

Indian Institute of Technology Dharwad



॥ सा विद्या या विमुक्तये ॥

Information Brochure

(For Indian Nationals)

M.S. Admissions

Autumn Semester 2022-23

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Section I

General Information on Admission Process

A. SCHEDULE OF MASTER OF SCIENCE (M.S.) ADMISSION

Sr. No.	Description	Relevant dates*
1.	Applications open	15-March-2022
2.	Last Date to apply online	15-April-2022
3.	Announcement of shortlist of eligible candidates	26-April-2022
4.	Online Interview Schedule	28-April 2022 to 28-May-2022
5.	Declaration of provisional list of selected candidates	15-June-2022
6.	Declaration of final list of selected candidates	27-June-2022
	Admission for waitlisted candidates starts	06-July-2022
7.	Admission for waitlisted candidates ends	16-July-2022

***All deadlines are defined exactly to be at 5:00pm on the respective date.**

All potential candidates are requested to visit institute website regularly for updated information about the schedule, especially in context on ongoing Coronavirus (COVID-19) related developments. **Future updates regarding the admission process will be made available on the institute website under section Academics >> Admissions >> M.S.**

B. APPLICATION CATEGORIES AND FINANCIAL SUPPORT

IIT Dharwad admits candidates for full time M.S. Programme, under Teaching Assistantship (TA), Financial Assistantship (JRF from UGC/CSIR NET, INSPIRE Fellowship etc.), CSR, Project Assistantship, and External (EX) schemes.

B.1 Teaching Assistantship (TA)

Funded by MoE, 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 the MoE norms.

1. The assistantship is payable for a maximum duration of two and half years or till the date of defence whichever is earlier. At present, the monthly rate of assistantship is ₹12400.
2. To get the Teaching Assistantship stipend, 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 work per week.
3. The continuation of the assistantship will be subject to the satisfactory performance of the duties assigned by the Departments as well as satisfactory academic performance.

4. As per MoE directives, the employees on the rolls (with or without pay) of any organization are not eligible for admission under this 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.

B.2 Financial and Project Assistantship

Funded from projects sponsored by industries and government funding agencies. Under this category, candidates will be paid fellowship as per the rules & regulations of the governing project.

B.3 CSR

Funded by corporates under the corporate social responsibility (CSR) scheme of the Government of India. The fellowship is payable for a duration as specified by the supporting organization for a particular project.

B.4 External (EX)

The candidates employed in recognized R&D organizations and desirous of pursuing M.S. programme while continuing 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 M.S. 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:

1. The competence of these candidates will be assessed along with the regular candidates.
2. At the time of online application, the candidate should submit a Sponsorship Certificate (Appendix A) from the organization in which he/she is employed giving an undertaking that the candidate would be released from the normal duties to fulfil the coursework requirement (and qualifier examination, if applicable). The certificate should also provide details of the facilities in the organisation relevant to the research programme and that would be made available to the candidate for carrying out his/her thesis work.
3. 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 M.S. 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.
4. To promote interaction between the internal supervisor and external co-supervisor, meetings between them should be arranged at least once in a semester in the Institute or in the sponsoring organization.
5. The M.S. registration of an external candidate would be reviewed at the end of each semester 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 and approved by Academic Program Evaluation Committee (APEC).

6. 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.
7. 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 list of eligible candidates called for the selection process will be declared on the Institute website on the date specified in the schedule. Only the eligible candidates are permitted to participate in the selection process.

C. APPLICATION PROCESS

1. Please read all the instructions given in the brochure carefully before filing up the application form.
2. Please note that the application is to be filled at one go. There is no save and proceed option. The application process flow is given below.

Keep all the documents handy >> pay the application fee through SBI e-collect facility >> Note down SBI e collect reference No>> Start online application form>> Fill all particulars including SBI e collect reference No>> Take a print/ save a pdf copy of preview of completed application form >> Final submission of application form >> Note down submission ID for future reference

3. The procedure to pay the application fee through SBI e-collect facility is made available on the website and application form. Candidates are requested to pay the application fee through the steps/procedure described there. Candidates may contact pgadmissions@iitdh.ac.in for any errors/issues pertaining to payment of application fees.
4. This information brochure and future updates regarding the admission process will be made available on the institute website under section Academics >> Admissions >> MS.
5. Application consists of 2 parts – Part 1 (Institute Form) and Part 2 (department specific form(s)). Each applicant is requested to submit both the forms. In case applicant wants to apply to multiple departments, (s)he should submit Part 2 of the application form for each of the respective departments.
6. You are required to submit the application form online. There are no downloadable

forms available. After filling the form, you are advised to take a print and keep the same for future reference. Only after successful submission of the form, you should receive a confirmation email. In case you have not received any e-mail confirmation, within one hour after submission, you are requested to resubmit the form.

7. The application fee is as follows:

Gen/Gen (EWS)/OBC/ all other candidates	₹ 200/-
Women/SC/ST/PwD category candidates	₹ 100/-

8. **The Application Form without valid online payment details will not be considered. Application FEE is Non-Refundable.**

Only one-time single application fee per applicant should be paid, irrespective of the number of the department the candidate is applying to.

