



भारतीय प्रौद्योगिकी संस्थान मण्डी

Indian Institute of Technology Mandi



पंजाब इंजीनियरिंग कॉलेज, चंडीगढ़

Punjab Engineering College, Chandigarh

# IIT Mandi - PEC Chandigarh PhD Joint Degree Program Information Brochure Admissions 2023-2024





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## About IIT Mandi

The Indian Institute of Technology Mandi (IIT Mandi), one of the premier technical institutes in India. IIT Mandi was established in 2009 with the aim of providing world-class education and cutting-edge research in engineering, science, and technology. Since its inception, the institute has strived to achieve excellence in education, research, and innovation.

Located in the scenic town of Mandi in the Himalayan foothills, the institute offers a unique learning experience to its students. With state-of-the-art facilities and world-class faculty members, IIT Mandi provides a conducive environment for research and learning. The institute offers undergraduate, postgraduate, and doctoral programs in various disciplines of engineering, sciences, and humanities.

At IIT Mandi, we believe in fostering an environment of innovation and creativity. Our faculty members are renowned experts in their fields and are committed to providing their students with the best possible education. With our multidisciplinary approach to education, we aim to produce graduates who are well-rounded and equipped to solve real-world problems.

We take pride in our research culture and encourage our students to engage in cutting-edge research in various fields. Our research facilities are equipped with state-of-the-art equipment and resources, providing our students with ample opportunities to explore their interests and pursue their passions.

Institute Webpage: [www.iitmandi.ac.in](http://www.iitmandi.ac.in)

## About PEC Chandigarh

Punjab Engineering College (PEC) having its roots in Lahore as Mugalpura Engineering College since 1921, moved to its present campus in 1953 as PEC affiliated to Panjab University. The institute became Deemed University in 2003 through a MHRD notification.

It is a Grant-in-Aid institution under the administration of the Union Territory of Chandigarh, Government of India. The institute has a 146 acres sprawling and pious campus and is a house of Chandigarh College of Architecture also. The academic and administrative processes are similar to IITs in the country. The institute's governance is through a vibrant Board of Governors. The institute is headed by a Director on 5 years tenure; a position, which is equivalent to Vice Chancellor of Universities.



The institute offers 8 Undergraduate B. Tech. programmes and 14 Postgraduate M. Tech. programmes in various disciplines of engineering and technology. After becoming Deemed to be University, the institute has also started PhD programme in various disciplines of engineering, science, management, humanities and social sciences. UG and PG programmes are admitted through national-level examinations, namely JEE (Mains) and GATE respectively. There are 11 academic departments and 2 centres of excellence.

The faculty of academic departments and centres are involved in cutting-edge research and development works. The institute collaborates very closely with research organisations, industries, alumni and other academic institutions both in India and abroad, and has signed MoUs to pursue joint research in niche areas. The students graduating from this institute are placed in highly reputed companies with handsome salary packages.

With a history of 100 Years now, the institute has produced a number of alumni who have earned names and fame both for themselves and the institute.

Institute Webpage: <https://pec.ac.in/>

## About PhD JDP

The Joint Degree Program (JDP) offers PhD students enrolled in both institutions the chance to collaborate on a multidisciplinary research project with faculty members and research teams from IIT Mandi and PEC Chandigarh, as well as to take advantage of the facilities and professional development opportunities offered by both institutions.

## Important Guidelines for PhD Application

1. Please read the instructions given in the brochure carefully before filling up the applications.
2. Online Application form & Information brochure (Including the admission schedule along with the important dates) is available on the institute website at the following link: <https://alliance.iitmandi.ac.in/>
3. You are required to submit the application form ONLINE. No Downloadable Forms will be available after filling the form, you are advised to take a print of your application for your records.
4. For each project, candidate should submit a separate application with the application fee.
5. The application fee is as follows:



Category	Amount in ₹
General/EWS/OBC/OBC(NCL)/Transgender/Foreign Nationals	200
Women/SC/ST/PD	100

- a. **Mode of Payment: SBI Collect Portal.**
  - b. Applicant should submit fee on SBI collect portal of the IIT Mandi and submit generated transaction number to the admission application portal Link:  
(<https://www.onlinesbi.sbi/sbicollect/icollecthome.htm> )
  - c. One application fee is valid for the single application. The application fee is **NON-REFUNDABLE.**
6. OBC candidates may note that the limit for annual income is Rs. 8 Lakhs for determining the creamy layer among Other Backward Classes (OBCs) candidates. The OBC (NCL) certificate issued for the financial year 2023-24 by the Competent Authority in the prescribed format must be uploaded in the ONLINE application form.
  7. Economically Weaker Sections (EWS) candidates may note that the limit for annual income is Rs. 8 Lakhs for determining the eligibility for benefit under Economically Weaker Sections (EWS) reservation. The EWS certificate issued by the Competent Authority in the prescribed format must be uploaded in the ONLINE application form and submitted at the time of admission.
  8. Seats are reserved for Economically Weaker Sections (EWS) / Other Backward Class Non-Creamy Layer (OBC-NCL) / Schedules Caste (SC) / Scheduled Tribe (ST) and Person with Benchmark Disability (PwD) categories as per Government of India norms.
  9. You should check Institute website for results / important announcements.
  10. You should check emails sent to your email address provided in your application for all important communications and announcements if any.
  11. Merely fulfilling eligibility criteria does not entitle a candidate to be called for the written test/interview. Decision of Institute authorities will be final. Admission is based on GATE / Written test / Interview performance in addition to general eligibility criterion, the applicants must also satisfy the eligibility criteria specified for the respective Departments / Centres / Schools / Interdisciplinary Groups.
  12. Candidates, if called for written test/interview should show/ bring with them (i) Photo ID Card, (ii) Printed copy of the application submitted online, (iii) Thesis / dissertation / report / publications (iv) copy of certificates and mark-sheets.



## Important Dates for Admission

Starting date for filling Online Application	17 <sup>th</sup> November, 2023
Last date for filling Online Application	30 <sup>th</sup> November, 2023
Declaration of shortlisted candidates list	Will be Published on IIT Mandi and PEC Chandigarh website
Shortlisted candidates will be informed by email	

## Contact Details

In case of any query related to the Ph.D. Programme admission process you may contact respective school / Centre, the contact details are:

