# Indian Institute of Technology Dharwad

## Department of Computer Science and Engineering

## Ph.D. Admission for Autumn Semester, 2018

### A. SCHEDULE OF PH.D. ADMISSION

| S. No. | Particulars | Dates |
|---|---|---|
| 1 | Last date for submission of completed application forms | 15th May, 2018 |
| 2 | Listing of shortlisted candidates for the Selection Process | 1st June, 2018 |
| 3 | Dates for the Selection Process | 29th and 30th June, 2018 |
| 4 | Declaration of Result | 9th July, 2018 |
| 5 | Last date for Fee Payment (at IITDh) | 20th July, 2018 |
| 6 | Date of Joining | 23rd July, 2018 |
| 7 | Last date of withdrawal | 25th July, 2018 |

### B. ELIGIBILITY FOR ADMISSION

**Qualifying Degree:** M.Tech. or equivalent degree (in any stream).

**B.1. Minimum score in the qualifying degree**

For General/OBC category candidates and/or for candidates where no concession in academic performance is called for, the eligibility criteria in the qualifying degree (M.Tech./M.E.) AND the Bachelor's Degree (B. E./B. Tech./M. Sc) is **First Class** as specified by the University. If the University doesn't specify the division/class, then either:

1. a minimum of 60% marks (without round off) in aggregate.
2. a minimum Cumulative Grade Point Average (CGPA) or Cumulative Performance Index (CPI) of 6.0 on the scale of 0-10; with corresponding proportional requirements when the scales are other than on 0-10, (for example, 4.8 on a scale of 0-8).

For SC/ST category candidates and differently abled candidates (PwD), a relaxation of 5% (or CPI/CGPA of 0.5 on the scale of 0-10) in the qualifying degree is applicable.

## C. APPLICATION CATEGORIES AND FINANCIAL SUPPORT

The Department of Computer Science and Engineering admits candidates for the Ph. D. Programme, under Teaching Assistantship (TA) and External (EX) schemes only.

### C.1. Teaching Assistantship (TA)
The students admitted as TAs are Funded by MHRD. The TAs are expected to assist in the academic/administrative work for smooth functioning of the Institute. Students under this category are entitled to financial support as per MHRD norms in force.

At present, the assistantship is payable for a maximum duration of 5 years or up to the defence of the thesis, whichever is earlier, at the monthly rate of ₹ 25,000 for the first 2 years and enhanced rate of ₹ 28,000/- for the remaining period, subject to satisfactory performance in academics and assigned TA duties.

> To get Teaching Assistantship, the students concerned must assist in teaching, research and/or administrative work as assigned by the respective Academic Unit to the extent of 8 hours of work per week. The continuation of the assistantship will be subject to satisfactory performance of the duties assigned by the Departments as well as satisfactory academic performance.

As per MHRD directives, the employees of any organizations with or without pay are not eligible for admission under TA category. Candidates selected in this category have to resign from the current job and submit a relieving letter from their employer before joining the programme. Students getting assistantships from the Institute may join projects sponsored by external agencies and obtain corresponding fellowships in lieu of TA ship.

### C.2. External (EX)

The candidates employed in recognized R&D organizations and desirous of pursuing Ph.D. programme while in employment may apply for admission as external candidates. After fulfilling the coursework requirement at the Institute, these candidates will be allowed to register for Ph.D. with a Supervisor (internal) from the Institute and a Co-supervisor (external) from their parent organization where they will be doing the research work. The admissions are based on the following norms:

i. The competence of these candidates will be assessed along with the regular candidates.

ii. The candidate should submit at the time of application, a Sponsorship Certificate (Appendix A.1) from the organization in which he / she is employed giving an undertaking that the candidate would be released from the normal duties to fulfill the coursework requirement (and

qualifier examination, if applicable). The certificate should also provide details of facilities relevant to the research programme and available to the candidate.

iii. The candidate is required to be at the Institute as a full-time student for the coursework (and qualifier examination, if applicable) of his/her Ph.D. Programme. The coursework requirement is likely to be a period of 1-2 semesters. Depending on the student's background and the programme requirements, an additional semester may be needed to complete the coursework/qualifier examination.

iv. To promote interaction between the internal supervisor and external co-supervisor, meeting between them should be arranged at least once in a year in the Institute or in the sponsoring organization.

v. The Ph.D. registration of an external candidate would be reviewed at the end of each year from the date of registration in terms of his progress in courses / seminars / approved research programme by a Research Progress Committee (RPC) nominated by the concerned Department Postgraduate Committee (DPGC).

vi. The option of external registration is for applicants who are working in well-equipped scientific institutions, laboratories, R&D establishments and industrial organizations engaged in research based activities. Persons working in colleges/universities are not eligible under this category.

vii. At the time of joining the programme, the students will have to produce a "Relieving certificate" from his / her employer that he / she has been fully relieved from normal duties during the semester(s) to complete the course work and other academic work at IIT Dharwad.