9. Applicants may find it convenient to keep following information handy while filling the application form online (whichever relevant):

- Skype Id / Gmail Id for G-meet
- Passport size photo whose size is less than 50 kb
- Educational details from secondary school onwards
- GATE qualification details
- Statement of Purpose (pdf file)
- Proof of application fee payment (pdf file)
- List of fellowship/ awards
- Publications and any other achievements/information.

10. Amendments to the form will not be possible once the last date to apply online is over. However, amendments can be considered if the applicant resubmits the entire form without making repeat fee payment before the deadline.

11. Check your emails regularly for any communication from the institute regarding the selection process.

12. Keep checking institute website regularly for updates regarding the selection process. Shortlisted candidates list will be uploaded on the institute website as per the schedule given above.

13. Candidates (if) called for written test / interview should bring with them Photo ID Card, Printed Copy of Online Application Form, Photocopies of Academic Transcripts, Degree Certificates & Experience Certificates, Caste Certificate (if applicable), PwD Certificate (if applicable), EWS Certificate (if applicable), Thesis/Dissertation/Report/Publications and all other relevant documents.

14. **Candidates should keep all their documents ready, they should produce the same when asked for within a short notice. The documents include all educational qualification, GATE score card, experience and category certificates etc.**

D. FEES, DEPOSITS & HOSTEL RENT

D.1 TA Category

The fee applicable for admission to MS programmes (as collected during the Spring Semester 2021-22) is provided below for reference purpose only:

S. No.	Fee Amount (In Rs.)	For General/EWS/OBC	For SC/ST/Divyangjan
A. One-time payment at the time of Admission			
1.	Admission Fee	2,200.00	2,200.00
2.	Graduation Transcript Fee	500.00	500.00
3.	Medical Examination	400.00	400.00
4.	Provisional Certificate	500.00	500.00
5.	Thesis Fee	2,500.00	2,500.00
6.	Student Welfare Fund	1,000.00	1,000.00
7.	Modernisation & Upgradation	2,500.00	2,500.00
8.	Identity Card	500.00	500.00
Sub-Total (A)		10,100.00	10,100.00
B. Semester Fee			
^1.	Tuition Fee – Statutory Fee	5,000.00	Nil
2.	Examination Fee	1,000.00	1,000.00
3.	Registration Fee	750.00	750.00
4.	Gymkhana Fee	1,750.00	1,750.00
5.	Student Benevolent Fund	500.00	500.00
6.	Medical Fee	1,500.00	1,500.00
*7.	Hostel Room Rent	2,000.00	2,000.00
*8.	Electricity & Water Charges	3,000.00	3,000.00
*9.	Hostel Establishment Charges	3,000.00	3,000.00
*10	Mess Establishment Charges	1,550.00	1,550.00
Sub-Total (B)		20,050.00	15,050.00
Mess Advance		26,000.00	26,000.00
C. Deposits (Refundable) to be paid at the time of Admission			
1.	Institute Security Deposit	1,000.00	1,000.00
2.	Library Security Deposit	1,000.00	1,000.00
3.	Mess Security Deposit	1,000.00	1,000.00
Sub-Total (C)		3,000.00	3,000.00
GRAND TOTAL FEE (A + B + C+ Mess Advance)		59,150.00	54,150.00

Note:

- All the SC/ST/Divyangjan students are exempted from payment of Tuition fee.
- *Students not staying in the campus or not provided married accommodation are not required to pay fee at sl. no. 7, 8, 9, 10 & 11.**
- ^IIT Dharwad reserves the right to revise the Tuition Fee-Statutory Fee (in future).

The following procedure may be adhered for the payment of fee:

1. Students to pay fees through SBI Collect by visiting the below mentioned link:
<https://www.onlinesbi.sbi/sbicollect/icollecthome.htm?corpID=3407756>

Follow the steps mentioned in procedure for paying fees using SBI Collect (Guidance document is attached with email).

In case of fees being paid through - (a) loan from a Bank, and (b) a sponsoring agency (private/government), the concerned student should request the bank / sponsoring agency to transfer the fees amount through our SBI collect OPG (online payment gateway). In this way, fee receipt will be generated automatically and delay will be avoided.

Students paying fees through online fee payment must ensure that their transaction is completed in all respect. Students who fail to register himself/herself for Autumn 2022-23 on the stipulated date, his/her studentship/registration is liable for cancellation.

D.2 Project/External/FA/Other categories

The fee applicable for admission to MS programmes (as collected during the Spring Semester 2021-22) is provided below for reference purpose only:

S. No.	Fee Amount (In Rs.)	For General/EWS/OBC	For SC/ST/Divyangjan
A. One-time payment at the time of Admission			
1.	Admission Fee	2,200.00	2,200.00
2.	Graduation Transcript Fee	500.00	500.00
3.	Medical Examination	400.00	400.00
4.	Provisional Certificate	500.00	500.00
5.	Thesis Fee	2,500.00	2,500.00
6.	Student Welfare Fund	1,000.00	1,000.00
7.	Modernisation & Upgradation	2,500.00	2,500.00
8.	Identity Card	500.00	500.00
Sub-Total (A)		10,100.00	10,100.00
B. Semester Fee			
^1.	Tuition Fee – Statutory Fee	25,000.00	Nil
2.	Examination Fee	1,000.00	1,000.00
3.	Registration Fee	750.00	750.00
4.	Gymkhana Fee	1,750.00	1,750.00
5.	Student Benevolent Fund	500.00	500.00
6.	Medical Fee	1,500.00	1,500.00
*7.	Hostel Room Rent	2,000.00	2,000.00
*8.	Electricity & Water Charges	3,000.00	3,000.00
*9.	Hostel Establishment Charges	3,000.00	3,000.00
*10	Mess Establishment Charges	1,550.00	1,550.00
Sub-Total (B)		40,050.00	15,050.00
Mess Advance		26,000.00	26,000.00
C. Deposits (Refundable) to be paid at the time of Admission			

1.	Institute Security Deposit	1,000.00	1,000.00
2.	Library Security Deposit	1,000.00	1,000.00
3.	Mess Security Deposit	1,000.00	1,000.00
Sub-Total (C)		3,000.00	3,000.00
GRAND TOTAL FEE (A + B + C+ Mess Advance)		79,150.00	54,150.00

Note:

- All the SC/ST/Divyangjan students are exempted from payment of Tuition fee.
- *Students not staying in the campus or not provided married accommodation are not required to pay fee at sl. no. 7, 8, 9, 10 & 11.**
- ^IIT Dharwad reserves the right to revise the Tuition Fee-Statutory Fee (in future).

The following procedure may be adhered for the payment of fee:

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In case of fees being paid through - (a) loan from a Bank, and (b) a sponsoring agency (private/government), the concerned student should request the bank / sponsoring agency to transfer the fees amount through our SBI collect OPG (online payment gateway). In this way, fee receipt will be generated automatically and delay will be avoided.

Students paying fees through online fee payment must ensure that their transaction is completed in all respect. Students who fail to register himself/herself for Autumn 2022-23 on the stipulated date, his/her studentship/registration is liable for cancellation.

E. INFORMATION PERTAINING TO HOSTELS

About IIT Dharwad	Kindly visit the website https://www.iitdh.ac.in/ for available facilities
Hostel Room Allocation (on sharing basis)	You will be allotted a room in the hostel & the room key will be handed over on your arrival at the Institute. Each room will accommodate roughly two/four students (depending on the prevailing conditions) and has an attached bath & toilet.
Are hostel rooms furnished	Each student will be provided a cot, chair & study table and wardrobe. Students can purchase mattress/bedding, bucket, etc. locally. Arrangements will be made for on-campus shopping for these items.
Possession of motorized vehicle	NOT ALLOWED, however bicycles are permitted in the campus.
Climatic conditions	The weather at Dharwad is pleasant throughout the year. Generally, it will be raining in the months of June to September and weather will be windy and cold during the months of October to January. It is suggested that you carry protective clothing accordingly.

Section II

Department Specific Information

F. DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

F.1 Eligibility for Admission

F.1.a Qualifying Degree

i. B. Tech / B. E. in Computer Science and Engineering

OR

ii. Any B. Tech / B. E. in allied Engineering branches

OR

iii. Master of Computer Applications (MCA)

OR

iv. MSc in Computer Science

A valid GATE score in Computer Science and Engineering*

*Valid GATE score is essential for candidates applying in TA category (except for candidates who have B.Tech. or equivalent degree from IITs or BS degree from IISc with minimum CPI/CGPA of 8.0 on the scale of 10). GATE score is not mandatory for the EX category.

F.1.b Minimum eligibility criteria

F.1.b.1 Minimum score in the qualifying degree

For General/General (EWS)/OBC category candidates and/or for candidates where no concession in academic performance is called for, the eligibility criteria in the qualifying degree (B.Tech./B.E.) is either:

1. a minimum of 60% marks (without round off) in aggregate over the entire duration of the undergraduate program.
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).
3. Candidates with MSc in Computer Science have eligibility criteria of a minimum of 60% marks in both BSc in Computer Science and MSc in Computer Science.
4. Candidates with MCA have eligibility criteria of a minimum of 60% marks in both BCA and MCA.
5. For SC/ST/PwD category candidates, a relaxation of 5% in the performance at the qualifying degree is applicable.

F.1.b.2 Minimum score in GATE

For General/General (EWS) category candidates and/or for candidates where no concession in academic performance is called for, the eligibility requirement in the GATE score is a minimum of 600. And for other categories, relaxation is given as per GOI norms.

Note that merely satisfying the eligibility conditions does not guarantee selection into the programme.

F.1.c Applicants in the final phase of getting qualifying degree

Students who are in the final phase of receiving above mentioned qualifying degree and who are likely to graduate before commencement of Autumn 2022-23 semester of IIT Dharwad are also eligible to apply. However, if offered, the admission to those candidates would be provisional. To join an academic program at IIT Dharwad, such candidates need to furnish necessary documents regarding completion of the degree on the date of joining mentioned in the Section A above. They need to meet the criteria specified in section above considering updated score in the qualifying degree, in the meanwhile, the aggregate academic performance announced by the respective university till the last date for submission mentioned in section A should be used to determine eligibility for application and same to be reported in the online application.