### IIT Mandi

Name of School/Centre	Email ID	Contact No.
Centre Artificial Intelligence and Robotics (CAIR)	<a href="mailto:cairoffice@iitmandi.ac.in">cairoffice@iitmandi.ac.in</a>	----
School of Biosciences & Bioengineering	<a href="mailto:sbboffice@iitmandi.ac.in">sbboffice@iitmandi.ac.in</a>	01905-267061
School of Chemical Sciences	<a href="mailto:scsoffice@iitmandi.ac.in">scsoffice@iitmandi.ac.in</a>	01905-267277
School of Civil & Environmental Engineering	<a href="mailto:scene_admissions@iitmandi.ac.in">scene_admissions@iitmandi.ac.in</a>	01905-267180
School of Computing and Electrical Engineering	<a href="mailto:sceoffice@iitmandi.ac.in">sceoffice@iitmandi.ac.in</a>	01905-267071
School of Humanities & Social Sciences	<a href="mailto:shssoffice@iitmandi.ac.in">shssoffice@iitmandi.ac.in</a>	01905-267719
Indian Knowledge System and Mental Health Application (IKSMHA)	<a href="mailto:iksmha@iitmandi.ac.in">iksmha@iitmandi.ac.in</a>	---
School of Management	<a href="mailto:somoffice@iitmandi.ac.in">somoffice@iitmandi.ac.in</a>	01905-267119
School of Mathematical & Statistical Sciences	<a href="mailto:smsoffice@iitmandi.ac.in">smsoffice@iitmandi.ac.in</a>	01905-267929
School of Mechanical and Materials Engineering	<a href="mailto:smmeadmissions@iitmandi.ac.in">smmeadmissions@iitmandi.ac.in</a>	01905-267138
School of Physical Sciences	<a href="mailto:spssoffice@iitmandi.ac.in">spssoffice@iitmandi.ac.in</a>	01905-267812

### PEC Chandigarh

Name of School/Centre /Department	Email ID	Contact No.
Production & Industrial Engineering	<a href="mailto:headprod@pec.edu.in">headprod@pec.edu.in</a>	0172-2753281
Mechanical Engineering	<a href="mailto:headmech@pec.edu.in">headmech@pec.edu.in</a>	0172-2753564
Metallurgical & Materials Engineering	<a href="mailto:headmett@pec.edu.in">headmett@pec.edu.in</a>	0172-2753954
Aerospace Engineering	<a href="mailto:headaer@pec.edu.in">headaer@pec.edu.in</a>	0172-2753880
Electrical Engineering	<a href="mailto:headelec@pec.edu.in">headelec@pec.edu.in</a>	0172-2753451
Electronics and Communication Engineering	<a href="mailto:headec@pec.edu.in">headec@pec.edu.in</a>	0172-2753761
Computer Science & Engineering	<a href="mailto:headcse@pec.edu.in">headcse@pec.edu.in</a>	0172-2753851
Civil Engineering	<a href="mailto:headcivil@pec.edu.in">headcivil@pec.edu.in</a>	0172-2753351
Physics	<a href="mailto:sanjeev@pec.edu.in">sanjeev@pec.edu.in</a>	0172-2753260
Chemistry	<a href="mailto:hkaur@pec.edu.in">hkaur@pec.edu.in</a>	0172-2753257



Mathematics	<a href="mailto:ashagoel@pec.edu.in">ashagoel@pec.edu.in</a>	0172-2753266
Centre of Excellence in Data Science	<a href="mailto:sanjeevsofat@pec.edu.in">sanjeevsofat@pec.edu.in</a>	0172-2753851
Centre of Excellence in Industrial and Product Design	<a href="mailto:parveenkalra@pec.edu.in">parveenkalra@pec.edu.in</a>	0172-2753286
Workshop & Skill Development Center; CoE Siemens	<a href="mailto:headprod@pec.edu.in">headprod@pec.edu.in</a>	0172-2753281
Centre of Management and Humanities (CMH)	<a href="mailto:anjusingla@pec.edu.in">anjusingla@pec.edu.in</a>	–
Cyber Security Research Centre	<a href="mailto:divya@pec.edu.in">divya@pec.edu.in</a>	0172-2753853
Computer Centre	<a href="mailto:sbatish@pec.edu.in">sbatish@pec.edu.in</a>	0172- 2753911

## Academic Structure

### Program management

A Doctoral Advisory Committee (DC) shall be set up for each JDP Scholar to support and monitor progress of the JDP Scholar throughout the candidature until the thesis has been submitted. The DC shall consist of the following members.

Chair/Head of the School/Department of the Home Institute or his/her nominee	Chairperson
Supervisor from the Home institute	Member
Supervisor from the Host institute	Member
Co-supervisor (s), if any with justification	Member (s)
Subject Expert from the Home Institution	Member
Additional members may be appointed to meet the requirements	Members

### Coursework Requirements

The JDP Scholar shall satisfy the minimum academic coursework requirements of the Home Institution. Additional courses may be taken when recommended by the DC. If a JDP scholar credits a course in one institution, the credits will be automatically transferred to the other institution and will be counted towards the degree requirement.

### Joint Degree Program Structure

- Candidates have a **“Home Institution”** where they begin their studies and spend the majority of time. The expectation is that candidates will spend a minimum of 12 months at the other, **“Host Institution”** the timing and duration of this will depend on the program of research but in general will be in the second or third year of the degree. Travel to and study at the Host Institution will be subject to the usual requirements of the institute.



- As a condition of enrolment on the PhD JDP, candidates are required to:
  - Spend a minimum of one year\* (two semesters) enrolled at each institution.  
\*Candidates registered as part-time PhD or under External Registration program need to spend the minimum residential requirement criteria of both the institute as mentioned in their ordinances and regulations.
  - Undertake a program of progress monitoring and examination that meets the requirements of both institutions.
  - Comply with the rules, regulations, policies, codes and procedures of both institutions.
  - Write and submit a thesis for defense by oral examination at the home Institution.
- Candidates for the PhD JDP will be enrolled in a PhD program in parallel at both institutions. The supervisory team will comprise academics from both institutions who will provide guidance and support throughout the doctoral program. Candidates will benefit from the research community, networking, and collaborations of the IIT Mandi – PEC Chandigarh. Through enrolment at both institutions, candidates will have access to services and support provided at IIT Mandi and PEC Chandigarh, including a variety of professional and personal development opportunities for researchers.
- The primary supervisor shall be from the Home Institution. There must be a Joint supervisor from the Host Institution.
- The PhD JDP includes a tailored program of progress monitoring to fulfil the requirements of both institutions. On successful completion of the program requirements, candidates will be awarded a PhD degree jointly by both the Institutions.

