National Institute of Technology Karnataka, Surathkal
Department of Mechanical Engineering

2022

INSTITUTE VISION

To facilitate the transformation of students into good human beings, responsible citizens and competent professionals, focusing on the assimilation, generation and dissemination of knowledge.

INSTITUTE MISSION

- Impart quality education to meet the needs of profession and society, and achieve excellence in teaching-learning and research.
- Attract and develop talented and committed human resources, and provide an environment conducive to innovation, creativity, team spirit and entrepreneurial leadership.
- Facilitate effective interactions among faculty and students, and foster networking with alumni, industries, institutions and other stakeholders.
- Practice and promote high standards of professional ethics, transparency and accountability.

VISION OF THE DEPARTMENT

Create globally competent mechanical engineers capable of working in an interdisciplinary environment, contributing to society through innovation, entrepreneurship and leadership

MISSION OF THE DEPARTMENT

M1 Produce Mechanical Engineers with a strong theoretical and practical knowledge to contribute to society with high moral and ethical values

M2 Nurture students with a global outlook for a sustainable future and sound health.

M3 Enable to be productive members of interdisciplinary teams, capable of adapting to changing environments of engineering, technology and society.

M4 Inculcate critical and deep-thinking abilities among students and develop entrepreneurial skills, innovative ideas and leadership qualities.

M5 Create facilities for continued education, training, research and consultancy

ABOUT THE DEPARTMENT

The department of Mechanical Engineering established in 1960, is the oldest and largest department of NITK, and has traversed the path of knowledge dissemination and generation as well as delivering over 7500 Mechanical Engineering graduates to the Nation. Over these 62 glorious years, it has carved a niche for itself in the key areas of teaching, research, consultancy, administration and community services. The Department prioritize the necessary revamping of Mechanical Engineering education, which is driven primarily by dynamics of technological advances and sustainable development and with the active involvement of industries, alumni, research organizations and other stakeholders. The department offers B.Tech, MTech and PhD. programs and caters to more than 715 B.Tech. students, 150 MTech. students and 110 PhD. Scholars.

PROGRAM EDUCATIONAL OBJECTIVES

PEO-1 Prepare graduates to have knowledge in mathematics, science and engineering to develop problem-solving skills necessary for career advancement in mechanical and allied disciplines

PEO-2 Organize graduates to have strong practical and theoretical knowledge in Mechanical Engineering, contributing through interdisciplinary research, innovation, entrepreneurial skills, and leadership to design and develop products

PEO-3 Inculcate teamwork, communication, interpersonal skills and ethical approach adapting to changing environments of engineering, technology and society

PEO-4 Impart critical thinking skills with deep concentration to develop initiatives and innovative ideas for R&D, Industry and societal requirements.

Programme Outcomes (POs)

- **PO1. Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- **PO2. Problem analysis:** Identity, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- **PO3. Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety, and cultural, societal, and environmental considerations.
- **PO4. Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- **PO5. Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
- **PO6. The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- **PO7. Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- **PO8. Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- **PO9. Individual and teamwork**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- **PO10. Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- **PO11. Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- **PO12. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Programme Specific Outcomes (PSOs)

- **PSO1.** Understand and apply the concepts of science and engineering principles to provide solutions to problems associated with mechanical engineering.
- **PSO 2.** Use experimental methods and computational tools to develop products, workable solutions and processes.

Educational Programs offered

Bachelor Program

B. Tech. in Mechanical Engineering	Current intake: 174

Masters Program

M. Tech. in Thermal Engineering	Current intake: 18
M. Tech. in Manufacturing Engineering	Current intake: 18
M. Tech. in Mechatronics Engineering	Current intake: 33
M. Tech. in Mechanical Design	Current intake:18
M. Tech. by Research (All streams)	Current intake: 08

Doctoral Program

Current intake: 24

The Department offers a doctoral program in the following areas of specialization: Renewable Energy, Alternative Fuels, Fuel cells, IC Engines & Combustion, Refrigeration and Air-conditioning, Heat Transfer, Micro/Nanofluids, Computational Fluid Dynamics, Turbomachines, Fracture Mechanics and Fatigue, Stress Analysis, Tribology, Machine Dynamics and Vibration, Condition monitoring, Advanced Materials, Advanced Manufacturing, Mechatronics, E-mobility, MEMS, Nanotechnology, Robotics and Control, Assistive Technologies, Product Design, Structural Acoustics, Polymer Nano-Composites, Precision Manufacturing, Additive Manufacturing, Smart manufacturing, 3D/4D printing, repair and re-manufacturing, Micro/Nano machining, solid-state manufacturing.

