



INDIAN INSTITUTE OF TECHNOLOGY
KHARAGPUR – 721 302, INDIA
Sponsored Research and Industrial Consultancy

ADVERTISEMENT NO. : IIT/SRIC/R/FAT/2026/101, DATED 2026-10-13

Applications are invited through online for the following assignment in a purely time bound research project undertaken in the Department of Aerospace Engineering of this institute.

Name of the temporary assignment	: 1) Junior Research Fellow [JRF] - Research, No. of post: 6.
Name of the temporary research project	: RDE Development with Real Time Flow and Thrust Control Phase -1 RDE Engine Testing Facility (Project Code – R/FAT)
Dept./Centre/School	: 1) Aerospace Engineering
PI/Co-PI	: Prof./Dr. Amardip Ghosh
Application fee(In Rs.)	: General / Male / OBC: 0 , Female : 0, SC/ST: 0
Last date of application	: November 03, 2026
Name of the Sponsoring Agency	: ARDB, DRDO(Room No. 411, DRDO HQ Annexe Metcalf House, Civil Lines, Delhi - 110054)
Consolidated Compensation (per month)	: 1) upto 37000 (depending on qualification and experience)

Qualifications & Experience

: 1)

Essential Qualification :

Post Graduate Degree in Basic Science OR Graduate / Post Graduate Degree in Professional Course selected through a process described through any one of the following:

- a. Scholars who are selected through National Eligibility Tests - CSIR-UGC NET including lectureship (Assistant Professorship) and GATE.
- b. The selection process through National level examinations conducted by Central Government Departments and their Agencies and Institutions such as DST, DBT, DAE, DOS, DRDO, MoE, ICAR, ICMR, IIT, IISc, IISER, NISER etc.

Relaxable upto 5 years in the case of SC/ST/OBC/Physically Handicapped / Visually Handicapped and female applicant.

Desired Experience :

Six Junior Research Fellow (JRF) positions are available for research and development activities related to Rotating Detonation Engine (RDE) development and advanced turbomachinery for RDEs. The projects involve fundamental and applied research in detonation-based combustion, high-speed reacting flows, combustion instability, supersonic mixing, advanced propulsion systems, RDE exhaust-flow characterization, turbine integration, experimental diagnostics, and data-driven modelling and control.

IMPORTANT: Candidates should apply **ONLY** if they have demonstrable, hands-on experience in at least one of the following seven areas:

1. Computational Fluid Dynamics (CFD):

Hands-on experience with ANSYS Fluent, OpenFOAM, or equivalent CFD software.

Experience in performing Reynolds-Averaged NavierStokes (RANS) and Unsteady RANS (URANS) simulations.

Experience in reacting-flow simulations involving combustion chambers, gas-turbine combustors, aero-engines, or propulsion systems.

Experience in non-reacting flow simulations involving compressors, turbines, nozzles, and related fluid machinery.

Familiarity with turbulence modelling, combustion modelling, supersonic mixing, shockboundary-layer interactions, and thermal choking.

Experience in modelling combustion instability, detonation waves, rotating detonation engines, or supersonic combustion is particularly relevant.

2. Experimental Research and Propulsion Testing:

Experience in combustor design, compressed-gas handling systems, combustion testing, or experimental facility development.

Experience in supersonic wind-tunnel testing, high-speed reacting-flow experiments, turbomachinery testing, or propulsion-system testing, including experimental characterization of RDE exhaust flows where applicable.

Familiarity with detonation physics, rotating detonation engines, combustion, flame stabilization, supersonic mixing, and combustion instability.

Hands-on experience in schlieren, shadowgraphy, and chemiluminescence imaging.

Experience in high-speed optical diagnostics, high-speed imaging of transient flow phenomena, and synchronization of optical measurements with experimental events.

Experience in measuring static and dynamic pressure, temperature, heat release, and other relevant flow and combustion parameters, including unsteady pressure and temperature measurements in RDE exhaust and turbine-flow environments.

Familiarity with experimental uncertainty analysis, test planning, facility operation, and laboratory safety procedures is desirable.

3. Instrumentation and Data Acquisition

Experience with LabVIEW-based instrumentation, virtual instrumentation, NI FlexLogger, CompactDAQ (cDAQ), and CompactRIO (cRIO) systems.

Hands-on experience with high-frequency dynamic pressure measurements, pressure transducers, signal conditioning, and data acquisition for combustion and high-speed flow experiments.

Experience in synchronizing high-speed cameras with ignition systems, laser sources, pressure acquisition systems, and other experimental hardware.

Familiarity with Arduino and other microcontroller-based systems.

Practical knowledge of electrical grounding, shielding, ferrites, Faraday cages, electromagnetic interference (EMI), and radio-frequency (RF) interference.

Experience with arbitrary waveform generators, signal amplifiers, low-pass filters, oscilloscopes, and high-voltage pulse or ignition systems.

Experience in developing reliable instrumentation systems for transient combustion, detonation, and supersonic-flow experiments is particularly relevant.

