Department of Mechanical Engineering

Indian Institute of Technology Indore

Khandwa Road, Simrol Indore 453 552

Madhya Pradesh, India

PhD Program in Department of Mechanical Engineering

The Department of Mechanical Engineering, IIT Indore invites applications from high caliber, sincere and research-oriented students for admission to the Ph.D programme for the Academic Year 2021-2022 as per the below-mentioned categories of admission, research areas, and time schedule. Candidates are strongly advised to visit the profiles of the faculty members at http://people.iiti.ac.in/~meiiti/index.php/about/ before applying for the PhD Program.

Categories of Admission: FA(Fellowship Awardee)/CT (College Teacher)/SW(Sponsored without Institute scholarship)/DF(Defense Forces)/IS (Institute Staff), ISF, ISW and GSW categories. Kindly refer to the main PhD Advertisement of the Institute available at http://academic.iiti.ac.in/phdadvt.php for more details.

A. Eligibility for Students:

Minimum Educational Qualifications (MEQs) and Qualifying Examination (QE) for Indian applicants	Minimum Educational Qualifications (MEQs) and Qualifying Examination (QE) for International applicants
B. Tech. Mechanical Engineering, Metallurgy, Automobile Engg; Marine Engineering; Ceramic Engineering; Materials Engineering, Manufacturing Engineering, Industrial Engineering, Reliability Engineering Production Engineering, Materials Science Engineering, Aerospace Engineering, Chemical Engineering, Biotechnology, Biomedical or any other related field of Engineering **and** **Masters' degree** in the Mechanical Engineering/ Technology/ Metallurgy Department/ Energy Systems Engineering; Energy and Environment; Energy Engineering; Automobile Engineering; Thermal Engineering; Heat Power; Energy Materials, Fluids & Thermal Engineering, Cryogenics & Vacuum Technology, Hydraulic Engineering, Material Science and Technology, Manufacturing Engineering, Industrial Engineering, Production Engineering, Reliability	➢ **MEQ:** Masters' degree in the **Mechanical Engineering** or any other related field of Engineering (with first division as defined by the awarding Institute/ University) ➢ **QE:** Valid TOEFL/IELTS OR equivalent qualification **OR** Valid GATE qualification

Engineering, Machine Design, CAD/CAM/Metallurgy, Materials Science or any other related field of engineering (with first division as defined by the awarding Institute/ University) and GATE qualification OR Four-year Bachelors' degree **OR** five-year integrated degree in the **Mechanical Engineering** or any other related field of Engineering (with first division as defined by the awarding Institute/ University) **AND** valid GATE qualification	

B. Eligibility for International Students: Please refer to the main PhD Advertisement of the Institute (http://academic.iiti.ac.in/phdadvt.php)

After submitting the application online, the eligible International candidate needs to send the signed hard and soft - copy of the application (application form should be singed and paste the photograph) along with a recent photograph, self-attested relevant certificates, and Statement of Purpose (SOP) to the DPGC Convener of ME Department latest by 07th November 2021.

C. Last date of online application: 07th November 2021

Last date of Online Application through http://academic.iiti.ac.in:8080/nregistration.jsp	07th November 2021
Shortlisted candidate intimated	till 07th November 2021
Last date of receiving recommendations of two referees (to be sent by referees to admission-me@iiti.ac.in)	till 07th November 2021
Date of Online Written/Interview	9th November 2021
Interview Schedule & Mode	
Online interviews for the Ph.D. admission would be conducted on 9th November 2021 through the Google Meet platform. A detailed schedule regarding the interview will be intimated to the eligible/shortlisted candidates later.	

D. Application procedure and general information for students:

[1] Candidates must apply ONLINE through the website (http://academic.iiti.ac.in:8080/nregistration.jsp). This will generate a unique application number for each applicant.

[2] Application Fee:

- Indian Applicants: 100/- Indian Rupees (non-refundable) to be paid through State Bank Collect (https://www.onlinesbi.com/sbicollect/icollecthome.htm).
- International Applicants: US $ 30 (non-refundable) through RTGS. Kindly refer to the main PhD Advertisement of the Institute at http://academic.iiti.ac.in/phdadvt.php for more details about the payment procedure and course fee structure.

Please refer to the main PhD Advertisement of the Institute for more details.

[3] Application must be submitted online on or before the date mentioned above.

[4] There is no need to send hard copies of the application form and supporting documents through POST or COURIER.

[5] The shortlisted applicants will be called for a written test/interview via email only, so mention your email id carefully.