FACULTY MEMBERS

Ravikiran Kadoli, Ph.D. (IIT Madras)
Head of the Department and Professor
Research Interests: Structural mechanics, Mechanics and applications of advanced materials, Fluid-Structure Interaction and other coupled problems like heat and mass transfer, CFD
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G.C. Mohan Kumar, Ph.D. (IIT Madras)
Professor (Dean F&W)
Research Interests: Mechanical Design Engineering, Biomechanics Green Composites, Experimental & Numerical Stress Analysis.
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H. Suresh Hebbar, Ph.D. (IIT Delhi)
Professor
Research Interests: Machine Design, Composite Materials, Tribology, Fracture Mechanics
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K.V. Gangadharan, Ph.D. (IIT Madras)
Professor (CSD)
Research Interests: Vibration and Control Dynamics, FEM, Condition Monitoring, Experimental Methods in Vibration
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Prasad Krishna, Ph.D. (University of Michigan)
Professor (Director of NIT, Calicut)
Research Interests: Fluid Power Control Systems, Processing of Advanced Materials and light alloys, Modelling and Simulation of Solidification Processes, Characterization of Interfacial Heat Transfer in Permanent Mould Casting Processes.
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Vijay H. Desai, Ph.D.(NITK Surathkal)
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Research Interests: Composite Materials, Functionally Graded Materials, Machining, Sensors and Actuators, Manufacturing Processes
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Professor
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Mervin A. Herbert, Ph.D. (IIT Kharagpur)
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Research Interests: Friction Stir Welding, Semi solid processing of composites, applications of Artificial Neural Network
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Mrityunjay R. D, Ph.D. (NITK Surathkal)
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Ajay Kumar Yadav, Ph.D. (IIT Kharagpur)
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Research Interests: Heat transfer, Refrigeration & Air Conditioning, Renewable Energy, Bio-fuels, IC Engines, CFD, Nanofluids
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Vasudeva M.. PhD, (IIT Bombay)
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Arumuga Perumal D. (IIT Guwahati)
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Research Interests: Lattice Boltzmann method, CFD, Microfludics/Nanofludics, NHT, Buff body flow

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Research Interests: Product Design, Machines and Mechanism theory

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Parthasarathy P, Ph.D. (KIT Germany)
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Research Interests: Fluid flow and heat transfer in porous media, Radiative heat transfer, Solar fuels and porous media injectors

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Poornesh Kumar K. PhD. (Inha University)
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Saurabh Chandraker, PhD. (NIT Rourkela)
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Research Interests: Rotordynamics, Composites, High Entropy materials and Tribology

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Arun Kumar S., Ph.D. (NITK Surathkal)
Assistant Professor

Research Interests: Friction Stir Welding/ Processing, Additive friction stir deposition, micromachining, Machinability study, Artificial intelligence.

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Mruthynjaya Swamy K. B. PhD. (IIT Kharagpur) Assistant Professor

Research Interests Microfabrication, Packaging and testing of MEMS devices. Process development of probe-assisted Nano-Lithography Technique.

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Ranjeet Kumar Sahu, Ph.D. (IIT Madras)
Assistant Professor

Research Interests: Micro-Nano Machining, Nano material synthesis and characterisation, Precision engineering, advanced welding, additive manufacturing

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A. S. S. Balan, Ph.D. (IIT Madras)
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P. S. Suvin, Ph.D. (IISc Bangalore)
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Khyati Verma, Ph.D. (IIT Delhi)
Assistant Professor

Research Interests: Impact Biomechanics, Head Trauma, Mechanical Behaviour of soft tissues under impact tissue biomechanics, Constitutive modelling, Finite element Modelling.