4. Control Systems and System Identification:

Experience in system identification, dynamic modelling, and PID controller design.
Familiarity with FPGA-based systems, real-time control, sensor fusion, and hardware-in-the-loop testing.
Experience in open-loop and closed-loop control of combustion chambers, ignition systems, shock systems, turbomachinery test rigs, or supersonic-flow facilities.
Understanding of combustion instability, transient system response, feedback mechanisms, and dynamic interactions between flow and combustion.
Experience in autopilot programming, including implementation, tuning, or testing of autopilot algorithms for autonomous or remotely piloted systems.
Experience in AI/ML-based control, adaptive control, or data-driven modelling of complex physical systems is desirable.

5. Artificial Intelligence and Machine Learning:

Experience in implementing deep-learning pipelines for real-world physical systems or scientific research.
Experience in generating training datasets using low-fidelity simulations, reduced-order models, high-fidelity CFD, or experimental datasets.
Application of AI/ML techniques to image classification, high-speed flow visualization, combustion diagnostics, and time-series data analysis.
Familiarity with transfer learning, transformer-based architectures, and other modern machine-learning techniques.
Experience in detecting, classifying, or predicting combustion instabilities, detonation-wave dynamics, shock motion, flow transitions, or anomalous operating conditions.
Experience in AI/ML-based reduced-order modelling, system identification, predictive modelling, or control of combustion chambers and supersonic-flow systems is desirable.

6. Signal Processing and Data Analysis:

Experience in processing experimental time-series signals, high-speed image sequences, or other time-resolved measurements.
Familiarity with Fast Fourier Transform (FFT), power spectral density, spectrograms, wavelet analysis, recurrence plots, intermittency analysis, and auto- and cross-correlation.
Understanding of the Nyquist sampling criterion, aliasing, sampling frequency selection, frequency-domain and time-domain analysis, fractal dimension estimation, and Bode plots.
Experience in analysing high-frequency pressure oscillations, combustion instability, detonation-wave dynamics, acoustic modes, shock oscillations, RDE exhaust-flow unsteadiness, turbine-flow interactions, and other transient flow phenomena.
Familiarity with time-frequency analysis, phase relationships, mode identification, signal synchronization, and interpretation of non-stationary signals.
Experience in processing synchronized pressure signals and high-speed schlieren, shadowgraph, or chemiluminescence images is particularly relevant.
Familiarity with signal acquisition hardware, including waveform generators, amplifiers, filters, and oscilloscopes, is desirable.

7. Applied Physics, Plasma, and Advanced Diagnostics:

Experience in high-voltage arc discharge, spark ignition, plasma-assisted ignition, or optimization of spark-discharge characteristics.
Experience in laser diagnostics, laser-based flow visualization, laser-induced ignition, or optical measurements in reacting flows.
Experience in optical system design and development, including photomultiplier tubes, image intensifiers, optical filters, beam splitters, and associated instrumentation.
Familiarity with combustion spectroscopy, chemiluminescence-based heat-release measurements, and diagnostics for high-temperature reacting flows.
Knowledge of acoustics, thermoacoustics, waveguide-based plasma generation, RF antennas, or electromagnetic-wave applications.
Knowledge or practical experience in magnetohydrodynamics (MHD), MHD generators, plasma accelerators, or flow decelerators.
Understanding of the operating principles and underlying physics of instruments used for pressure, temperature, velocity, heat-release, and other flow-field measurements.

Instructions to Applicants

Applicants must clearly identify the relevant area or areas of expertise and provide specific evidence of their hands-on experience. Evidence may include:

Research projects, dissertations, or relevant publications.
CFD simulations performed and validated.
Experimental facilities designed, developed, or operated.
Instrumentation, data acquisition, or control systems developed.
High-speed imaging, laser diagnostics, or signal-processing methods implemented.
Software, algorithms, or AI/ML pipelines developed and applied to physical systems.

Candidates should clearly distinguish between theoretical familiarity and practical experience. Merely listing a software package, programming language, or instrument without demonstrating its application will not be sufficient. Candidates with strong expertise in one or more of the listed areas are encouraged to apply. Experience directly relevant to RDE development, advanced turbomachinery for RDEs, detonation-based combustion, combustion instability, high-speed reacting flows, turbine integration, and advanced experimental diagnostics will be particularly valuable.

Age Limit : 35 years. Age rules may be relaxed upon fulfilling sponsor agency rules if any.

Tenure : 36 Months or the termination of the project, whichever is earlier.

Note:1. The qualifications and experience prescribed are the minimum and mere possession of the same does not entitle a candidate to be called for the interview.

2. Age as on last date of advertisement.

Application fee shall be deposited in the following bank account through RTGS/NEFT/NET Banking etc. as under:

1).BANK NAME: STATE BANK OF INDIA(00202);2).BANK ADDRESS: P.O:KHARAGPUR TECHNOLOGY,DIST:MIDNAPORE;WEST BENGAL-721302;3).NAME OF BANK A/C: IIT SRIC-OM Account;4).ACCOUNT NO: 39502115210;5).IFSC CODE: SBIN0000202;6).SWIFT CODE: SBININBB339;
The transaction details(UTR No./Transaction ID etc.) should be mentioned in the Application Form.