



**भारतीय प्रौद्योगिकी संस्थान भुवनेश्वर**  
**Indian Institute of Technology Bhubaneswar**  
**Admission to Master of Science (by Research) Programme**  
**(Spring Session 2023-24)**

Indian Institute of Technology Bhubaneswar invites online application for admission into be two-and-half academic years (5 – Semesters) Master of Science (by Research) Programme in specialization viz. Mechanical Engineering, Civil Engineering, Electrical Engineering, Electronics & Communication Engineering, Computer Science & Engineering, Metallurgical and Materials Engineering from eligible candidates for the academic year 2023-24 (Spring). Candidates are required to submit their **online applications** in the prescribed format together with self-attested copies of relevant testimonials and prescribed fees by the last date submission of application. **No hard copy of the application will be accepted.**

**Opening date for online application : 18<sup>th</sup> October, 2023**

**Last date for submission of online application : 23<sup>th</sup> November, 2023 11:00 PM**

**1) School of Electrical Sciences:**

<b><i>Computer Science and Engineering</i></b>	Artificial Intelligence, Machine Learning, Natural Language Processing, Internet-of-Things, Cyber-Physical Systems, Multi-Robot Systems, Distributed Systems, Algorithms, Computer Vision, Visual Surveillance, Intelligent Transportation Systems, Software Defined Networks, Cryptography and Network Security, Formal Methods for Testing and Verification, Languages, Compilers, High Performance Computing Architecture.
<b><i>Electronics and Communication Engineering</i></b>	Integrated Circuits and VLSI Systems, Semiconductor devices, Antennas and Arrays, Augmented and Virtual Reality, Biomedical Signal Processing, Cognitive Radio, Digital Signal Processing, Image and Video Processing, Computer Vision, Information Theory and Coding, RF and Microwave , Multimedia, Communication Systems, Optical Communication, Fiber Sensors, Speech Processing, Wireless Communications.
<b><i>Electrical Engineering</i></b>	Renewable Energy Systems, Micro-Grid and Smart-Grid, Power System Protection, Power Quality, Power System Operation and Planning, Power Electronics and Drives, Control System, Electric Vehicle, Electric Machine Design, High Voltage Engineering.

**2) School of Infrastructure (Civil Engineering):**

<b><i>1. Water Resources Engineering:</i></b>	Fluvial hydraulics, Hydrology, Watershed management, Flow through emergent and submerged rigid and flexible, Anthropogenic impacts on river basins, Physical and numerical modelling of flow and sediment transport; Application of Computational Fluid Dynamics (CFD) in hydraulic design, Remote sensing, Glaciology, Disaster risk management.
<b><i>2. Structural Engineering:</i></b>	Structural Dynamics, Earthquake Engineering, Self-centering Systems, Analysis and design of reinforced concrete structures, Dynamic Soil-Structure Interaction, Concrete Technology, Mechanics of laminated composites, Solid and Structural Mechanics, Topology optimization, Meta-materials, Modeling of brittle and ductile fracture, Modeling of Residual stress in composites, Building Information Modeling (BIM) with Mobile

	Robotic Platform (MRP), Retrofitting of heritage structures, Structural Health Monitoring; Machine Learning and Deep Learning; Computer Vision techniques; Digital twin engineering, Smart Materials and Structures Non-local theory, and constitutive modelling, Energy efficient buildings, Static and dynamic instability of thin-walled structures.
<b>3. Geotechnical Engineering:</b>	Dynamics of Soil and Foundation, Offshore Geotechnology, Geotechnical Earthquake Engineering, Soil-structure Interaction, Geotechnics of Soil Erosion, Ground Improvement, Environmental Geotechnics.
<b>4. Transportation Engineering:</b>	Public Transportation, Non-motorized transportation, Green Transportation, Safety and Security aspects of Urban Traffic, Travel Behaviour, Traffic System Analysis, Transport Economics, Traffic Engineering, Intelligent Transportation System, Performance-Based Geometric Design of Highways, Road Safety, Alternative Materials for Road Construction, Bitumen Rheology and Ageing of Bitumen, Design of Low Energy Asphalt Mixes, Pavement Recycling, Design of Climate Resilient and Sustainable Pavements, Transportation Geotechnics, Pervious Concrete Pavements
<b>5. Environmental Engineering:</b>	Water and Wastewater Treatment, Solid Waste Management, waste to Energy Sustainable natural wastewater treatment.