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Supporting Staffs

Mr. Vamana
Technician

Mr. C A Verghese
Technical Assistant SG-II

Mr. Shivashankar
Technical Assistant

Mr. A Jayanth
Technical Assistant SG-II

Mr. Mahesh B.K
Assistant Engineer SG-I

Mr. Chandrashekar M K
Assistant Engineer SG-II

Mr. Shashikantha
Technical Assistant SG-II

Mrs. Vijaya
Assistant Secretary-II

Mrs. Shubhavathi
Office Secretary

Mr. Avinash D
I/C. Heat transfer Lab

Mr. Guruprasad K
CAD/CAM lab

Mr. Guruprasad
Machine Shop

Mr. Mahaveera
Fitting Shop

Mr. Mahesh Anchan
Carpentry Shop

Mr. Nishan K
Machine Shop

Mr. Pradeep
Machine Shop

Mr. Raghuram S
Metrology Lab

Mr. Sudhakar Naik
Fitting Shop

Mr. Vinay
IC engine Lab

Mr. Vishal
Fuels Lab

Mr. Yashpal
Fuels Lab

Mr. Yathin
IC engine

Mr. Nithyananda
Office Staff

Mr. Ashok
House-keeping Staff

Mrs. Nethravathi
House-keeping Staff

Mr. Prabhakar
House-keeping Staff

Mrs. Appi
House-keeping Staff

Mr. Dinesh Kotian
Machine shop

Mr. Dhiraj Kumar
Fitting Shop

Mr. Jaswin J Suvarna
Wood turning

Mrs. Vanitha Devadiga
House-keeping Staff

Current Research Areas of the Department

Emission Studies on Engines, Combustion of premixed flames, Micro Channels Flow, Nanofluids, Computational Fluid Dynamics, Alternate Refrigerants and Alternate Refrigeration Methods, Alternate Fuels, Renewable Energy Systems, Smart Materials, Piezoelectric and Magneto-Rheological Devices, MEMS, Nano Materials and Precision Engineering, Advanced Manufacturing, Machining Processes, Process Modelling Based on Numerical, Artificial Intelligence Techniques and Solidification Processing, Characterization, Tribological Studies and Processing of Composites, Vehicle Dynamics, Condition Monitoring, Fracture Mechanics, Assistive Technologies, Rotor dynamics, Additive Manufacturing, Smart Manufacturing. Impact Biomechanics, Robotics, Path planning, Application of the IOTs in the Manufacturing domain ……

Major Facilities


Wire EDM


Microwave furnace


Universal Testing Machine


Optical Microscope


Vacuum Arc melting setup


Dynamic testing Machine


Heat radiator


Automated Manufacturing System


KUKA Robot


Table Top CNC


Climate testing machine


Refrigeration testing Center


Furnace


UTM- 2kN


Polymer composite – Preparation and testing


CNC Milling Center


CNC Turning Center


Capstan Lathe


Lathe


Milling Machine


Drilling Machine


3D Polymer printer


Sectional view of UD truck


BMW engine


High-Performance Work Stations


MMM 4 stroke diesel engine


Single Cylinder 4-stroke engine


Kirloskar Oil engine

Major Facilities


Ruston Horizontal C.I. engine


Research engine test setup


Morse Test


V.C. ratio computerized C.I engine


Reciprocating air compressor SS.


HT parallel flow exchanger


Blower test


Fluidized bed gasifier


BOSCH Computerised Engine test bench


Flash and Fire Point Tester


Bomb Calorimeter


Say Bolt Viscometer


Flash Point


Red Wood Viscometer


Boys Gas Calorimeter


Dynamic Testing Machine


Dead-weight Pressure gauge


Radial Drilling Machine


Wood Turn Lathe


Work Bench


Electro-Hydraulics Setup


Electro-Pneumatics setup


Programmable Logic Controller


Variable frequency drive

Computer-Aided Design/Manufacturing Lab (available software)

PTC creo

MSC Software

Mastercam

AUTODESK AUTOCAD

UGS

SIM PACK

ANSYS

AMESim

LabVIEW

Adams

Central research facility

5-Axis CNC Machining vertical center

Friction Stir Processing (FSP) system

Hybrid Micromachining with EDM

Metal 3D Printer

Fatigue Testing Machine

Liquid Nitrogen Plant

Scratch Test

Multi-purpose Impact Testing Machine with

Impact Test Machine

HVAF/HVOF Coating Facility

3D Scanner

Ball Milling

Hollow Fiber Spin System

FESEM (Carl Zeiss)

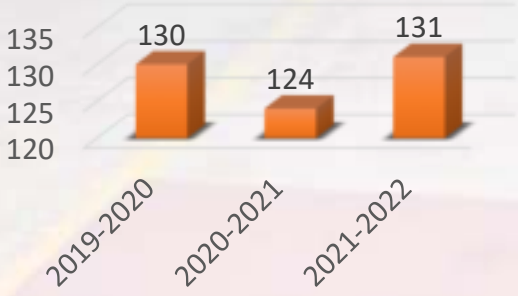
X-ray Diffraction

R&D PROJECTS (ONGOING AND SANCTIONED)