### Admissions are currently open under the following research projects

<b>1.</b>	<p><b>Project Title.</b></p> <p><b>Microwave sintering of high entropy ceramics</b></p> <p>Project Details.</p> <p>Ceramics are conventionally synthesized using conventional sintering or spark plasma sintering, which poses many limitations such as high processing time and high cost. The use of microwave energy to sinter such ceramics is of high interest these days. The use of microwave energy is well known to reduce sintering cycle time and lead to enhanced properties of the sintered products. In this project microwave energy will be utilized to sinter advanced ceramic materials and especially a new category</p>
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	known as high entropy ceramics.	
	<b>Home Institute: IIT Mandi</b> <b>Supervisor: Dr. Sunny Zafar</b> <b>School/Dept.: School of Mechanical and Materials Engineering</b>	<b>Host Institute: PEC Chandigarh</b> <b>Supervisor: Dr. Gurpreet Singh</b> <b>School/Dept.: Production &amp; Industrial Engineering</b>
<b>2.</b>	<b>Project Title.</b> <b>Functional Materials for energy and environment applications</b> Project Details. Various oxides materials will be synthesized and utilized for environmental and energy harvesting applications. Environmental applications include water-cleaning, hydrogen production and bacterial disinfection using multi-catalysis processes. Energy harvesting will be realized using piezoelectric and triboelectric effects.	
	<b>Home Institute: IIT Mandi</b> <b>Supervisor: Dr. Rahul Vaish</b> <b>School/Dept.: School of Mechanical and Materials Engineering</b>	<b>Host Institute: PEC Chandigarh</b> <b>Supervisor: Dr. Gurpreet Singh</b> <b>School/Dept.: Production &amp; Industrial Engineering</b>
<b>3.</b>	<b>Project Title.</b> <b>Study on lead free ferroelectric ceramics for energy harvesting</b> Project Details. Non-conventional energy harvesting is the need of the day. Fast depletion of the conventional energy sources compels researchers to study the potential of all the non-conventional energy sources in greater details in order to achieve higher efficiencies. Lead zirconate titanate (PZT) has been extremely popular for its potential as a piezoelectric material for energy harvesting applications. This work will target studying the lead free ceramics for their potential applications in energy harvesting applications. Additionally the potential of these materials for electrical energy storage will also be studied.	
	<b>Home Institute: IIT Mandi</b> <b>Supervisor: Dr. Vishal Singh Chauhan</b> <b>School/Dept.: School of Mechanical and Materials Engineering</b>	<b>Host Institute: PEC Chandigarh</b> <b>Supervisor: Dr. Gurpreet Singh</b> <b>School/Dept.: Production &amp; Industrial Engineering</b>
<b>4.</b>	<b>Project Title.</b> <b>Fracture and Fatigue Behaviour of Piezoelectric Materials in Aerospace: An Experimental and Multi-scale Modelling approach</b> Project Details. Piezoelectric materials are increasingly vital in aerospace applications, where they play crucial roles in sensors, actuators, and structural health monitoring. However, understanding the fracture and fatigue behaviour of piezoelectric materials in aerospace environments is of paramount importance for ensuring the safety and reliability of aerospace systems. This research proposal outlines a comprehensive study aimed at investigating the fracture and fatigue behaviour of piezoelectric materials used in aerospace applications. The study will encompass experimental investigations, multi-scale modelling, and polarization analysis to provide a holistic understanding of their performance under aerospace conditions. The effect of polarization and thermo-mechanical-electrical loading conditions will be investigated for ensuring the reliability and durability of aerospace systems.	
	<b>Home Institute: IIT Mandi</b> <b>Supervisor: Dr Himanshu Pathak</b> <b>School/Dept.: School of Mechanical and Materials Engineering</b>	<b>Host Institute: PEC Chandigarh</b> <b>Supervisor: Dr Chanderkant Susheel</b> <b>School/Dept.: Mechanical Engineering</b>
<b>5.</b>	<b>Project Title.</b> <b>Education via Social Robots</b> Project Details.	

	<p>The Education via Social Robots is a visionary project designed to enhance the educational experience of young students (grades 1 to 5). This innovative AI-driven robot will serve as a personalized tutor, offering interactive lessons based on NCERT (National Council of Educational Research and Training) books for all subjects. Through engaging conversations and dynamic facial expressions, the robot will create an immersive learning environment, catering to individual learning styles and pacing. By making learning fun and accessible, the LLM Social Robot aims to improve students' foundational knowledge and literacy skills while fostering a lifelong love for learning. This project represents a pioneering step towards revolutionizing primary education with cutting-edge technology.</p>	
	<p><b>Home Institute: IIT Mandi</b> <b>Supervisor: Prof. Varun Dutt</b> <b>School/Dept.: School of Computing and Electrical Engineering</b></p>	<p><b>Host Institute: PEC Chandigarh</b> <b>Supervisor: Prof. Manish Kumar and Prof. Rajesh Kumar Bhatia</b> <b>School/Dept.: Computer Science &amp; Engineering</b></p>
6.	<p><b>Project Title.</b> <b>Analysis and interventions for digital addiction based on IKS</b></p> <p>Project Details. This innovative project merges India's rich heritage of the Indian Knowledge System (IKS) theory and practices, with state-of-the-art methods such as Virtual Reality (VR) technology to tackle the growing concern of digital addiction in India. By blending ancient IKS wisdom from practices like Ayurveda, Yoga, and meditation with immersive VR experiences, we plan to explore a holistic approach to address addiction and promote well-being. Drawing inspiration from traditional scriptures, our guided VR meditation interventions aim to cultivate relaxation, mindfulness, and self-reflection, targeting the root causes of digital addiction. Through a comprehensive case study, we'll assess the impact, aligning with IKS mission of preserving wisdom while advancing modern solutions.</p>	
	<p><b>Home Institute: IIT Mandi</b> <b>Supervisor: Dr. Arnav Bhavsar</b> <b>School/Dept.: School of Computing and Electrical Engineering</b></p>	<p><b>Host Institute: PEC Chandigarh</b> <b>Supervisor: Dr. Manish Kumar</b> <b>School/Dept.: Computer Science &amp; Engineering</b></p>
7.	<p><b>Project Title.</b> <b>Experimental and Numerical Investigation of the Gas Liquid Mass Transfer During Interfacial Interactions</b></p> <p>Project Details. Gas-liquid mass transfer and hydrodynamics find applications in various fields ranging from blood flow in the pulmonary capillaries, water filtration by using gas sparging in ultrafiltration hollow fibers, monolith slurry reactor, monolith mass transfer reactors, Carbon-dioxide absorbers and the reduction of syngas to the hydrocarbons by using Fischer-Tropsch process. The gas-liquid mass transfer would be quantified by using the Particle Image Velocimetry and colorimetric technique which uses high speed camera along with state of art in-house developed codes would be utilized. Open-Source solvers would be deployed to resolve the interfacial mass transfer along with correct interface capturing schemes.</p>	
	<p><b>Home Institute: IIT Mandi</b> <b>Supervisor: Dr. Parmod Kumar</b> <b>School/Dept.: School of Mechanical and Materials Engineering</b></p>	<p><b>Host Institute: PEC Chandigarh</b> <b>Supervisor: Dr. Lokesh</b> <b>School/Dept.: Mechanical Engineering</b></p>
8.	<p><b>Project Title.</b> <b>Fabrication and finite element analysis of auxetic metamaterial panels for defense applications</b></p> <p>Project Details. Auxetic metamaterials are a special class of materials that possess a negative Poisson's ratio (NPR) as opposed to the positive values seen in conventional materials. Therefore, auxetic materials display an anomalous expansion and contraction in the dimensions along the transverse direction for tensile and compressive loads, respectively. Studies and experiments have proved that the auxetic materials can improve mechanical properties, including shear resistance, indentation resistance and fracture toughness, compared to conventional</p>	