F.2 Financial support category

The Dept. of Computer Science and Engineering at IIT Dharwad invites application for the MS programme under the following categories *only* for the Autumn 2022-23 semester –

- a) TA
- b) EX
- c) Project Assistantship

- **Code:** Au22_MS_CSE_DSAI1 / Au22_MS_EE_CSML1

Title: Tribal language speech to speech using deep learning framework

Description: This project involves development of artificial intelligence and deep learning-based systems for speech to speech translation.

Broad domain of research: Speech Processing, Natural Language Processing, machine learning and deep learning.

Requirement: The candidate should have exposure to the basics of probability and good programming skills in python.

Type of funding support – PA (Rs. 25000/- ; additional HRA applicable if staying outside campus; it may vary as per the policy applicable from time to time)

Duration of funding - 2 years

Number of openings: 1.

- **Code:** Au22_MS_CSE_DSAI2 / Au22_MS_EE_CSML2

Title: Speech Technologies in Indian Languages - Speaker Recognition

Description: This project involves development of artificial intelligence and deep learning-based systems for speaker recognition.

Broad domain of research: Speech Processing, Natural Language Processing, machine learning and deep learning.

Requirement: The candidate should have exposure to the basics of probability, signal processing and good programming skills in python.

Type of funding support – PA (Rs. 25000/- ; additional HRA applicable if staying outside campus; it may vary as per the policy applicable from time to time)

Duration of funding - 3 years

Number of openings: 3.

- **Code:** Au22_MS_CSE_DSAI3 / Au22_MS_EE_CSML3

Title: Standalone Domain Specific Speech to Speech Translator for Hindi, English and Tamil Languages

Description: This project involves development of artificial intelligence and deep learning based systems for speaker recognition.

Broad domain of research: Speech Processing, Natural Language Processing, machine learning and deep learning.

Requirement: The candidate should have exposure to the basics of probability, signal processing and good programming skills in python.

Type of funding support – PA (Rs. 25000/- ; additional HRA applicable if staying outside campus; it may vary as per the policy applicable from time to time)

Duration of funding - 3 years

Number of openings: 1.

F.3 Modality of selection process

Only the eligible applicants are permitted to participate in the selection process. The tests and interviews will be based on the topics listed in Section F.5. The selection process would involve two rounds. Round-1 will be an online interview to test the aptitude, programming skills and knowledge of Discrete Structures and Data Structures and Algorithms of the candidate. In round-2, the candidates shortlisted from round-1 will be called for interview by the respective panel based on the research area preference mentioned in the admission form. The candidates are encouraged to check the Institute Website from time to time. Selection committee decisions are final in all matters including any disciplinary matters/malpractice.

F.4 Focus area of research

The research topics are broadly classified as given below.

1. **Data Science and Artificial Intelligence (DSAI):** Machine Learning (ML), Deep Learning (DL), Reinforcement Learning (RL), Stochastic Control and Optimisation, Bayesian Optimization, Text Mining, Speech and Audio Processing, Handwriting and Document Processing, ML for Cyber Physical Systems, Mining large data streams, ML for Cyber Security, Big Data Analytics, Distributed data processing.
2. **Computer/Communication Networks (CN):** 5G/IoT Networks, AI Driven Networking, Network Virtualization, Network/Cyber Security, Blockchains, Software Defined Networks, Network Function Virtualization, Data Center Networking
3. **Embedded systems and Computer Architecture (ESCA):** Application of neural networks on Edge devices, Reliability and Security of Autonomous vehicles, Modeling and characterization of heterogeneous processors, Efficient Computer Architectures, Runtime Verification of Hardware
4. **Theoretical Computer Science (TCS):** Algorithms, Concurrency, Formal Verification, and Graph Theory.
5. **High Performance Computing and Programming Languages (HPCPL):** Parallel Computing, Compilers and Translation Systems, Programming models and runtime systems.

In this call, applications are invited for conducting research in all the areas mentioned above. The applicant may be asked to indicate prioritized preferences for broader research areas.

F.5 Syllabus – Computer Science and Engineering

- **Engineering Mathematics**
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. Linear Algebra: Matrices, determinants, system of linear equations, eigenvalues and eigenvectors, LU decomposition Calculus: Limits, continuity and differentiability. Maxima and minima. Mean value theorem. Integration. Probability: Random variables. Uniform, normal, exponential, poisson and binomial distributions. Mean, median, mode and standard deviation. Conditional probability and Bayes theorem.
- **Digital Logic**
Boolean algebra. Combinational and sequential circuits. Minimization. Number representations and computer arithmetic (fixed and floating point).
- **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 context-free languages, pumping lemma. Turing machines and undecidability.

- **Compiler Design**

Lexical analysis, parsing, syntax-directed translation. Runtime environments. Intermediate code generation.

- **Operating Systems**

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

- **Databases**

ER-model. Relational model: relational algebra, tuple calculus, SQL. Integrity constraints, normal forms. File organization, indexing (e.g., B and B+ trees). Transactions and concurrency control.