[6] The candidates must arrange recommendation letters (in the given format only) at least two referees. A sample of the recommendation letter is provided in Word format, which can be downloaded for further use. The letters of recommendation must be sent by referees to admission-me@iiti.ac.in before **7th November 2021**.

[7] The shortlisted candidates must submit a handwritten statement of purpose explaining why they would like to pursue the Ph.D. in the specific area (200 to 300 words) on the day of appearing for a written test/interview (in the given format only).

[8] Only shortlisted candidate will be asked to submit PDF of the application form along with the scanned copies of the application form (form should be singed and paste the photograph), fee payment receipt and self-attested copies of supporting documents (10th marksheet, 12th marksheet, B.Tech degree mark sheets and certificate, GATE score card, Master's degree mark sheets and certificate, Caste Certificate, if applicable and all other relevant certificates) in the mentioned order (all combined into a single PDF file).

[9] SW category candidates must have NOC, experience certificate, last three months' salary slips, and Employer's PAN card and along with above documents. If a candidate is shortlisted, he has to submit it immediately.

[10] Candidates who are Fellowship Awardees (FA) should send a combined pdf with a letter of the fellowship award (i.e. from CSIR, UGC, DST, etc.) along with application form generated after applying online (form should be sing and past the photograph) to admission-me@iiti.ac.in within the online application deadline.

[11] **GATE qualification is not compulsory for DF/IS/CT/SW category candidates.**

[12] No interim correspondence whatsoever will be entertained from applicants regarding conduct and result of the selection process and reasons for not being called for interview or selection.

[13] Mere fulfillment of the essential qualifications does not guarantee admission to Ph.D. program in the Department of Mechanical Engineering. The selection will be based on the overall performance, which may include a written test, interview, academic background, suitability for research in the chosen field/area, research aptitude, communication skills, and others. The Institute/department reserves its rights to set higher norms for shortlisting and call a limited number of candidates for the written test/interview.

The candidates can contact the DPGC convener for further information at the following address:

admission-me@iiti.ac.in

For any further queries, please contact: Ph.D. Admission Cell, Indian Institute of Technology Indore, Indore-453552, Indore, Madhya Pradesh, India. Email: phdadmission@iiti.ac.in	For queries specific to the Department, emails can be sent to admission-me@iiti.ac.in

Annexure

Vacancies are available in the following areas:

Sr. No.	Specialization	Research Areas
1	**Thermal and Materials Engineering** **(Dr. Satyanarayan Patel)**	• Energy conversion, storage and harvesting materials • Solid-State Refrigeration • Piezoelectric, Pyroelectric and ferroelectric materials • Energy Engineering
2	**Manufacturing** **(Dr.I.A.Palani)** B.E/B.Tech/M.E/M.Tech (Instrumentation and Control)	• Shape Memory Alloys • Triboelectric Nano Genertaors • Laser Based micro fabrication • Mechatronics System Design • Soft Robotics
3	**Design Engineering** **(Dr. Shailesh I. Kundalwal)**	• Modeling of Hydrogen Storage • Nanomechanics and Micromechanics • Mechanics and Physics of Solids • Computaional Material Science
4	**Design Engineering** **(Dr. Sandeep Singh)**	• Solid mechanics and design • Finite element method • Computational mechanics • Computational material science • Multiscale modelling of nanomaterials • Atomistic simulation • Finite element modelling of nanostructures
5	**Thermal Engineering** **(Dr. Ankur Miglani)**	• Combustion and Propulsion: Combustion of next-generation fuels (Gel and nanofluid fuels); • Heat Transfer, micro/nanofluidics: Thermal management of high-heat-flux electronics; • Soft matter: Instabilities in drying colloidal droplets
6	**Manufacturing Engineering** **(Dr. Girish Verma)**	• Machining processes • Abrasive based finishing process • Ultrasonic-assisted machining process • Additive manufacturing.
7	**Thermal Engineering** **(Dr. Harekrishna Yadav)**	• Fluid Dynamics and Heat Transfer • Fluid-Structure Interaction • Shear Flow, Supersonic Flow, Flow and Turbulence Measurement using Optical Techniques • Applied Mathematics
8	**Production/Manufacturing/Materials/Metallurgy** **(Dr. Kazi Sabiruddin)**	• Surface Engineering • Thermally sprayed ceramic coatings • Tribo-mechanical applications