	materials from which they are made. These auxetic materials also offer very good sound and vibration absorption and could have many potential applications to aerospace and defense areas.	
	<b>Home Institute: IIT Mandi</b> <b>Supervisor: Mohammad Talha</b> <b>School/Dept.: School of Mechanical and Materials Engineering</b>	<b>Host Institute: PEC Chandigarh</b> <b>Supervisor: Prof. Sarbjit Singh</b> <b>School/Dept.: Mechanical Engineering</b>
9.	<p><b>Project Title.</b> <b>Tribological investigations of 3D printed polymer composites for anti-wear applications</b></p> <p>Project Details. Polymers as well as polymer composites are widely used nowadays for several tribological applications. However, the incorporation of short fibers in the polymer matrix can lead to the development of tribological material for several engineering applications. The development of tribo-polymeric materials will open the pathway of the importance of polymer in tribology, the special design of polymer composites for low friction and wear under sliding against smooth metallic counterparts, and synergistic effects of short fibers and traditional fillers and fibers for optimal tribological performance. Based on these attributes, the present work will consist of the development of polymeric tribo-components in mechanical and automotive engineering, including slide elements, filament wound bushings for harsh environments, cages of high-precision ball bearings, and hybrid bushings. In this work, the polymeric composite components will be developed with the reinforcement of carbon fibers, glass fibers as well as Kevlar fibers with different percentages and fiber alignments. The developed material will be directly employed for the component fabrication for real-life engineering applications while analyzed through mechanical, chemical, electrical, and thermal analysis techniques.</p>	
	<b>Home Institute: IIT Mandi</b> <b>Supervisor: Dr. Prateek Saxena</b> <b>School/Dept.: School of Mechanical and Materials Engineering</b>	<b>Host Institute: PEC Chandigarh</b> <b>Supervisor: Dr. Jasvinder Singh</b> <b>School/Dept.: Production &amp; Industrial Engineering</b>
10.	<p><b>Project Title.</b> <b>Flexible Electronics</b></p> <p>Project Details. To design and develop flexible Electronics devices and systems</p>	
	<b>Home Institute: IIT Mandi</b> <b>Supervisor: Prof. Rahul Vaish</b> <b>School/Dept.: School of Mechanical and Materials Engineering</b>	<b>Host Institute: PEC Chandigarh</b> <b>Supervisor: Prof. Arun Kumar Singh</b> <b>School/Dept.: Electronics and Communication Engineering</b>
11.	<p><b>Project Title.</b> <b>Design of bidirectional power converter for integrating battery and ultra capacitors for optimal power distribution in EV drive system using AI/ML techniques.</b></p> <p>Project Details. The need for high power density and energy density for electric drive application has paved way for the integration of hybrid energy storage systems (HESS) in a single unified platform. For optimal utilization of battery and ultracapacitor (UC) in a hybrid energy storage system (HESS), a bidirectional power converter interfaced with optimal power flow management system plays a vital role. Keeping this in view, a power converter configuration capable of meeting fluctuating load demands with dynamic flexibility in achieving power flow in motoring and regeneration mode is proposed.</p>	
	<b>Home Institute: IIT Mandi</b> <b>Supervisor: Dr. Venkata Ratnam Vakacharla</b> <b>School/Dept.: School of Computing and Electrical Engineering</b>	<b>Host Institute: PEC Chandigarh</b> <b>Supervisor: Dr. Shimi</b> <b>School/Dept.: Electrical Engineering</b>
12.	<b>Project Title.</b>	

	<p><b>Development of 2D-TMD based devices for nanoelectronic applications</b></p> <p>Project Details. The project involves development of low-cost two-dimensional semiconductor materials for nanoelectronics applications. 2D transition metal dichalcogenides (TMDs) are a class of materials that have attracted significant interest in the scientific community due to their unique electronic &amp; optical properties and have the capability of scaling FETs to the 1-nm node and beyond because of their intrinsic atom-scale thicknesses and dangling bond free surface. Recent research has shown that TMDs can exhibit semiconductor properties, making them ideal for use in high-performance nanoelectronics device applications. However, uniform monolayer large area growth of such material is an open challenge for the semiconductor community.</p>	
	<p><b>Home Institute: IIT Mandi</b> <b>Supervisor: Dr. Robin Khosla</b> <b>School/Dept.: School of Computing and Electrical Engineering</b></p>	<p><b>Host Institute: PEC Chandigarh</b> <b>Supervisor: Dr. Shilpi Choudhary</b> <b>School/Dept.: Physics</b></p>
13.	<p><b>Project Title.</b> <b>Materials for environmental applications</b></p> <p>Project Details. Remarkable advancements in modern material technology have helped the diversity of materials for different environmental applications. Emerging materials/composites will be fabricated from different techniques such as chemical/physical methods and will be used for environmental applications such as energy, water management, sensors for qualitative and quantitative monitoring of specific analytes. Different process steps will be thoroughly optimized and further utilized for specific environmental applications.</p>	
	<p><b>Home Institute: IIT Mandi</b> <b>Supervisor: Dr. Satvasheel Ramesh Powar</b> <b>School/Dept.: School of Mechanical and Materials Engineering</b></p>	<p><b>Host Institute: PEC Chandigarh</b> <b>Supervisor: Dr. Sandeep Kumar</b> <b>School/Dept.: Physics</b></p>
14.	<p><b>Project Title.</b> <b>Power systems : Protection, stability and renewables</b></p> <p>Project Details. Power systems Protection challenges with Renewables. 2. Power systems stability challenges with Renewables. 3. Dynamic state estimation application for protection. The research work will taken to address the emerging challenges due to integration of renewables in Indian grid on systems operation &amp; control.</p>	
	<p><b>Home Institute: IIT Mandi</b> <b>Supervisor: Dr Pratim kundu</b> <b>School/Dept.: School of Computing and Electrical Engineering</b></p>	<p><b>Host Institute: PEC Chandigarh</b> <b>Supervisor: Dr. Manohar Singh</b> <b>School/Dept.: Electrical Engineering.</b></p>
15.	<p><b>Project Title.</b> <b>Assouad and Hausdorff dimension of fractional integrals</b></p> <p>Project Details. Fractal dimension is a tool to measure the roughness of sets in fractal geometry. The basic idea is to use fractal dimension as a tool to understand the geometric properties of rough/irregular sets. Recently, researchers tried to estimate and compute the box dimension of the fractional integral of continuous function, see, for instance, Fractional Calculus and Applied Analysis 25 (3) (2022) 1022-1036, Indag. Math. 31(2), 294–309 (2020), Applied Mathematics and Computation 339 (2018) 220-230, and Nonlin. Anal. 72(11) 4304–4306 (2010). To be precise, Liang (Fract. Calc. Appl. Anal. 21(6) (2019) 1651–1658) proved that the box dimension of the Riemann-Liouville fractional integral of a 1-dimensional continuous function is one. Following Liang's result, Chandra and Abbas (Numerical Algorithms 91 (3) (2022) 1021-1046) showed that the box dimension of the graph of the mixed Riemann-Liouville fractional integral of two-dimensional continuous functions is also two. We know that there are various dimensions scattered in the literature. Among these, Hausdorff and Assouad dimensions are very important. Motivated by the works of Liang, Verma, Viswanathan, Chanda, and Abbas, we will try to</p>	