- **Computer Networks**

Concept of layering. LAN technologies (Ethernet). Flow and error control techniques, switching. IPv4/IPv6, routers and routing algorithms (distance vector, link state). TCP/UDP and sockets, congestion control. Application layer protocols (DNS, SMTP, POP, FTP, HTTP). Basics of Wi-Fi. Network security: authentication, basics of public key and private key cryptography, digital signatures and certificates, firewalls.

F.6 Department level contacts for admission process enquiries

For queries related to MS admissions, you can send an email to pgadmissions.cse@iitdh.ac.in with the Subject “Query related to MS Admissions for CSE”.

G. DEPARTMENT OF ELECTRICAL ENGINEERING

G.1. Eligibility for Admission

G.1.a. General Criteria

1. B. Tech / B. E. or equivalent degree in Electrical Engineering, Electronics and Communication Engineering, Electrical and Electronics Engineering, Instrumentation Engineering or any related stream.
2. A valid GATE score in relevant stream*

*Valid GATE score is essential for candidates applying in TA category (except for candidates who have B.Tech. or equivalent degree from IITs or BS degree from IISc with minimum CPI/CGPA of 8.0 on the scale of 10).

G.1.b. Minimum score in the qualifying degree

For General/General (EWS)/OBC category candidates and/or for candidates where no concession in academic performance is called for, the eligibility criteria in the qualifying degree (B.Tech./B.E.) is either:

1. a minimum of 60% marks (without round off) in aggregate over the entire duration of the undergraduate program.
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/PwD category candidates, a relaxation of 5% (or CPI/CGPA of 0.5 on the scale of 0-10) in the performance at the qualifying degree is applicable.

Note that merely satisfying the eligibility conditions does not guarantee selection into the programme.

G.1.c. Applicants in the final phase of getting qualifying degree

Students who are in the final phase of receiving above mentioned qualifying degree and who are likely to graduate before commencement of Autumn 2022 semester of IIT Dharwad are also eligible to apply. However, if offered, the admission to those candidates would be provisional. To join an academic program at IIT Dharwad, such candidates need to furnish necessary documents regarding completion of the degree on the date of joining mentioned in the Section A above. They need to meet the criteria specified above considering updated score in the qualifying degree, in the meanwhile, the aggregate academic performance announced by the respective university till the last date for submission mentioned in section A should be used to determine eligibility for application and same to be reported in the online application.

G.2. Financial support category

The Department of Electrical Engineering admits candidates for full time M.S. Programme, under Teaching Assistantship (TA) and Project Assistantship (PA) category only.

G.3. Research Areas

G.3.1. TA category

The research areas are broadly classified in four streams as described below. **The applicant MUST indicate the choice of the research topics in an order of preference.**

- A. Microelectronics and VLSI:** Including but not limited to, Analog / Mixed signal / RF Integrated Circuits and Systems, High speed circuits, instrumentation circuits, Power management and Energy harvesting circuits etc.

Eligible social category to apply: - Gen, Gen (EWS), OBC, SC, ST and PwD

- B. Electronic Devices:** Including but not limited to Gas sensors, Nano-electronics. GaN-based HEMTs, Silicon Carbide Power Diodes and Radiation detectors.

Eligible social category to apply: - Gen, Gen (EWS), OBC, SC, ST and PwD

- C. Power & Energy Systems: (1) Power Systems:** Power system stability and control; Smart Grid; Micro grids; Impact of renewables, battery energy storage and Electric Vehicles on Grid; Cyber Security and Game Theory Applications in Smart Grid.

(2) Power Electronics, Converters and Controls: DC/DC and DC/AC converters for applications in Electric Vehicle; Power Electronics and converters for Renewable Energy; Medium voltage hybrid DC circuit breakers; Grid connected multilevel inverters; high voltage power electronics and control; Electrical drives for Electrical Vehicles.

Eligible social category to apply: - Gen, Gen (EWS), OBC, SC, ST and PwD

- D. Communications/signal processing:** Wireless communication, wireless networks, caching in cellular networks, machine learning for wireless communication/networks, federated learning with communication constraints, Satellite Communications, Underwater communications, theoretical aspects of learning over wireless networks. Speech, language and audio processing.

Eligible social category to apply: - Gen, Gen (EWS), OBC, SC, ST and PwD

- E. Control and Robotics:** Including but not limited to Control of Robots through Speech Signals, Autonomous Vehicles, Control for Differential Games, Control of Structures etc.

Eligible social category to apply: - Gen, Gen (EWS), OBC, SC, ST and PwD

G.3.2. Project positions (PA category): No reservation is applicable for PA category

G.3.2.1 Position-1

Code –Au22_MS_EE_PES

Broad Area: Power and Energy Systems

Project Title: Development of Power-Line Interface System to Power a Transmission-Line Inspection Robot from a Live Transmission Line Conductor

Abstract: The main aim of this project is to design a current transformer and power converters for extracting electrical power from current carrying transmission lines. The line conductor acts as the primary of the CT and power can be extracted from the secondary of the CT. The extracted power can be used in line crawling robots used for monitoring transmission lines.

Research Topic: Can be the same as the topic mentioned in the abstract or will be decided later after mutual discussion.