9.	**Design Engineering** **(Dr. Pavan Kumar Kankar)**	• Vibration • Vibration and force analysis in biomechanical preparation of root canals • Fault diagnosis of mechanical components
10	**CFD and Heat Transfer/Thermal Engineering** **(Dr. Shanmugam Dhinakaran)**	• CFD • Numerical Analysis • Fluid Dynamics • Biofluid Mechanics & Bioheat Transfer
11	**Production/Manufacturing/Materials** **(Dr. Ashish Rajak)**	• Metal Forming • Metal Welding • Finite Element Method • Powder Compaction
12	**Thermal Engineering** **(Dr. Devendra Deshmukh)**	• Multiphase Flows • Combustion • I.C. Engine • Laser Diagnostics.
13.	**Thermal Engineering** **(Dr. Santosh Kumar Sahu)**	• Fluid Dynamics • Heat Transfer • Thermal Science

Faculty members and their research profiles: To gain more insight, interested applicants are encouraged to visit below Faculty Members' websites who are going to recruit PhD candidates.

Dr. Satyanarayan Patel obtained PhD from the Indian Institute of Technology Mandi in the year 2016. In the IIT Mandi his research is focused on ferroelectric and piezoelectric materials for energy storage and conversion and caloric effects for solid-state refrigeration. In 2016, he was awarded Alexander von Humboldt Research Fellowship for Postdoctoral Research Technische Universität (TU) Darmstadt, Germany. There, he focused on zinc oxide nanowires for piezotronics and energy harvesting applications. The main scientific goal of the project is to develop zinc oxide nanorods/nanowires for tuning the current-voltage characteristics by mechanical confinement and explore potential applications as nanogenerators for energy conversion. The key research area is solid-state refrigeration, piezoelectric and pyroelectric materials for energy harvesting and storage. Webpage: https://sites.google.com/view/satyanarayan-patel

Dr. I. A. Palani is working as Associate Professor in the discipline of Mechanical Engineering IIT Indore. After completing his Doctorate from Indian Institute of Technology Madras, He worked as a post doctoral research scientist in Graduate school of Information science and electrical Engineering, Kyushu University, Japan. He has developed Mechatronics and Instrumentation Lab at IIT Indore. His area of expertise includes laser assisted surface processing, micro-machining, Smart materials and shape memory alloys. He has published more than 100 international journal publications and he has filed 6 Indian Patents. He has executed project from different funding agencies such as DST, SERB, DAAD, JSPS, DRDO, MHRD worth 6 crores. He has closely worked with industries such as

Volvo Eischer, John Deere, WABCO as technical consultant. He has strong research collaboration with University of IFW Dresden Germany, Kyushu University, Japan and Jeju University, South Korea, St Petersburg state University, Russia and Purdue University, US. He is a life member in Indian Laser Association, RRCAT Indore and Smart materials and structures, IISC Bangalore. He has received Alumni award for the year 2015 under research and innovation. He is a recipient of Kyushu university friendship scholarship and AICTE National doctoral fellowship. He is a member of SPIE, Indian Laser Association, Institute of Smart Materials and Structures.
Webpage: https://iiti.ac.in/people/~palaniia/

Dr. Shailesh I. Kundalwal is an Associate Professor of Mechanical Engineering who specializes in Design Engineering stream. Before joining IIT Indore in 2017, he was Banting Fellow at the University of Toronto (UofT). In fact, he was the first holder of Banting Fellowships Award in the MIE Department, UofT. He obtained his M.Tech and Ph.D. degrees in Applied Mechanics from IIT Kharagpur. By the end of MTech (Mechanical Systems Design) program, he was awarded with an honorary Prof. D. P. Ghosh Memorial Award for securing the first rank and being best outgoing PG students enrolled in Applied Mechanics specializations. He proposed a novel multifunctional Fuzzy Fiber Reinforced Composite in his doctoral studies which led to a critical breakthrough in the field of hybrid nanocomposites. During three-separate international postdoctoral stints, he worked in the field of multiscale modeling of composites and mechanics of nanostructures. He founded the Applied and Theoretical Mechanics (ATOM) Laboratory at IIT Indore in 2017 which undertakes research mainly in computational and experimental investigations of nanostructures. He received the SERB Early Career Research Award in 2018 in the field of flexoelectricity. He guided 16 BTech, 10 MTech/MS (coguided: 4) and 5 PhD (coguided: 1) students till date. He is currently guiding 7 PhD students and handling few projects awarded by national funding agencies. He has authored 60 research articles (excluding conference papers and chapters) in reputed international journals. He contributes as a reviewer on several international journals, national/international research funding agencies, and Elsevier/CRC/Springer books in the broad field of solid mechanics. He is a member of professional bodies such as ISTAM, ASME, CSME, APS, and IEI (I). Prior to his higher education at IIT Kharagpur, he served in the Defence Research and Development Organisation at the Defence Institute of Advanced Technology (DIAT), Pune in different capacities, where he was engaged in Experimental Stress Analysis and Photoelastic research works in the Department of Mechanical Engineering. Intersted fellowship awardees can contact Dr. SI Kundalwal vai email (kundalwal@iiti.ac.in) for more information on advertised research areas and can visit his webpage: https://www.sikundalwal.com/.