	estimate/compute the Assouad and Hausdorff dimension of fractional integrals of continuous functions.	
	<b>Home Institute: IIT Mandi</b> <b>Supervisor: Prof. Syed Abbas</b> <b>School/Dept.: School of Mathematical and Statistical Sciences</b>	<b>Host Institute: PEC Chandigarh</b> <b>Supervisor: Dr. Rattan Lal</b> <b>School/Dept.: Mathematics</b>
16.	<p><b>Project Title.</b> <b>Design and Synthesis of Amphiphilic metalloaggregates for photothermal therapy and antimicrobial applications</b></p> <p>Project Details. The project aims to design and synthesize amphiphilic metalloaggregates and explore their potential in photothermal therapy. Also, the designed metalloaggregates will be explored for their antimicrobial applications.</p>	
	<b>Home Institute: IIT Mandi</b> <b>Supervisor: Dr. Amit Jaiswal</b> <b>School/Dept.: School of Biosciences and Bioengineering</b>	<b>Host Institute: PEC Chandigarh</b> <b>Supervisor: Dr. Navneet Kaur</b> <b>School/Dept.: Chemistry</b>
17.	<p><b>Project Title.</b> <b>Waste sourced value added materials for sustainable 3D printing</b></p> <p>Project Details. The recycling of materials is of paramount importance in addressing the global pollution and landfill crisis. The significance of recyclable, waste-sourced, and biodegradable materials cannot be overstated in our quest for a more sustainable and eco-conscious future. These materials play a crucial role in reducing our environmental footprint and preserving the planet in several ways. The rise of 3D printing technology not only provides a flexible approach to manufacturing but also contributes to reducing material waste, thus ensuring sustainability. We propose to utilize recyclable, biodegradable, and waste-sourced materials in extrusion-based 3D printing to mitigate the environmental repercussions significantly.</p>	
	<b>Home Institute: PEC Chandigarh</b> <b>Supervisor: Dr. Shilpi Chaudhary</b> <b>School/Dept.: Physics</b>	<b>Host Institute: IIT Mandi</b> <b>Supervisor: Dr. Garima Agrawal</b> <b>School/Dept.: School of chemical sciences</b>
18.	<p><b>Project Title.</b> <b>Design and development of lead-free Perovskite materials for solar cell applications</b></p> <p>Project Details. In recent years, perovskite materials have gained prominence due to their exceptional light absorption and charge-carrier mobility, making them an attractive choice for affordable and scalable solar cell technology. Halide hybrid organic-inorganic perovskites (HOIPs) with the chemical formula ABX<sub>3</sub> have received significant attention for next-generation solar cells. While lead-based perovskite cells now achieve efficiency levels exceeding 20%, concerns about their long-term stability and lead's toxicity present obstacles to commercialization. We propose to investigate alternative, sustainable perovskite materials with improved efficiency, and will also explore various electron and hole transport layer materials for enhanced solar cell performance.</p>	
	<b>Home Institute: PEC Chandigarh</b> <b>Supervisor: Dr. Shilpi Chaudhary</b> <b>School/Dept.: Physics</b>	<b>Host Institute: IIT Mandi</b> <b>Supervisor: Dr. Robin Khosla</b> <b>School/Dept.: School of Computing and Electrical Engineering</b>
19.	<p><b>Project Title.</b> <b>I. "CHAKSHU: Enabling Inclusivity in the Digital World for the Visually Impaired</b></p> <p>Project Details. In our increasingly digital society, accessibility for the blind and visually impaired is a pressing</p>	

	<p>concern. With approximately 285 million visually impaired individuals worldwide, including 62 million in India, access to digital resources remains a challenge. Recent news highlighted the closure of a school for blind students in Varanasi due to resource shortages, reflecting a broader issue facing blind schools across India. CHAKSHU, proposes a modified Wikipedia tailored to the blind and visually impaired.</p> <p>CHAKSHU aims to revolutionize accessibility by:</p> <ul style="list-style-type: none"> <li>Creating a user-friendly Wikipedia interface for the blind.</li> <li>Developing a system to interpret textual content, figures, symbols, and equations. Implementing voice-controlled navigation.</li> <li>Enhancing hyperlink navigation.</li> <li>Adapting Wikipedia for blind contributions.</li> <li>Offering a braille instruction manual for independent use. CHAKSHU strives to empower the visually impaired in our digital society, promoting inclusivity and access to knowledge.</li> </ul>	
	<p><b>Home Institute: PEC Chandigarh</b> <b>Supervisor: Prof. Rajesh Kumar Bhatia and Dr. Manish Kumar</b> <b>School/Dept.: Computer Science &amp; Engineering</b></p>	<p><b>Host Institute: IIT Mandi</b> <b>Supervisor: Prof. Varun Dutt</b> <b>School/Dept.: School of Computing &amp; Electrical Engineering</b></p>
<p>20.</p>	<p><b>Project Title.</b> <b>Neurofeedback-based Assessment of Open-Eye Meditation (Brahma Kumaris) Depth using EEG and wristband integration</b></p> <p>Project Details.</p> <p>Meditation is known to be beneficial in a variety of aspects of our lives, from handling stress to practicing focus to overcoming serious mental health conditions, all in a cost efficient manner. Recently, the EEG correlates of meditation are being studied extensively. The study of EEG correlates of meditation helps to unveil the underlying brain mechanisms involved in meditation and to identify the biomarkers of the practice. However, given that there are different types of meditation focusing on various aspects, there is much scope in such a study. This knowledge will not only be able to explain the extrinsically observable physiological effects of meditation but also can be used to design and build tools for improving meditation experience. In this work, we attempt to investigate for the Brahma Kumaris Rajyoga Meditation the differences between meditators and non-meditators, and also that between meditators with different levels of experience, via EEG-related features and other physiological features. Such a tool can allow users to learn to meditate efficiently and to track the progress of the practice. The effectiveness of meditation sessions. For achieving this, the EEG recordings of controls as well as experts (at different level of meditation experience) practicing meditation tradition obtained from the Brahma Kumaris Rajyoga Meditation Centre, Chandigarh will be used.</p>	
	<p><b>Home Institute: PEC Chandigarh</b> <b>Supervisor: Dr. Padmavati Khandnor</b> <b>School/Dept.: Computer Science &amp; Engineering</b></p>	<p><b>Host Institute: IIT Mandi</b> <b>Supervisor: Dr. Arnav Bhavsar</b> <b>School/Dept.: School of Computing &amp; Electrical Engineering</b></p>
<p>21.</p>	<p><b>Project Title.</b> <b>Experimental and finite element simulation of FG-GPL reinforced porous composite panels</b></p> <p>Project Details.</p> <p>Due to their superior mechanical properties, e.g. exceptionally high Young's modulus, high strength, large specific surface area, and good thermal conductivity, graphene and its derivatives such as graphene platelets (GPLs) are excellent reinforcing nanofillers for composite materials. The most recently developed functionally graded graphene platelets reinforced composite (FG-GPL) where GPLs are non-uniformly dispersed with more GPLs in the area where they are most needed to achieve significantly improved mechanical performance has opened up a new avenue for the development of next-generation structural forms with an excellent combination of high stiffness, lightweight and multi-functionality.</p>	
	<p><b>Home Institute: PEC Chandigarh</b> <b>Supervisor: Dr. Chanderkant Susheel</b></p>	<p><b>Host Institute: IIT Mandi</b> <b>Supervisor: Dr. Mohammad Talha</b></p>