1. Design and development of Supercritical carbon dioxide based naturally circulated solar thermal collector, PI: Dr. Ajay Kumar Yadav; Co-PI: Dr. M. R. Ramesh, Funding amount: 23.81 Lakh, SERB, Duration: 3 years (2022-25).
2. Development of Cost Effective Radiofrequency Ablation System and Magnetic Hyperthermia Equipment for Thermal Therapies of Cancerous Tumors, Dr. Ajay Kumar Yadav, Prof. Laxminidhi T, Prof. Sripathi U Acharya, Prof. B. S Rao (MAHE), Prof. P. U Saxena (KMC), SERB, 48.94Lakhs, 8/03/ 2019- 07/03/2023.
3. Experimental Characterization and Numerical Modelling of Delamination Growth in Fiber Reinforced Polymer Laminated Composites under Cyclic Loading, Dr. S Kattimani & Prof. S.M. Murigendrappa, SERB, 26.28Lakhs, 24/03/2017 -24/03/2020.
4. An Experimental and Theoretical Investigation on Narrow Thermal Hysteresis of Cu-Al-Be Based SMA Actuator for Vibration Isolation, Prof. S.M. Murigendrappa & Dr. S Kattimani, SERB, 16Lakhs, .
5. Active Vibration Control of Laminated Composite Sandwich Plates in Hygrothermal Environment using 1-3 Piezoelectric Composites, Dr. S Kattimani, SERB, 40.9Lakhs, 26/03/2018 - 26/03/2021.
6. Investigation on Radiolucent Composite Sandwich Materials for Biomedical Imaging Systems under Hygrothermal Environment, Dr. S Kattimani, DST- ASEAN -India Collaboration, 41Lakhs, 2020-2022 (Approved).
7. Experimental Investigation on Pulsating Synthetic Jet Micromixers to Determine the Injection Dynamics of Insulin in Hydrogels for Subcutaneous Drug Delivery, Dr. Arumuga Perumal D, SERB, 32.6Lakhs, 01 August 2017-31 July 2020.
8. An Investigation in to the Effects of Induced Helicity in the Carotid Bifurcated Arteries on Patient Specific Models, Dr. Anish S and Dr. Mrityunjay Doddamani, SERB, 16.15Lakhs, 26/2/2020 to 25/2/2023.
9. Improvement in the Properties of Thermally Sprayed Hydroxyapatite Bio-Ceramic Coating Reinforced with Nanostructured Materials, Dr Sudhakar C Jambagi, SERB, 38.4Lakhs, 18/3/2019 to 17/3/2022.
10. Experimental and Numerical Investigation of Effect of Leading Edge Protuberances on the Performance of Wind Turbine Blade, Dr. Sathyabhama A, SERB, 66Lakhs, May 2016 to March 2020.
11. Ultrafine Grain Refinement through Low Plasticity Burnishing on WAAM of Mg alloy for Aerospace and Automotive Applications, Dr. A.S.S.BALAN, SYST-SEED, 16.09Lakhs, Jan 2020 to Jan 2023.
12. Experimental Technique to Induce Surface Grain Refinement through Laser Shock Peening on ECAP Processed Mg. Alloy, Dr. H Shivananda Nayaka, SERB, 41.02Lakhs, May 2019 to May 2022.
13. Design of Magneto Rheological Damper for Vehicular Applications, Indian PI: Prof. C.Sujatha, IIT Madras ; Indian Co-PI: Dr. Hemantha Kumar, NITK Surathkal International PI: Prof. Muthukumaran Packirisamy ; International Co-PI: Prof. Ramin Sedaghati, Concordia University, Canada, MHRD, 60.35Lakhs, 2019-2021.
14. Development of Cost Effective Magneto-Rheological (Mr) Fluid Damper in Two Wheelers and Four Wheelers Automobile to Improve Ride Comfort and Stability, PI: Dr. Hemantha Kumar, Co- PI: Prof. C.Sujatha, Dept. of Mechanical Engineering, IIT Madras, Prof. K.V.Gangadharan, Dept. of Mechanical Engineering, NITK, Dr. Sharnappa J., Dept. of Mechanical Engineering, NITK, Dr. Mohd.Rizwan Rahman, Dept. of Material and Metallurgy Engg. NITK, Dr. Sheron F. Dept. of Electrical and Electronics Engg. NITK, Dr. Sandesh S. Senior Manager, Ashok Leyland Ltd. Chennai, Mr. Rajasekharan, Scientific Advisor, Rambal Ltd. Chennai., MHRD & Ministry of Road Transport and Highways, 355Lakhs, 2017-2020.