Number of openings: 1

Proposed stipend: 15,500/- per month+ HRA as per norms if hostel facility is not available

G.3.2.2 Position-2

Code –Au22_MS_EE_SPC

Broad area: Signal Processing and Control

Project Title: Disaster response drone for fire rescue in public buildings

Abstract: The project involves developing a drone to assist fire-fighters by locating the people stranded from public buildings like hospitals, malls etc, during the fire break-out. It involves developing image processing and navigation algorithms for indoor environments with limited visibility. The candidate is expected to be familiar with basic concepts of linear algebra, image processing, navigation, and controls along with MATLAB. Hands-on- experience of ROS, and/or drone development is preferred.

Number of openings: 1

Proposed stipend: 15,500/- per month+ HRA as per norms if hostel facility is not available

G.3.2.3 Position-3

Code - EEQ/2020/000047

Broad Area: Wireless Communication

Project Title: Deep Learning Oriented Blockchain Method based Resource Allocation in 6G Wireless Networks

Abstract: The project is focused on developing Deep learning-oriented, Blockchain-enabled resource allocation strategies for next-generation (6G) wireless networks. The candidates will explore the area of basics digital communication systems and advanced wireless communication networks.

Number of openings: 1

Proposed stipend: 31,000/- per month+ 16% HRA if hostel facility is not available

G.3.2.4 Position-4

Code - CRG/2020/004611

Project Title: Powering the Ultra-Low-Power Wireless System/IoT Node by Scavenging Multi-Band Radio Frequency (RF) Energy

Broad domain of research – VLSI Circuits, Network Theory, and Analog Electronics.

Type of funding support: PA (Rs. 31000/- ; additional HRA Applicable if staying outside campus; it may vary as per the policy applicable from time to time)

Duration of funding - 2 years

Details (if any) - Good exposure to VLSI Circuits, Network theory and Analog Electronics with good background in circuit simulation tools.

Abstract: The scope of this project is to develop an on-chip energy processing unit for powering an ultra-low-power wireless sensor/IoT node by scavenging multi-band RF energy.

Number of openings: 1

Proposed stipend: 31,000/- per month+ 16% HRA if hostel facility is not available

G.3.2.5 Position-5

Code –Au22_MS_EE_FDL

Project Title: Federated Deep Learning for Caching in 5G and Beyond Networks

Description: This project involves designing efficient ML based caching algorithms for the next generation wireless networks.

Broad domain of research: Wireless communications/networks, caching, Deep learning for communication, 5G and beyond.

Requirement: The candidate should be interested in working on theoretical problems. He/She should have a good understanding of basic communication systems and probability theory. Good knowledge in programming is an added advantage.

Type of funding support – PA (Rs. 31000/- ; additional HRA applicable if staying outside campus; it may vary as per the policy applicable from time to time)

Duration of funding - 2 years

Number of openings: 1.

G.3.2.6 Position-6

Code - Au22_MS_EE_CSML1 / Au22_MS_CSE_DSAI1

Project Title: Tribal language speech to speech using deep learning framework

Description: This project involves development of artificial intelligence and deep learning-based systems for speech to speech translation.

Broad domain of research: Speech Processing, Natural Language Processing, machine learning and deep learning.

Requirement: The candidate should have exposure to the basics of probability and good programming skills in python.

Type of funding support – PA (Rs. 25000/- ; additional HRA applicable if staying outside campus; it may vary as per the policy applicable from time to time)

Duration of funding - 2 years

Number of openings: 1.

G.3.2.7 Position-7

Code - Au22_MS_EE_CSML2 / Au22_MS_CSE_DSAI2

Project Title: Speech Technologies in Indian Languages - Speaker Recognition

Description: This project involves development of artificial intelligence and deep learning-based systems for speaker recognition.

Broad domain of research: Speech Processing, Natural Language Processing, machine learning and deep learning.

Requirement: The candidate should have exposure to the basics of probability, signal processing and good programming skills in python.

Type of funding support – PA (Rs. 25000/- ; additional HRA applicable if staying outside campus; it may vary as per the policy applicable from time to time)

Duration of funding - 3 years

Number of openings: 3.

G.3.2.8 Position-8

Code - Au22_MS_EE_CSML3 / Au22_MS_CSE_DSAI3

Project Title: Standalone Domain Specific Speech to Speech Translator for Hindi, English, and Tamil Languages

Description: This project involves development of artificial intelligence and deep learning-based systems for speaker recognition.

Broad domain of research: Speech Processing, Natural Language Processing, machine learning and deep learning.

Requirement: The candidate should have exposure to the basics of probability, signal processing and good programming skills in python.

Type of funding support – PA (Rs. 25000/-; additional HRA applicable if staying outside campus; it may vary as per the policy applicable from time to time)

Duration of funding - 3 years

Number of openings: 1.

G.3.2.9 Position-9

Code - Au22_MS_EE_SEN

Project Title: Design and implementation of a Gas Sensors

Description: This project is on developing resistive sensors for vapours which indicate stresses in crops. This will require synthesis of sensing materials characterizing them, exhaustively testing the material for the vapours. The work will also include assembling interfacing electronics for the prototype development.