	<b>School/Dept.: Mechanical Engineering</b>	<b>School/Dept.: School of Mechanical and Materials engineering</b>
22.	<p><b>Project Title.</b> <b>Modeling of magnetorheological Elastomer based metamaterial for sensing and actuation application.</b></p> <p>Project Details. Recent advances in magnetorheological elastomers (MREs) have demonstrated their potential for a wide range of applications, including vibration reduction and dampening. This study introduces MREs with piezoresistive self-sensing properties via the addition of conductive fillers to widen the field of MRE applications. These multifunctional MREs are based on a polymer matrix embedding Fe<sub>3</sub>O<sub>4</sub> nanoparticles as magnetically responsive components and multiwalled carbon nanotubes (MWCNT) as conductive additives. In this study authors intends to investigated the impact of MWCNT inclusion on the morphology, mechanical properties, electrical conductivity, magnetorheological behavior, and piezoresistive characteristics of these MRE-based composites. Combining the magnetorheological and piezoresistive properties, will lead to generation of magnetorheological actuators equipped with self-sensing capabilities for monitoring deformation.</p>	
	<p><b>Home Institute: PEC Chandigarh</b> <b>Supervisor: Dr. Chanderkant Susheel</b> <b>School/Dept.: Mechanical Engineering</b></p>	<p><b>Host Institute: IIT Mandi</b> <b>Supervisor: Prof. Rahul Vaish</b> <b>School/Dept.: School of Mechanical and Materials engineering</b></p>
23.	<p><b>Project Title.</b> <b>Modeling and control of Magneto Rheological Elastomers based on Multi-scale modelling approach</b></p> <p>Project Details. In this study, it is intended to developed a multiscale computational approach to assess the magneto-mechanical coupling of Magneto Rheological Elastomers (MREs). This approach considers the influence of both magnetic fields and deformation on the field-dependent stiffness variations in the MREs. We specifically investigate the impact of MRE microstructural features, such as particle concentrations within chains and between chains, as well as macroscopic geometry factors like the thicknesses of MRE laminate and face sheets. These investigations aim to provide guidance for the design of structures utilizing MRE-based isolation. Furthermore, it is intended to obtain magnetic field and lateral stiffness data for several MRE-based isolator prototypes through finite element-based shear simulations and experimental testing. The simulation results will be compared with experimental data, demonstrating the precision and practicality of our proposed computational method.</p>	
	<p><b>Home Institute: PEC Chandigarh</b> <b>Supervisor: Dr. Chander Kant Susheel</b> <b>School/Dept.: Mechanical Engineering</b></p>	<p><b>Host Institute: IIT Mandi</b> <b>Supervisor: Dr Rajeev Kumar</b> <b>School/Dept.: School of Mechanical and Materials engineering</b></p>
24.	<p><b>Project Title.</b> <b>Novel Semiconductor Devices</b></p> <p>Project Details. To design and develop novel Semiconductor Devices and circuits for high frequency and high power applications</p>	
	<p><b>Home Institute: PEC Chandigarh</b> <b>Supervisor: Dr. Arun Kumar Singh</b> <b>School/Dept.: Electronics &amp; Communicatuion Engineering</b></p>	<p><b>Host Institute: IIT Mandi</b> <b>Supervisor: Prof. Satinder Kumar Sharma</b> <b>School/Dept.: School of Computing &amp; Electrical Engineering</b></p>
25.	<p><b>Project Title.</b> <b>Reliability of source gated thin film transistors</b></p> <p>Project Details. Source gate thin film transistor offers promising performance for front end sensor applications. In this</p>	



	project source gated thin film transistors will be fabricated and corresponding circuit methodologies for current and voltage sensing will be designed. The reliability analysis will be carried out at device and circuit levels to assess the performance for next generation sensor interfaces.	
	<b>Home Institute: PEC Chandigarh</b> <b>Supervisor: Dr. Deepak Kumar Sharma</b> <b>School/Dept.: Electronics &amp; Communication Engineering</b>	<b>Host Institute: IIT Mandi</b> <b>Supervisor: Prof. Satinder Kumar Sharma</b> <b>School/Dept.: School of Computing &amp; Electrical Engineering</b>
26.	<p><b>Project Title.</b>  <b>Energy-efficient and Secure Routing Architecture in Wireless Sensor Networks</b></p> <p>Project Details.          In Wireless Sensor Networks (WSNs), various sensor nodes have the capabilities to sense and monitor any activity and later the sensed data is forwarded to the base station. But the primary concern has been the limited energy of the sensor nodes as the energy consumed by these nodes while they communicate, makes it difficult for their prolonged connectivity. This energy efficiency issue should be addressed as energy-efficient routing among the sensor nodes decides the fate of sensor nodes in the context of its operational period. To this end, cluster-based routing is a promising approach as it enhances the network performance of WSNs by reducing the number of transmissions to the sink and implements load balancing on the sensor network. Moreover, in the clustering approach, a node is selected as a Cluster Head (CH) which performs data collection from the other nodes. CH aggregates the collected data and, sends this collected data to the sink which further forwards it to the user via the Internet. To this end, extensive research has been done that employed conventional or optimization algorithms based techniques taking several factors like distance, energy of a node, etc. into consideration while selecting a node as CH. However, these approaches did not consider enough parameters for CH selection, and lacks in security, and suffers from hotspot problem. Therefore, the development of an intelligent and secure clustering approach that considers enough parameters for CH selection in WSN to handle the energy expenditure and security of sensor nodes is an open research area. While designing such routing protocol, meta-heuristic method will be incorporated for selecting a node as CH.</p>	
	<b>Home Institute: PEC Chandigarh</b> <b>Supervisor: Dr. Satnam Kaur</b> <b>School/Dept.: Computer Science &amp; Engineering</b>	<b>Host Institute: IIT Mandi</b> <b>Supervisor: Dr. Adarsh Patel</b> <b>School/Dept.: School of Computing and Electrical Engineering</b>
27.	<p><b>Project Title.</b>  <b>Supply chain performance system optimisation</b></p> <p>Project Details.          To develop and analyse the model for supply chain performance system under different contexts.</p>	
	<b>Home Institute: PEC Chandigarh</b> <b>Supervisor: Dr Mohit Tyagi</b> <b>School/Dept.: Production &amp; Industrial Engineering</b>	<b>Host Institute: IIT Mandi</b> <b>Supervisor: Dr. Satvasheel Ramesh Powar</b> <b>School/Dept.: School of Mechanical and Materials engineering</b>
28.	<p><b>Project Title.</b>  <b>Design, Fabrication and Testing of High Frequency Massive MIMO Antenna for 5G and Beyond Applications</b></p> <p>Project Details.          The massive MIMO antenna is key enable technology for future generation communication systems by providing high speed and low latency. In this work, a massive MIMO antennas will be designed, optimized, fabricated and tested to support 5G and beyond backhauling and handheld devices. The major issue in millimeter wave based massive MIMO antennas is interference occur due to the large number of antennas over one platform. To cater with this problem beam-forming technique can be used which radiates the signal in a desired direction rather than to spread in the all directions. In brief, a Massive MIMO antenna is designed and further enhance the directivity by using beam-forming techniques. The proposed antennas can be used in wireless and dense applications.</p>	