### 3) School of Mechanical Sciences:

<b>Mechanical Engineering</b>	Fluid Mechanics, Turbulence, Computational Fluid Dynamics, Large Eddy Simulation, Fluid-structure interaction, Aero and hydrodynamic propulsion, Heat Transfer, Inverse Heat Transfer, Two-Phase Heat Transfer, Bio-Heat Transfer, Thermal System Optimization, Radiation Heat Transfer in Participating Medium, Conjugate Heat Transfer, Thermal energy storage system, modeling of cryopreservation, Atmospheric Radiation, Remote Sensing, Electronics cooling and Thermal Management, Aerodynamics Flow Control, Flapping wings, Wind Turbine, Experimental Combustion, Energy Systems, Sustainable Fuels, Reacting & Non-Reacting Flow Diagnostics, Combustion Modelling, Acoustics, Composite Materials, Sandwich Structures, Fracture Mechanics, Smart Composite Structures, Vibration, Solid Mechanics, Robotics, Biologically inspired robotics, Human assistive devices, Industrial Noise Control, Condition Monitoring, Multiscale methods for Fracture, Molecular Dynamics; Fracture in Multiphysics problems; structural dynamics, Non-linear elasticity, Mechanics of inflatable structures, Experimental modal analysis, Sensors, Discrete Element Modelling; Deformable granular materials; Discrete model for shape memory alloy, Biomedical image processing using Artificial Intelligence and Deep Learning, Autonomous underwater navigation and structural health monitoring using computer vision, Conventional Machining, Modelling & Simulation of Machining Processes, Sustainable Machining, Machining of Super alloys, Computer Aided Manufacturing, Cellular Manufacturing, Reverse Engineering, Laser Material Processing, Laser-based additive manufacturing/cladding, Pulse Heat Transfer in Manufacturing Analysis, Non-conventional Machining, Hybrid machining techniques, Machining of ceramic and hard materials, Surface texturing, Micro-machining and Tribology. Dissimilar high-strength alloy welding, Hot wire TIG welding of superalloys, Modelling of arc welding processes, residual stress and distortion control in welded structures, TIG cladding and laser treatment for cutting tool life enhancement, Residual stress control in multi-metallic wire arc additive manufacturing (WAAM), LVOF and HVOF based TBC and wear resistance coating, Modelling, and Friction stir welding (FSW) of Al and Mg alloys, FSW tool design, residual stress control in friction stir welded joints, investment casting of
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high-temperature alloys, manufacturability and synthesis of in-situ MMC of Al and Mg alloys, Incremental forming of hard metals, Post-processing of 3D-printed parts, Electrochemical 3D Printing (EC3DP), Metal Forming, Plasticity, Mechanical behavior of Materials.

**4) School of Minerals, Metallurgical and Materials Engineering:**

<p><i>Minerals, Metallurgical and Materials Engineering</i></p>	<p><b>Physical Metallurgy:</b></p> <p>Aluminium-based alloys and composites, Recycling of aluminium alloys, Semisolid metal processing, Processing, Characterization and Modelling of High Entropy Alloys; Light weight High Entropy Alloys; High-entropy alloy based composites; Specialty alloys for marine applications; Coatings for technological applications, Corrosion of advanced materials, Recrystallization behaviour and grain boundary engineering, High entropy alloy thin films; High entropy alloys for extreme environments</p> <p><b>Energy and functional materials:</b></p> <p>Photovoltaics with oxide perovskites and double-perovskites; Piezoelectric-polymer composites for energy harvesting; Materials for metal-ion batteries; Hydrogen storage materials; Energy materials, Batteries, Electro-spraying, Multi-ferroic oxide solar cells and Conventional solar cells. Ab-initio studies in functional and energy materials, Thermoelectric materials, Thermal and electrical properties of nanostructured materials, Biocomposites</p> <p><b>Materials processing:</b></p> <p>Process metallurgy, Iron and Steel Making, Non-ferrous Extractive Metallurgy, Dissimilar joining: experiments and modeling in Friction Stir Welding, Additive Manufacturing, Hydrogen based alternative ironmaking processes; Powder metallurgy of nanocrystalline materials, Surface engineering; Stainless steel and Ferroalloy Production, Hybrid joining</p> <p><b>Mechanical metallurgy:</b></p> <p>Severe plastic deformation of light metals and alloys, Strain-rate sensitivity in metals and alloys, Superplasticity, Virtual characterization using crystal plasticity based finite element modelling; Tribology of aluminium alloys; Mesoscale experimental mechanics; Creep and fatigue of advanced materials</p> <p><b>Modelling, Simulation, Process control and Automation:</b></p> <p>Phase-field modelling of microstructural evolution; Implementation of crystal plasticity in the Abaqus package; Prediction of forming limit diagram using two-phase materials using crystal plasticity; Chaos analysis of dynamical systems; Kinetic and thermodynamic modeling of extractive Metallurgical processes; Process Optimization, Chaos control and dynamic process control, Nonlinear dynamical systems' control in iron and steelmaking; Application of AI techniques; Coupled FEM-DEM modelling.</p>
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# 1. Eligibility Criteria for Application

The candidates meeting any one of the eligibility criteria, as listed below in Sections 1.1, 1.2 and 1.4, are eligible to apply for MS.R programme.