Broad domain of research– Gas sensors.

Requirement: Candidate should have fundamentals knowledge of electronic devices, VLSI technologies, nanotechnology and having fair knowledge of Signal processing.

Type of funding support – PA (Rs. 31000/-; additional HRA applicable if staying outside campus; it may vary as per the policy applicable from time to time)

Duration of funding - 3 years

Number of openings: 1.

G.3.2.10 Position-10

Code - 22Au_MS_EE_PA03 / 22Au_MS_MMAE_PA03

Project Title: Grading of farm produce quality using computer vision and machine learning

Brief Project Description: The project will focus on applied research to translate computer vision and machine learning techniques for classification of the farm produce. Major focus will be on the assessment of various techniques to capture the scene appropriated and algorithms to efficiently and effectively provide automated inferences using low cost hardware. This project is funded by IIT Dharwad SPOKE for the BITS BioCyTiH Foundation.

Broad domain of research: Computer Vision, AI in Agriculture, 3D modeling

Candidate Requirement: This research would need interdisciplinary skill sets - specifically computational geometry, image processing, and computer vision. Candidates should be interested in algorithmic thinking and coding skills across various platforms. This project will also involve instrumentation work and field visits for conducting surveys and field testing to ensure that the project remains relevant for the various stakeholders.

Type of funding support – PA (Rs. 23000/-; No additional HRA applicable; it may vary as per the policy applicable from time to time)

Duration of funding - 36 months maximum

Number of openings: .1

G.4. Modality of selection process

All the eligible candidates are invited for the first round of interviews via video conferencing. After the first round interviews, a shortlist will be announced for the second round of interviews. The shortlisted candidates will be asked to attend the second round of interview via video conferencing. Syllabus for the interview is given in Section G.4.1 of this document.

The interview slot (date and starting time) specific to each candidate will be communicated online at https://www.iitdh.ac.in/academics_ms.php.

Selection committee decision is final in all matters including any disciplinary matters/malpractice.

G.4.1. Syllabus – Electrical Engineering

Engineering Mathematics: Linear Algebra: Matrix Algebra, Systems of linear equations, eigenvalues, and eigenvectors. Transform Theory: Fourier Transform, Laplace Transform.

Electric Circuits: KCL, KVL, Transient response of dc and ac networks, Sinusoidal steady-state analysis, filters, Ideal current and voltage sources, Thevenin's theorem, Norton's theorem, Superposition theorem, Maximum power transfer theorem, Three phase circuits, Power and power factor in ac circuits.

Signals and Systems: Representation of continuous and discrete-time signals, Shifting and scaling operations, Linear Time Invariant and Causal systems, Fourier series representation of continuous periodic signals.

Analog Electronics: Characteristics of diodes, transistors; Simple diode circuits; Amplifiers; Operational amplifiers: Characteristics and applications.

Control Systems: Basic control system components; Feedback principle; Transfer functions; root locus

Magnetic Circuits: Inductor; Transformers - Single phase transformer: equivalent circuit, phasor diagram, open circuit and short circuit tests, regulation and efficiency.

H. DEPARTMENT OF MECHANICAL MATERIALS AND AEROSPACE ENGINEERING

H.1. ELIGIBILITY FOR ADMISSION

H.1.a General Criteria

1. B.Tech. /B.E. or equivalent degree in Mechanical Engineering or Materials and Metallurgical Engineering or Aerospace Engineering or other related streams.
2. A valid GATE score in one of the following papers AE, ME, MT, PI, XE (A, B, C, D, E)
*

*Valid GATE score is essential for candidates applying in TA category (except for candidates who have B.Tech. or equivalent degree from IITs or BS degree from IISc with minimum CPI/CGPA of 8.0 on the scale of 10).

H.1.b Minimum score in the qualifying degree

For General/General (EWS)/OBC category candidates and/or for candidates where no concession in academic performance is called for, the eligibility criteria in the qualifying degree (B.Tech./B.E.) is either of the following two:

- A minimum of 60% marks (without round off) in aggregate over the entire duration of the undergraduate program.
- 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 0-10 (for example, 4.8 on a scale of 0-8).

For SC/ST/PWD category candidates, a relaxation of 5% in the performance at the qualifying degree is applicable.

Merely satisfying the eligibility conditions does not guarantee selection into the program.

H.2 Applicants in the final phase of getting qualifying degree

The students who are in the final phase of receiving above mentioned qualifying degree and are likely to graduate before the commencement of the Autumn 2022 semester are also eligible to apply. However, if offered, the admission to those candidates would be provisional. To join the academic program at IIT Dharwad, such candidates need to furnish necessary documents regarding completion of the degree on the date of joining IIT Dharwad. The date of joining will be announced later on the Institute website. The candidate needs to meet the criteria specified in section **Error! Reference source not found.**1 above considering the updated score in the qualifying degree. In the meanwhile, the aggregate academic performance announced by the respective university till the last date for submission (mentioned in section A) should be used to determine eligibility for

application, and the same should be reported in the online application.