	<b>Home Institute: PEC Chandigarh</b> <b>Supervisor: Dr. Simranjit Singh</b> <b>School/Dept.: Electronics &amp; Communication Engineering</b>	<b>Host Institute: IIT Mandi</b> <b>Supervisor: Dr. G. Shrikanth Reddy</b> <b>School/Dept.: School of Computing and Electrical Engineering</b>
29.	<b>Project Title.</b> <b>Lead free ferroelectric materials for energy and environmental applications</b>  Project Details. Ferroelectric materials are very useful for various applications. Still lead based ferroelectric materials (PZT) are dominating the market. But lead is toxic for human beings. Therefore, there is dire need of lead free ferroelectric materials. Here, we are proposing lead free BaTiO <sub>3</sub> based materials for two applications; first one is for energy storage and second is for catalysis application. We will use solid state reaction technique for the synthesis of lead free ferroelectric materials. Synthesis facilities are available as well as few characterization facilities like dielectric and ferroelectric characterization are available at PEC Chandigarh.	
	<b>Home Institute: PEC Chandigarh</b> <b>Supervisor: Dr. Sanjeev Kumar</b> <b>School/Dept.: Physics</b>	<b>Host Institute: IIT Mandi</b> <b>Supervisor: Prof. Rahul Vaish</b> <b>School/Dept.: School of Mechanical and Materials engineering</b>
30.	<b>Project Title.</b> <b>Sustainable Composites for Electric Vehicles Application</b>  Project Details. The project focuses on the development and utilization of environmentally friendly composite materials tailored for electric vehicle (EV) components. This innovative initiative aims to enhance the sustainability of EVs by replacing traditional materials with composites that offer improved performance, reduced weight, and lower environmental impact. Through cutting-edge research and engineering, this project seeks to advance the EV industry's commitment to eco-conscious transportation solutions.	
	<b>Home Institute: PEC Chandigarh</b> <b>Supervisor: Dr. Jimmy Karloopia</b> <b>School/Dept.: Production &amp; Industrial Engineering</b>	<b>Host Institute: IIT Mandi</b> <b>Supervisor: Dr. Sunny Zafar</b> <b>School/Dept.: School of Mechanical and Materials engineering</b>
31.	<b>Project Title.</b> <b>Industry 4.0 Perspectives in the Supply Chain Performance Systems</b>  Project Details. Manufacturing sector plays a cosmological function in growth and development of any industrialized country. In today's era the manufacturing industries are facing difficulties about numerous aspects such as, forecasting demands for products, delay in lead time, inventory control, increasing return on investment, and improving efficiency. Present study grounds the "Industry 4.0" perceptions which need to be embedded, for converting the traditional manufacturing practices to smart ones. Extending the principles of the industry 4.0 eases the operation feasibility and improves the performance of supply chain. In continuation to the same various barriers, hindering its adoption in the supply chain performance system are identified, underpinning the notions allied with manufacturing arena	
	<b>Home Institute: PEC Chandigarh</b> <b>Supervisor: Prof Ravinderjit Singh Walia</b> <b>School/Dept.: Production &amp; Industrial Engineering</b>	<b>Host Institute: IIT Mandi</b> <b>Supervisor: Dr. Manoj Thakur</b> <b>School/Dept.: School of Management</b>
32.	<b>Project Title.</b> <b>Study of Tribological behaviour behaviour of composite coating for industrial applications</b>  Project Details. In recent years' innovation in carbon based materials have encouraged both researchers as well as industrialists to develop materials/composites with improved tribological properties. Researchers have	

	<p>been fascinated to develop diamond like carbon (DLC) or carbon nanotubes (CNTs) reinforced coatings to their good corrosion resistance, excellent wear resistance, good adhesion strength, and self-lubricious nature. To abate frictional loss, advanced coatings are vital for many industrial application, thick low friction environment-friendly carbon coatings have been deposited using thermal spray technique</p> <p>This study focuses on the tribological behaviour of multilayer composite coating deposited by a flame spray method for high temperature applications. The FEM modelling, microstructural characterisation and mechanical properties were studied. The tribological testing of the deposited coating was performed at different temperatures, using a high to low temperature pin-on-disk tribometer.</p>	
	<p><b>Home Institute: PEC Chandigarh</b> <b>Supervisor: Prof Ravinderjit Singh Walia</b> <b>School/Dept.: Production &amp; Industrial Engineering</b></p>	<p><b>Host Institute: IIT Mandi</b> <b>Supervisor: Prof. Rajeev Kumar</b> <b>School/Dept.: School of Mechanical and Materials engineering</b></p>
33.	<p><b>Project Title.</b> <b>Geospatial techniques in Landslides management</b></p> <p>Project Details. The studies related to landslides mapping, forest fires, sand mining, the environment, climate change, global warming etc. have all benefited from the use of Geospatial techniques (Remote Sensing, GIS, etc.) along with machine learning, deep learning, etc. India is dealing with a number of disasters, and these techniques can assist in identifying places at high risk of natural disasters by examining historical data, topography, and other pertinent aspects. Therefore, in this context, a PhD subject would be considered that could assist the stakeholders in reducing the catastrophes' aftereffects.</p>	
	<p><b>Home Institute: PEC Chandigarh</b> <b>Supervisor: Dr. Har Amrit Singh Sandhu</b> <b>School/Dept.: Civil Engineering</b></p>	<p><b>Host Institute: IIT Mandi</b> <b>Supervisor: Dr Dericks P Shukla</b> <b>School/Dept.: School of Civil and Environmental Engineering</b></p>
34.	<p><b>Project Title.</b> <b>Development of nanocomposite materials for electrocatalysis and electroanalysis</b></p> <p>Project Details. Development of a novel class of materials and find their unique application in the electrocatalysis is an important area of research. My research will be primarily focused on to develop synthesis strategies for functional nanoporous materials with high surface area (such as mesoporous zeolite/mesoporous carbon/metal oxides/conducting polymers/metal organic framework) and ionic liquids for electrocatalysis. The porous materials synthesized using suitable structure directing agents are expected to have unique features and properties. The research work will have a high impact on design of more active and stable electrocatalysts. The applications of these novel electrocatalysts will be investigated in energy generation, fuel cells, batteries, and biosensors.</p>	
	<p><b>Home Institute: PEC Chandigarh</b> <b>Supervisor: Dr. Balwinder Kaur</b> <b>School/Dept.: Chemistry</b></p>	<p><b>Host Institute: IIT Mandi</b> <b>Supervisor: Dr. Abhimanew Dhir</b> <b>School/Dept.: School of Chemical Sciences</b></p>
35.	<p><b>Project Title.</b> <b>Metasurface-based reconfigurable intelligent surfaces</b></p> <p>Project Details. Metasurface-based reconfigurable intelligent surfaces (RIS) are a cutting-edge technology that has gained significant attention in the field of wireless communications and electromagnetics. These surfaces are engineered structures composed of a planar array of subwavelength-sized electromagnetic resonators, which can be electronically controlled to manipulate and control the propagation of electromagnetic waves. These are 2D arrays of subwavelength scatterers (often called meta-atoms) that can be designed to control the amplitude, phase, and polarization of electromagnetic waves. The ability to dynamically change the properties of the metasurface (e.g., phase shift, reflection, absorption) enables adaptability to varying communication scenarios.</p>	
	<p><b>Home Institute: PEC Chandigarh</b> <b>Supervisor: Dr. Gourab Das</b></p>	<p><b>Host Institute: IIT Mandi</b> <b>Supervisor: Dr. Anirban Sarkar</b></p>

