development of Functional Textile Fibres for Waterproofing, Crack Control, and Self-Healing in Concrete Infrastructure
Project Summary (Minimum 500 and maximum 2000 characters)	This project aims to develop functional textile fibres for concrete applications to improve waterproofing, crack control, and self-healing performance in buildings and infrastructure. Concrete structures often face durability problems due to seepage from rainwater, groundwater, leaking pipelines, wet areas, and vulnerable joints, which accelerate deterioration and reduce service life. The proposed work will focus on designing fibre-based solutions that can reduce moisture ingress, bridge microcracks, limit crack propagation, and enhance the self-healing capability of damaged concrete. Advanced manufacturing approaches such as melt blowing and 3D printing will also be explored to create customized fibres or fibre-based forms with tailored properties. Through experimental and analytical evaluation of permeability, crack-width control, healing efficiency, and long-term durability, the project seeks to establish a practical and scalable framework for multifunctional fibre-reinforced concrete systems that can reduce maintenance needs and extend the service life of civil infrastructure.

Ph.D. Supervisors+
(Supervisor 1 and Supervisor 2 cannot be from the same department of IITD)

Role	Name of Faculty	Academic Unit in IITD/Institute/University	Email ID (Official)
Supervisor 1*	Arnab Banerjee	Civil and Environmental Eng	abanerjee@iitd.ac.in
Supervisor 2	Sumit Sinha Ray	Textile	ssinharay@textile.iitd.ac.in

*Supervisor 1 must be from IIT, Delhi.
+All cells in this table are mandatory fields that need to be filled by faculty for consideration of proposal.
\$The date of superannuation of supervisors should be at least three years from the date of registration of selected candidates.

Project requirements (Student qualifications, experience required, etc)
*The candidate will be shortlisted based on common shortlisting criteria decided by ScRC (SIRe)

- M.Tech in Civil or Material or Textile Engineering

Source of fellowship/funding and project number
(CSIR/UGC/DBT/ICMR/ICAR/NEET-PG/DST-INSPIRE/IRD/FITT Project details, if any)

Students must have funding or part time.

Role of Faculty Members involved:

Supervisor-1	Identifying the civil applications
Supervisor-2	Development of fibrous material and characterizations.

Note :-

- 1. Approval from the respective DRC/CRC/ScRC of your Department/Centre/School will be required for using the "Full-time Institute Assistantship (Category-wise) (FIA)" for selecting the students in SIRe.**
- 2. Declaration:- Faculty members, please ensure that you have at least 3 years of service left before superannuation along with adequate sitting space & lab facilities for the SIRe student.**
- 3. PI/s are also encouraged to submit joint proposals with AIIMS, NII, JNU and institutes with which IITD has an existing MoU. If the Co-PI (Supervisor 2) is from outside IITD, kindly share his/her detailed CV.**
- 4. If a research scholar is to be considered for selection under the project fellowship, then the project should have a minimum of two-year duration remaining.**
- 5. A candidate applying with a valid JRF/INSPIRE/any national level fellowship should have at least two-year validity from the date of joining the Ph.D. program.**
- 6. The third supervisor's name (if required) can be added only after the formation of Student Research Committee (SRC) subject to a strong recommendation of SRC and subsequent approval from the competent authority.**
- 7. If Institute fellowship is being sought, then DRC approval of the parent department of Supervisor 1 is required at the time of selection.**