**1.1** The eligibility of a candidate is based on the academic qualification at the time of application, as given below:

- B.Tech./B.E. or equivalent degree in an appropriate discipline with minimum 60% marks or 6.5 CGPA (in a 10-point scale). The candidate must be GATE qualified in an appropriate discipline.

**OR**

Master of Science or equivalent degree in an appropriate discipline with minimum 60% marks or 6.5 CGPA (in a 10-point scale), **and** minimum 60% marks or 6.5 CGPA (in a 10-point scale) in Bachelor of Science/Arts/Commerce or equivalent degree, from a recognized University / Institution. The candidate must be GATE or CSIR-UGC NET (LS) qualified in an appropriate discipline.

- Minimum 60% marks in all examinations throughout the academic career with a single relaxation of 5% marks in either 10<sup>th</sup> or equivalent or 12<sup>th</sup> level examination or equivalent.
- An additional relaxation of up to 5% marks in all academic examination levels is permitted for SC/ST/PwD candidates.

**1.2** Persons who possess the minimum qualifications as prescribed in **Section 1.1** and are already working in a sponsored project of the Institute as JRF/SRF/equivalent shall also be eligible for applying to the MS.R program. These candidates must be GATE/CSIR-UGC NET (LS) qualified while applying for MS.R program.

**1.3 Students with B. Tech. degree from CFTIs:** Such applicants with a CGPA greater than or equal to 8.0 are eligible to apply without GATE.

**1.4 Institute Staff Category:** Permanent staff member of institute or sponsored by other organizations with minimum qualification of B.Tech./B.E. or equivalent degree in an appropriate discipline with minimum 70% marks or 7.5 CGPA (in a 10-point scale) are eligible to apply for MS.R programme. Moreover, they must have minimum 3 years of experience and be employed in industry / organization at the time of applying. They need not be GATE/CSIR-UGC NET (LS) qualified. **Such candidates need to produce No Objection Certificate (NOC) from the employer while applying.**

**OR**

B.Tech./B.E. or equivalent degree in an appropriate discipline with minimum 60% marks or 6.5 CGPA (in a 10-point scale). The candidate must be GATE qualified in an appropriate discipline.

## GATE / NET Disciplines for MS.R admission

School Name	GATE Discipline	UGC-CSIR-NET (LS) Discipline
SES	<ul style="list-style-type: none"><li>• Electrical Engineering (EE)</li><li>• Instrumentation (IN)</li></ul>	
	Computer Science and Information Technology (CS)	Computer Science and Applications (Code-87)

	<ul style="list-style-type: none"> <li>• Electronics and Communication Engineering (EC)</li> <li>• Instrumentation Engineering (IN)</li> <li>• Electrical Engineering (EE)</li> </ul>	Electronic Science (Code-88)
<b>SIF</b>	Civil Engineering (CE)	
<b>SMS</b>	Mechanical Engineering (ME) Production Engineering (PI) Aerospace Engineering (AE) Chemical Engineering (CH) Biotechnology (BT) Biomedical Engineering (BM)	
<b>SMMME</b>	1. Metallurgical Engineering (MT) 2. Mechanical Engineering (ME) 3. Engineering Sciences (XE) 4. Production and Industrial Engineering (PI)	

### Selection Procedure:

- a) For candidates under Categories 1.1, 1.2, 1.3 and 1.4:

Shortlisted candidates will have to appear for written test and interview. Selection to be based on 40% weightage in written test and 60% weightage in interview. The final selection will be based on combined performances in the written test and interview. The schools can fix cut-offs for written test and/or interview based upon the requirements.

- b) The selection process will be regulated by the respective schools.

### Application Fee:

For General, General (EWS) and OBC Candidates : Rs. 500/- (Rupees Five Hundred Only)

For SC/ST/PwD Candidates : Rs. 250/- (Rupees Two Hundred Fifty Only)

### N.B.

- **Application Fee (Non- refundable): USD 50 for all category (Foreign Nationals).**
- **Application fee once paid shall not be refunded under any circumstances.**
- **Female candidates are exempted from payment of application fee.**

### Contacts:

Information relating to admission	For Technical issues with Online Application Process (Submission of Application Form)	For issues with online payment of Application Fee
<b>Academic Section</b> Email ID: <a href="mailto:academic.phd@iitbbs.ac.in">academic.phd@iitbbs.ac.in</a> Contact No. <a href="tel:0674-7134466">0674 - 7134466</a>	<b>ERP Team</b> Email ID: <a href="mailto:erp.admin@iitbbs.ac.in">erp.admin@iitbbs.ac.in</a> Phone: <a href="tel:0674-7138615">0674 - 7138615</a>	<b>Accounts Section</b> Email ID: <a href="mailto:fa.section@iitbbs.ac.in">fa.section@iitbbs.ac.in</a> Contact No – <a href="tel:0674-7134563">0674-7134563</a>

**NOTE:** Telephonic Helpline Numbers are answerable during 10:00 AM to 5:00 PM of Working days only.