	<b>School/Dept.: Electronics and Communication Engineering</b>	<b>School/Dept.: School of Computing and Electrical Engineering</b>
36.	<p><b>Project Title.</b> <b>Assessment of system performance using fuzzy set theory</b></p> <p>Project Details. Model development and assessment in order to optimise the system performance using the concept of fuzzy sets</p>	
	<p><b>Home Institute: PEC Chandigarh</b> <b>Supervisor: Dr Mohit Tyagi</b> <b>School/Dept.: Production &amp; Industrial Engineering</b></p>	<p><b>Host Institute: IIT Mandi</b> <b>Supervisor: Dr Manoj Thakur</b> <b>School/Dept.: School of Management</b></p>
37.	<p><b>Project Title.</b> <b>Operation and control of microgrid</b></p> <p>Project Details. Micro grid is gaining more and more popularity because of integration of new and renewable energy resources. There are several aspects which are still open for research and development. In view of this operation and control segment of micro grid under various operating scenarios needs to be addressed. Therefore, some adaptive and intelligent control structures will be designed under this work and the developed control algorithms will be tested on the micro grid test bed here in Punjab Engineering College.</p>	
	<p><b>Home Institute: PEC Chandigarh</b> <b>Supervisor: Dr. Ajay Kumar</b> <b>School/Dept.: Electrical Engineering</b></p>	<p><b>Host Institute: IIT Mandi</b> <b>Supervisor: Dr. Pratim Kundu</b> <b>School/Dept.: School of Computing and Electrical Engineering</b></p>
38.	<p><b>Project Title.</b> <b>Energy management strategy for a hybrid energy storage system in Electric Vehicle using Ensembled Algorithm</b></p> <p>Project Details. To improve the efficiency, life and effective utilization of battery system in electric vehicles Hybrid Energy Storage System (HESS) is proposed. An optimal Energy Management Strategy (EMS) of a Hybrid Energy Storage System (HESS) with battery, Fuel Cell (FC) and a supercapacitor (SC) is the main concern of the industry. Hence this study aims to develop different control strategies for optimal Energy Management and evaluated them under different practical operating conditions.</p>	
	<p><b>Home Institute: PEC Chandigarh</b> <b>Supervisor: Dr. Shimi</b> <b>School/Dept.: Electrical Engineering</b></p>	<p><b>Host Institute: IIT Mandi</b> <b>Supervisor: Dr. Venkata Ratnam Vakacharla</b> <b>School/Dept.: School of Computing and Electrical Engineering</b></p>
39.	<p><b>Project Title.</b> <b>Landslide in lower Himalayas due to anthropogenic activities</b></p> <p>Project Details. There has been a substantial increase in the landslide in the state of Himachal Pradesh, Uttarakhand and other hilly areas of Himalayan terrain. This sharp increase in the number of landslide owes to many anthropogenic activities viz. construction of structures at the crest of the slope, excavation activities at the foot of hills, widening of roads, erosion of slope due to deforestation etc. The study will aim to identify vulnerable zones of landslides in lower Himalayan region in Himachal Pradesh state to mitigate the menace of landslide. Potential reasons/ anthropogenic activities will be identified. Slope stability analysis in different stretches will be carried out and may be categorised in different degree of vulnerability of landslides. The remedial/ Strengthening measures could be planned based upon analysis.</p>	
	<p><b>Home Institute: PEC Chandigarh</b> <b>Supervisor: Prof. S.K Singh</b> <b>School/Dept.: Civil Engineering</b></p>	<p><b>Host Institute: IIT Mandi</b> <b>Supervisor: Dr. Uday Venkata Kala</b> <b>School/Dept.: School of Civil and Environmental Engineering</b></p>



## General Qualifications

In the present call, the students for the PhD JDP will be admitted only in the Regular category. An eligible student in this category works full-time and receives assistantship from the Institute.

The candidate should fulfil the minimum eligibility criteria of the Home institution of the respective projects as mentioned in the below link.

**IIT Mandi :** <https://cloud.iitmandi.ac.in/f/ebee554e7294407399ce/>

**PEC Chandigarh:** [https://pec.ac.in/sites/default/files/2023-03/phd\\_2022-23.pdf](https://pec.ac.in/sites/default/files/2023-03/phd_2022-23.pdf)

*In addition to general eligibility criterion, the applicants must also satisfy the eligibility criteria specified for the respective Projects/Departments / Centres / Schools / Interdisciplinary Groups. Over and above the general eligibility criteria for admission, candidates need to satisfy additional criteria for financial support / fellowship, as specified under specific admission categories.*

The final selection process to Ph.D. JDP programme for any project will be through written test and/or interview.

## Application and Admissions

The admissions process will be managed by the IIT Mandi - PEC Chandigarh Joint Admissions Sub-committee (JASC) constituted at the School/Department/Centre level and according to each Institution's admissions procedure. Candidates must meet the admissions requirements of both institutions. The eligibility criteria for enrolling in a joint PhD program will be same as that of a regular PhD program/ERP of the individual institute. The details of the same can be found in the PhD ordinance of the individual institute.

- IIT Mandi [https://www.iitmandi.ac.in/pdf/ordinances/Ordinances\\_phd\\_mtech.pdf](https://www.iitmandi.ac.in/pdf/ordinances/Ordinances_phd_mtech.pdf)
- PEC Chandigarh [https://pec.ac.in/sites/default/files/2023-03/phd\\_2022-23.pdf](https://pec.ac.in/sites/default/files/2023-03/phd_2022-23.pdf)

All applicants will be expected to apply through an online admissions portal.

## Fees, Scholarships and Funding

- The JDP Scholar shall pay tuition fees only to their Home Institution throughout the duration of the JDP including the duration of study at the Partner Institution as per its fee structure.
- Unless otherwise indicated, candidates who wish to be admitted onto the PhD JDP are entitled to receive fellowship meeting the eligibility criteria. The cost of