

Call Letter for PhD Admissions Selection Process

Indian Institute of Technology Dharwad
Department of Mechanical Engineering

Date: 09-11-2018

Dear Successful Candidate,

With reference to your application for the admission to PhD programme Spring Semester (2018-19) in the Department of Mechanical Engineering at IIT Dharwad, you have been called for the selection process. The selection procedure consists of three rounds: an online objective screening test, one subjective written test followed by an interview. The written test will be conducted to those candidates shortlisted from the online objective screening test. The interview will be will be conducted to those candidates shortlisted from the subjective written test.

The selection process is scheduled on **3rd of December, 2018** at IIT Dharwad. Please report at the Academic Block at 8:00 AM. The process may be extended to the second day (**4th of December, 2018**), however accommodation CANNOT be provided by the Institute.

The syllabus for the screening tests is given in the Ph.D. Information Brochure of IIT Dharwad, available online at: http://iitdh.ac.in/academics/phd%20pdf/PhD_ME_2018%20Spring.pdf. Electronic gadgets like mobile phone, smart watch etc. are not permitted in the examination rooms. However, non-programmable scientific calculator is allowed for the online and written tests.

The candidate is requested to bring the following documents

- Passport Size Photograph
- Photo ID card (any one from these: PAN/AADHAR/Driving Licence/Voter ID/Passport/Govt. issued ID/Educational Institute ID)
- Print-out of the submitted online application form
- Proof (receipt / acknowledgement) of application fees payment
- Self-Attested Photocopies of
 - Date of Birth Certificate/10th class marks sheet
 - Mark-sheets (all semesters) of graduation and post-graduation
 - Provisional Degree Certificate (PC)/Qualifying Degree Certificate (QDC) (if any)

- Qualifying Exam Score Card Certificate (GATE/CEED/CSIR/UGC or any other)
- Copies of papers published (if any)
- Caste Certificate (OBC-NC (Non-Creamy layer)/SC/ST) (if applicable)
- Persons with Disability Certificate (for PwD category) (if applicable)
- Experience Certificate (if applicable)

The results of the selection process will be declared on or before 10th of December 2018. **If you are offered the admission, the fees for the first semester, must be paid by 28th of December 2018 through net-banking to the following account:**

Bank: State Bank of India **Branch:** I.I.T. (Powai)

Account Name: IIT Bombay (IIT Dharwad)

Account No.: 35636327083

IFSC: SBIN0001109 **MICR:** 400002034

The fee structure is as follows:

- General/OBC: ₹ 30,200.00
- SC/ST: ₹ 27,700.00

The Institute reserves the right to withdraw the admission AT ANY TIME, in case the candidate does not fulfil the minimum qualification/required percentage of marks in qualifying examination or provides any false information.

Note:

- Only for OBC-NC: OBC certificate must be supplemented with NC certificate.
- ONLY FOR SC/ST/PwD under TA category: You will be paid to and fro second class (non-AC) train fare by the shortest railway route from your place of residence. For this purpose, onwards railway ticket in original and a photocopy of the return ticket has to be submitted.

**PLEASE NOTE THAT THIS CALL IS MERELY AN INTIMATION FOR THE
ONLINE TEST/ WRITTEN TEST/ INTERVIEW AND DOES NOT GUARANTEE
THE ADMISSION**

Indian Institute of Technology Dharwad
Department of Mechanical Engineering

Guidelines for Shortlisted Applicants

1. Guidelines for the Shortlisted Applicants

The following are the important guidelines for the shortlisted candidates.

1. Shortlisted candidates should report the institute on 3rd of December, 2018 at 8:00 AM
2. No accommodation will be provided in the campus during the selection process
3. Applicants should bring:
 - a. **Non-programmable scientific calculator**
 - b. Photo ID card
 - c. Thesis/dissertation/report of M.Tech. or equivalent degree
 - d. Self-attested copies of the educational certificates up to qualifying degree (10th, 12th, BE/BTech., ME/M.Tech., GATE Score card etc.) and mark-sheets
 - e. NEFT application fee details provided for registration

4. IMPORTANT NOTES:

- a. Electronic Devices like Mobiles, Smart-watch, Laptop etc. are not allowed in the examination halls or onto the interview room
- b. Department's decision is the final regarding any disciplinary matters
- c. Institute doesn't take any responsibility of your luggage/items that you leave before entering the examination hall.
- d. For more details, refer to the information brochure.

1.1. Modality of written tests and interview

The selection process consists of two written rounds and an interview. The written tests comprise of an objective and a subjective test, and are referred to as First round and Second round, respectively. The interview is Third round.

Candidates shortlisted based on the selection criteria have to attend First round based on the syllabus given in Section G of the advertisement (reproduced at the end of this call letter) and chosen specialization. No change in specialization will be allowed. Only candidates selected in the First round are allowed to write Second round in the area of specialization chosen in the PhD application form. Second round comprises of a subjective test and syllabus for the test is

detailed in Section G of the advertisement. Candidates selected in Second round are required to attend the Third round comprising of a technical interview. The further details of the tests/interview are given in the following sections.

1.2. Details of first round

1. There is a 90-minute objective test to all the applicants
2. Syllabi for Fluid-thermal and Design specializations are given in Section G. Syllabus for the Engineering Mathematics is common to both the specializations.
3. A user name and a password will be given to you to login and start the online exam.
4. You cannot change your chosen specialization (stream).
5. There is a 1/3rd negative marking for all answers that are wrongly marked.
6. Submit your answers and logout after your online examination.
7. After the examination, wait till the shortlisting for the second round of selection. The list will be displayed on the notice board. No individual intimation will be given.
8. Second round of selection follows immediately after announcing the result.
9. It is the responsibility of the applicant to be inside the campus till the result is announced.