Dr. Sandeep Singh received his PhD from IIT Delhi in the area of multiscale modelling of carbon nanotubes and master's in Applied Mechanics from MNNIT Allahabad. Preferred Candidates: Candidates with good knowledge of fundamentals of subjects like Mechanics of Materials, Mechanical Vibrations.

Dr. Ankur Miglani is currently working as an Assistant Professor in the Department of Mechanical Engineering at IIT Indore. Prior to that he worked as the SERB Indo-US Postdoctoral Fellow at the Cooling Technologies Research Center in the Department of Mechanical Engineering, Purdue University (with Prof. S.V. Garimella and Prof. J.A. Weibel) (2016 – 2019). His post-doc work stems from an industry-directed project (Ford R&AE, Michigan, USA) that focuses on the assessing the two-phase cooling solutions for thermal management of power-dense electronics in hybrid vehicles. His past work aimed to address the growing challenge of achieving clean, safe and efficient combustion. To this end, his first

post-doc at Korea Advanced Institute of Science and Technology (KAIST; with Prof. S.W. Baek, 2016) and doctoral work at Indian Institute of Science (with Prof. S. Basu, IISc, 2015) in collaboration with Prof. R. Kumar (University of Central Florida) focused on investigating the rheological and combustion characteristics of a new-class of fuels, namely, gelled fuels and nanofuels, that are anticipated to be the primary carriers for future energy formulations. He is recipient of the SERB Indo-US postdoctoral fellowship (2016), Brain-Korea 21 postdoctoral fellowship and has recently been part of the core committee team of 8 members that led the proposal on CPS System Simulation, Modeling and Visualization and was awarded a grant of approximately INR 100 crores by DST, Govt. of India to establish a technology innovation hub (TIH) at IIT Indore. He published 40 articles in international journals and conference proceedings, which have featured in the inside front covers of the RSC Soft-Matter, covered by the Indian Express and KAIST Aerospace news and has received invitation from the Journal of Heat Transfer and Journal of Thermal Science and Engineering Applications. Currently, he actively collaborating with both academia and industry. His academic collaboration is with Purdue University, University of Central Florida and Korea Advanced Institute of Science and Technology KAIST, while industry collaboration is with Ace Chemicals and Engineering Pvt. Ltd (India), RsKissan Foods Pvt. Ltd. and Choithram Hospital (India). To this end, he has two on-going industrial consultancy projects. His interdisciplinary research lies at the cross-roads of nano/micro fluidics, combustion, and heat transfer with specific thrust on: • Combustion and Propulsion: Combustion of next-generation fuels (Gel and nanofluid fuels); Application: IC Engines, Gas Turbines, Sounding Rockets • Heat Transfer, micro/nanofluidics: Thermal management of high-heat-flux electronics; Application: Hybrid /Electric Vehicles, Data Centers, High computing clusters, Radars, Lasers • Soft matter: Instabilities in drying colloidal droplets.

Dr. Girish Verma I have completed my MTech and PhD degrees in Mechanical Engineering from Indian Institute of Technology Delhi. My PhD topic was on experimental investigations and modelling of ultrasonic assisted end milling. I have published ten journal papers and attended two all India manufacturing technology, design and research conferences. I was involved in an India-UK project related to modelling of ultrasonic assisted manufacturing processes. I have received prestigious Gandhiyan Young Technological Innovation Award. I am working as Assistant Professor in IIT Indore from Aug, 2019. I am currently working in the areas of Machining processes, Abrasive based finishing process, Ultrasonic-assisted machining process and Additive manufacturing.

Dr. Harekrishna Yadav is an Assistant Professor in the Department of Mechanical Engineering at IIT Indore where he has been a faculty member since October 2019. before joining IIT Indore, he worked as a postdoctoral fellow at Technion- Israel Institute of Technology, Israel from 2017- 2019. Prior to this, He received his Ph.D. degree from IIT Bombay in 2017, and M. Tech degree from IIT Roorkee. His research interests lie in the broad area of experimental fluid dynamics and heat transfer. His current research activity includes Fluid-Structure Interaction, Shear Flow, Flow and Turbulence Measurement using Optical Techniques, Heat Transfer Enhancement, Supersonic Flow, Renewable and Sustainable Energy.