15. Experimental Investigation of Passive, Semi-Active and Active Vibration Control of Composite Sandwich Structure, PI: Dr. Sharnappa Joladarashi Co-PI: Dr. Hemantha Kumar, DST, 51.5Lakhs, 2017-2020.
16. Investigations on the Dynamic Behaviour of Bacterial Helical Flagellar Filaments under Axial Flow, Dr. Ranjith M, DST-SERB, 21.46Lakhs, 2017-2020.
17. Design, Analysis and Demonstration of the Porous Injector Concept for Throttling of Liquid Rocket Engine., Dr. Parthasarathy P, ISRO, , 2019-2021.
18. Design and Testing of Robust, High Efficient, Low Polluting LPG Porous Burners for Household Applications., Dr. Parthasarathy P and Dr. Arun M, DST-SYST, , 2020-2023.
19. Development of Composite Filament for Light Weight 3D Printed Components, PI - Dr. Mrityunjay Doddamani, Co-PI's - Dr. Srikanth Bontha, Dr. Vamsi Krishna Balla, DST-TSDP, TDT, GoI, 33.03Lakhs, 2017-2020.
20. Pre-Operative Damage Assessment in Orthopedic Surgery using 3D Printing to Minimize Healing Time, Dr. Mrityunjay Doddamani, VGST, GoK, 5Lakhs, 2017-18.
21. Cost-Effective Enhanced Insulating Foams for Cold Storage Application, Dr. Mrityunjay Doddamani, ISHRAE, 30.62Lakhs, 2020-2023.
22. Additive Manufacturing of Novel Structural Foam Composites for Durability and Damage Tolerance, PI: Dr. Mrityunjay Doddamani (NITK), Dr. Pavana Prabhakar (UW-Madison, USA); Co-PI's Dr. Suhasini Gururaja (IISc), Prof. Gustavo Parra-Montesinos (UW-Madison, USA), SPARC, MHRD, GoI, 86.49Lakhs, 2019-2021.
23. Development of Brushless DC (BLDC) Motors for an Automotive Power Window Application, Dr. K V Gnagadharan (PI) + Mr. Srinivas (Co PI) . Ms/ Aditya Auto , Dept. of Heavy Industries , 375Lakhs, 2020-2022.
24. Design of Oil Skimming Application with Super Hydrophobic Sponge, Dr. Pruthviraj U (PI) App Mech , Dr. K V Gangadharan (CO.PI), MRPL , 44Lakhs, 2019-2021.
25. TPEM - Fame India Scheme - “Switched Reluctance Motor & Controller for 2W & 3W”, 2018-2021 Dr. K V Gnagadharan (PI) , Co Pis Dr. Jeyaraj , Dr. Navin Karanth,Dr. Venkitesh Perumal (EE), Dr. Suresh Y, (EE) , Dr. Krishnan C (EE) + Mr. Srinivas . Ms/ Aditya Auto , Dept. of Heavy Industries , 1700Lakhs, 2018-2021.
26. Virtual Lab Phase III, Dr. K V Gangadharan(PI) , Dr. Pruthviraj(AppMech), Dr. Mohit T (CS), NMEICT(MHRD), 100Lakhs, 2017-2021.
27. Origins of Yielding in Polymer Electrolyte Membranes, KK Poornesh, DST-SERB, 50Lakhs, 2019-2022.
28. Interface Characteristics of Membrane Electrode Assemblies, KK Poornesh, DST, 35Lakhs, 2018-2022.
29. Analytical and Numerical Investigations of Mixed Convection Through Wire Mesh Porous Structure Filled in a Channel, Dr. N. Gnanasekaran, DST-SERB, 21Lakhs, 2019-2022.

Research Outcome

Placement



Industry collaboration

IFB Goa, NMPT, Wonderla Kochin, Wonderla Bangalore, Wonderla Hydrabad, OMPL, Classic Fusion, Hi-Tech Batteries, IKP knowledge park, BRIC Hackathon, MRPL, INVENCIO, Rambal India Ltd. Ashok Leyland Ltd. Arya Technokrats Belgaum, AUM Techno Spray, Bosch, UD truck India……

Contact:

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