1.3. Details of second round

1. The examination contains 90 minutes of subjective paper
2. Syllabi for Fluid-thermal and Design specializations are given in Section G. Syllabus for the Engineering Mathematics is common to both the specializations.
3. All answers should be written in clear hand writing.
4. Assumptions made should be written down.
5. No additional sheets will be provided.
6. The results will be announced for the third round of selection process.

1.4. Details of third round of selection

1. A personal interview is conducted to each applicant.
2. The applicant is advised to read some material regarding the topic that he/she has chosen in the application form.
3. Faculty from all fields and from other departments may be present in the interview panel.
4. The final list of selected applicants will be announced for pre-spot registration.

Appendix I: Syllabi for Objective and Subjective Tests

Engineering Mathematics: Common for Fluid-Thermal and Design Streams:

- **Linear Algebra:** Matrix algebra, systems of linear equations, eigenvalues and eigenvectors.
- **Calculus:** Functions of single variable, limit, continuity and differentiability, mean value theorems, indeterminate forms; evaluation of definite and improper integrals; double and triple integrals; partial derivatives, total derivative, Taylor series (in one and two variables), maxima and minima, Fourier series; gradient, divergence and curl, vector identities, directional derivatives, line, surface and volume integrals, applications of Gauss, Stokes and Green's theorems.
- **Differential equations:** First order equations (linear and nonlinear); higher order linear differential equations with constant coefficients; Euler-Cauchy equation; initial and boundary value problems; Laplace transforms; solutions of heat, wave and Laplace's equations.
- **Complex variables:** Analytic functions; Cauchy-Riemann equations; Cauchy's integral theorem and integral formula; Taylor and Laurent series.
- **Probability and Statistics:** Definitions of probability, sampling theorems, conditional probability; mean, median, mode and standard deviation; random variables, binomial, Poisson and normal distributions.
- **Numerical Methods:** Numerical solutions of linear and non-linear algebraic equations; integration by trapezoidal and Simpson's rules; single and multi-step methods for differential equations.

Design Stream:

- **Engineering Mechanics:** Free-body diagrams and equilibrium; trusses and frames; virtual work; kinematics and dynamics of particles and of rigid bodies in plane motion; impulse and momentum (linear and angular) and energy formulations, collisions.
- **Mechanics of Materials:** Stress and strain, elastic constants, Poisson's ratio; Mohr's circle for plane stress and plane strain; thin cylinders; shear force and bending moment diagrams; bending and shear stresses; deflection of beams; torsion of circular shafts; Euler's theory of columns; energy methods; thermal stresses; strain gauges and rosettes; testing of materials with universal testing machine; testing of hardness and impact strength.

- **Theory of Machines:** Displacement, velocity and acceleration analysis of plane mechanisms; dynamic analysis of linkages; cams; gears and gear trains; flywheels and governors; balancing of reciprocating and rotating masses; gyroscope. Vibrations: Free and forced vibration of single degree of freedom systems, effect of damping; vibration isolation; resonance; critical speeds of shafts.
- **Machine Design:** Design for static and dynamic loading; failure theories; fatigue strength and the S-N diagram; principles of the design of machine elements such as bolted, riveted and welded joints; shafts, gears, rolling and sliding contact bearings, brakes and clutches, springs.

Fluid-Thermal Stream:

- **Fluid Mechanics:** Fluid properties; fluid statics, manometry, buoyancy, forces on submerged bodies, stability of floating bodies; control-volume analysis of mass, momentum and energy; fluid acceleration; differential equations of continuity and momentum; Bernoulli's equation; dimensional analysis; viscous flow of incompressible fluids, boundary layer, elementary turbulent flow, flow through pipes, head losses in pipes and bends, flow in convergent-divergent channels, vorticity and stream-functions, elementary Computational Fluid Dynamics, finite-difference approximation to the first and second order partial derivatives.
- **Heat-Transfer:** Modes of heat transfer; one dimensional heat conduction, resistance concept and electrical analogy, heat transfer through fins; unsteady heat conduction, lumped parameter system, Heisler's charts; thermal boundary layer, dimensionless parameters in free and forced convective heat transfer, heat transfer correlations for flow over flat plates and through pipes, effect of turbulence; heat exchanger performance, LMTD and NTU methods; radiative heat transfer, Stefan- Boltzmann law, Wien's displacement law, black and grey surfaces, view factors radiation network analysis.
- **Thermodynamics:** Thermodynamic systems and processes; properties of pure substances, behaviour of ideal and real gases; zeroth and first laws of thermodynamics, calculation of work and heat in various processes; second law of thermodynamics; thermodynamic property charts and tables, availability and irreversibility; thermodynamic relations.
- **Applications Power Engineering:** Air and gas compressors; vapour and gas power cycles, concepts of regeneration and reheat. I.C. Engines: Air-standard Otto, Diesel and

dual cycles. Refrigeration and air-conditioning: Vapour and gas refrigeration and heat pump cycles; properties of moist air, psychrometric chart, basic psychrometric processes.

- **Turbomachinery:** Impulse and reaction principles, velocity diagrams, Pelton-wheel, Francis and Kaplan turbines.