Dr. Kazi Sabiruddin is an Associate Professor in the Department of Mechanical Engineering IIT Indore . He joined IIT Indore in 2011 as an assistant professor. Prior to the joining of IIT Indore he served BIT Mesra and JUET Guna. He holds a doctoral degree in Mechanical Engineering from Indian Institute of Technology Kharagpur (2009). He is an M.Tech in

Production Engineering (2006, Specialization: Tool Engineering) and a B.Tech in Mechanical Engineering (2003).His research area is "Surface Engineering" with a specialization in “thermally sprayed ceramic coatings for tribo-mechanical applications”. He also continues research in the board area of manufacturing.

Dr. Pavan Kumar Kankar is working as an Associate Professor in Department of Mechanical Engineering. His research interests include fault diagnosis and prognosis using machine learning techniques, reliability, bio-medical signal processing and analysis of dynamical systems. He is having more than 16 years of teaching and research experience. He worked with Villanova University for effective discrimination between four kinds of common defects in gears by utilizing the method of recurrence analysis. Dr. Kankar also worked on improving theoretical model of unbalanced shaft-bearing system with researchers of Faculty of Science, University of Yaoundé, Yaoundé, Cameroon. He contributed in various projects awarded by national and international funding agencies under IMPRINT India Initiative by Ministry of Human Resource Development and India-Japan Cooperative Science Programme etc., total worth of Rs. 3.5 crore approx. Dr. Kankar has contributed to more than 130 publications which include journal papers, conference papers, books, and book chapters. He is member of International Institute of Acoustics and Vibration, USA. He is a member of various professional bodies like American Society of Mechanical Engineers, Society for Reliability and Safety (SRESA), Tribology Society of India. His work is having more than 2750 citations.

Dr. Shanmugam Dhinakaran is an expert in Computational Fluid Dynamics and Heat Transfer. His research interests are in CFD (all areas), and Biofluid Mechanics and Bioheat Transfer. He is looking for highly motivated and bright students for research in the afore-mentioned areas. Candidates should have a background in the relevant field of Engineering or Science (Mathematics, Applied Mathematics and Physics). For more details about the ongoing research activities, publications, etc., visit http://people.iiti.ac.in/~sdhina

Dr. Ashish Rajak is working as an Assistant professor in Department of Mechanical Engineering, IIT Indore, India. He worked as a Post Doctorate Researcher for more than a year in the Impulse Manufacturing Laboratory at Ohio State University, the USA after completing his Ph.D. He has received his Integrated Ph.D. degree in High Strain Rate Metal Joining and Forming Techniques from IIT Guwahati. His research area spans from materials science to manufacturing applications, focusing on numerical modelling and simulation on high strain rate metal forming and joining techniques. His research vision is to understand the material behaviour at high strain rate forming techniques. He works in designing metal crimping, clinching, forming, and welding using the Electromagnetic and Vaporizing Foil Actuator System. Area of Specialization: High strain rate metal forming and joining techniques.

Dr. Devendra Deshmukh is working as an Assosiate professor in Department of Mechanical Engineering, IIT Indore, India.. He has carried out his research in the area of biofuel spray characterization at high pressures. He has previously worked as a research engineer in GM-TCI Bangalore and TVS Motor Company. His current research interests are in the areas of biofuels, spray and combustion diagnostics, and modelling of IC engine processes. visit https://iiti.ac.in/people/~dldeshmukh/index.html

Dr. Santosh K. Sahu is serving as an Associate Professor in the Department of Mechanical Engineering at the Indian Institute of Technology Indore, India, where he has been a faculty member since 2009. He has over 11 years (post PhD) of research experience in reactor thermal hydraulics, multi-phase flow and heat transfer, energy storage, thermal management of electronic components, jet impingement cooling, heat exchanging equipment, rarefied gas flows, quenching of hot stationary and moving surfaces, pool boiling heat transfer. He has published over 150 articles that include international indexed journals, conference proceedings, patent and book chapters. He has received the Indo-US research fellowship in Engineering Sciences and visited Purdue University as visiting scholar during September 2011-January 2012. He is Life Member of Indian Society for Heat and Mass Transfer (ISHMT) and Member of American Society of Mechanical Engineer (ASME). He is a reviewer of various international journals and books. Web: http://people.iiti.ac.in/~santosh/