**Based on the information provided by the applicants a short-list of candidates called for the selection process will be declared on the Institute website on the date specified in the schedule. Only the short-listed candidates are permitted to participate in the selection process.**

## D. GUIDELINES FOR SHORTLISTED APPLICANTS

The following are the important guidelines of the institute pertaining to the selection process

1. **Reporting Time: 29th June, 2018 at 8:00 AM.**
2. **Online screening test will begin on 29th June, 2018 at 09:30 AM.**

3. Based on the performance in the online screening test, some of the candidates will be shortlisted for the written test.
4. **Written test will begin on 29th June, 2018 at 02:00 PM.**
5. Based on the performance in the written test, some of the candidates will be shortlisted for the interview.
6. Interviews will be held on 30th June (or 29th June, if time permits).
7. **No accommodation can be provided** in the campus during the written test/interview.
8. Applicants should bring:
   a. Photo ID card
   b. Printed copy of the application
   c. Thesis/dissertation/report of M.Tech. or equivalent degree
   d. Copy of certificates and mark-sheets
   e. Two passport size photographs
   f. Non-programmable scientific calculator

**D.1. DO NOT's**
   a. Mobiles and other electronic devices are not allowed in the examination hall.
   b. Department's decision is the final regarding any matter pertaining to this selection process.
   c. Institute doesn't take any responsibility of your luggage/items that you leave before entering the examination hall.

# E. MODALITY OF THE SELECTION PROCESS

**Only the short-listed applicants are permitted to participate in the selection process.**

The selection process consists of an online screening test, a written test and an interview. The online screening test will consist of multiple choice questions. Based on the performance in the online screening test, some of the candidates may be short-listed for the written test, which will be a descriptive test. Based on the performance in the written test, some of the candidates may be short-listed for the interview. Candidates will be offered a PhD position based on their performances in both the interview and the written test, with equal weightage given to both.

# F. RESEARCH TOPICS

The research topics are broadly classified as given below. The applicant may be asked to indicate the choice of the research topics in the order of preference.

1. **Theoretical Computer Science:** Algorithms, Concurrency, Formal Verification, and Graph Theory.

2. **Computer Architecture**

# G. SYLLABUS

For online screening and written test, the following syllabus will be followed. In the online screening, candidates can expect questions based on aptitude and reasoning as well.

**Discrete Mathematics:** Propositional and first order logic. Sets, relations, functions, partial orders and lattices. Groups. Graphs: connectivity, matching, coloring. Combinatorics: counting, recurrence relations, generating functions.

**Computer Organization and Architecture:** Machine instructions and addressing modes. ALU, data-path and control unit. Instruction pipelining. Memory hierarchy: cache, main memory and secondary storage; I/O interface (interrupt and DMA mode).

**Programming and Data Structures:** Programming in C. Recursion. Arrays, stacks, queues, linked lists, trees, binary search trees, binary heaps, graphs.

**Algorithms:** Searching, sorting, hashing. Asymptotic worst case time and space complexity. Algorithm design techniques: greedy, dynamic programming and divide-and-conquer. Graph search, minimum spanning trees, shortest paths.

**Theory of Computation:** Regular expressions and finite automata. Context-free grammars and push-down automata. Regular and contex-free languages, pumping lemma. Turing machines and undecidability.

**Compiler Design:** Lexical analysis, parsing, syntax-directed translation. Runtime environments. Intermediate code generation.

**Operating System:** Processes, threads, inter-process communication, concurrency and synchronization. Deadlock. CPU scheduling. Memory management and virtual memory. File systems.

**Sponsorship Certificate for Ph.D. External Registration (EX)**

(To be typed on letterhead of the Sponsoring Organization)

Name of the sponsoring organization: _____

Address: _____

Present Designation of the applicant: _____

Present status of the applicant: _____
(Permanent/Quasi Permanent/Temporary)

Division where research work is proposed to be done: _____

Name of supervisor from the sponsoring organization: _____
(Bio-data of supervisor to be enclosed giving details of designation, qualification, research experience etc.)

Details of facilities relevant to the research problem which will be made available to the candidate by the organization.

Statement of proposed Co-supervisor (external)

If Shri / Kum. / Smt._____ is registered for the doctorate degree, I agree to act as his/ her research Co-supervisor along with the research Supervisor from IIT Dharwad.

Signature of proposed Co-supervisor (external)

If Shri./ Kum./ Smt. _____ is admitted to the Ph.D. programme, we shall allow him/ her to undergo the programme of studies at IIT Dharwad.

Further, if Shri./ Kum./ Smt. _____ is admitted to the Ph.D. programme, we shall fully relieve him/her from normal duties to complete the course work requirement (and qualifier examination, if applicable) at IIT Dharwad.

During the period of Doctoral programme, the candidate will be permitted to carry out his / her research work at our laboratories / organization and will be given the required facilities.

We also give our consent to _____ of our organization to be the Co-supervisor (external) of the Ph.D. thesis, along with a faculty member of IIT Dharwad as the Supervisor.

Signature and Seal of the Sponsoring Authority

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