H.3 Financial support category

The Department of Mechanical, Materials and Aerospace Engineering at IIT Dharwad invites applications for the MS program under the following categories *only* for the Autumn 2022 semester:

- a) TA
- b) Project category

H.4 Information on project category

The following projects are seeking MS scholars in the project category:

a) Project: **22Au_MMAE_MS_PA01**

Broad area: 3D printing/Additive Manufacturing, clay manufacturing, extrusion-based 3D printing.

Eligible social category to apply – All categories

Fee – Please see section “Fees, deposits & hostel rent”

Duration of the funding - 2 years subject to availability of funds.

Stipend: The proposed stipend is Rs. 15,000/- per month.

Number of openings: 1

Topic: Development of Eco-friendly Ancient Indian Clay, Ceramic Idols/Potters of Traditional Importance by Extrusion Based 3D printing/Additive Manufacturing.

Brief Description:

India is known for its cultural heritage and diversity. Since historic times, arts and handicrafts were given prime importance and it continues till today. Starting from idols to kitchen utensils, from bricks to earthen pots, most of the items were prepared from clay and similar materials. With the advent of plastic and metallic components, objects with cultural importance as mentioned above are slowly fading away. Objectives of this proposal to bring back the lost culture of clay, ceramic, potters by developing novel 3D printing/additive manufacturing technology, extruder nozzle design, path plan, area filling pattern, composition, etc.

b) Project: **22Au_MMAE_MS_PA02**

Broad area: Fluid and Thermal, Solar energy developments

Eligible social category to apply – All categories

Fee – Please see section “Fees, deposits & hostel rent”

Duration of the funding - 2 years subject to availability of funds.

Stipend: The proposed stipend Rs. 15,000/- per month + 16% HRA if the hostel facility is

not available.

Number of openings: 1

Topic: Development of Solar-thermal based smart dryer for post-harvest grain storage systems.

Brief Description:

The proposed project details development of a solar-based and Cyber-Physical-System enabled food grain dryer systems for the silo storages. The energy required for the drying process is derived from the solar energy, however, integration of other means is to be provided with the design of the module. The objectives of the work are (i) to understand the design requirements of the post-harvest storage process for food-grain silos, (ii) to translate the design requirements in the sub-modules of the solar based dryer system design, and (iii) to finalize the exposure time, operating temperatures, air-circulation patterns around the silo, heating rates, humidity reading and control, charging-discharging of the heat storage device, operations of the solar-collector module, etc.

c) Project: **22Au_MMAE_MS_PA03**

Broad area: Computer Vision, AI in Agriculture, 3D modeling

Eligible social category to apply – All categories

Fee – Please see section “Fees, deposits & hostel rent”

Duration of the funding - 3 years subject to availability of funds.

Stipend: The proposed stipend Rs. 23,000/- per month; No additional HRA applicable; it may vary as per the policy applicable from time to time.

Number of openings: 1

Topic: Grading of farm produce quality using computer vision and machine learning

Brief Description:

The project will focus on applied research to translate computer vision and machine learning techniques for classification of the farm produce. Major focus will be on the assessment of various techniques to capture the scene appropriately and algorithms to efficiently and effectively provide automated inferences using low-cost hardware. This project is funded by IIT Dharwad SPOKE for the BITS BioCyTiH Foundation.

d) Project: **22Au_MMAE_MS_PA04**

Broad area: 3D printing/Additive Manufacturing, 4D printing, extrusion-based 3D printing

Eligible social category to apply – All categories

Fee – Please see section “Fees, deposits & hostel rent”

Duration of the funding - 2 year subject to availability of funds.

Stipend: The proposed stipend Rs. 15,000/- per month.

Number of openings: 1

Topic: 4D Printing technology development

Brief Description:

The 4D printing process is a combination of 3D printing technology and smart material (ex. shape memory alloy, shape memory polymers). 4D printing has shown potential applications in various fields viz. self-repair, biomedical, self-assembly, self-bending actuator, self- folding actuator, soft robotics, agriculture, sensor, product packing, and food delivery. This project requires development in mathematical models, simulation, experiments etc. for various applications.

e) Project: **22Au_MMAE_MS_PA05**

Broad area: 3D printing/Additive Manufacturing, Gradient Structure, Self-healing, Smart material, Polymer and Metal 3D Printing.

Eligible social category to apply – All categories

Fee – Please see section “Fees, deposits & hostel rent”

Duration of the funding - 2 year subject to availability of funds.

Stipend: The proposed stipend 15,000/- per month.

Number of openings: 1

Topic title: A study and adaption of ancient Indian alloy processing and metallurgical technologies for self-healing and gradient structure applications via Additive Manufacturing.

Brief Description:

India is the land of rich history and cultural heritage. In ancient days, many popular metallic structures were developed. One such structure is Delhi Iron Pillar erected at about 1600 years ago. Pillar is made up of Wrought Iron. The pillar is referred as “Rust-less pillar” since it did not rust till date. There is material variation from inside to outside in the form of gradient. Proposal takes into account, the ancient manufacturing ideas and gives it a modern touch to suit present requirements. Present proposal aims at development of engineering structures, gradient structure, self-healing objects via polymer (Material Extrusion) and metallic (Wire-Directed Energy Deposition) additive Manufacturing processes.

H.5 Shortlisting of Applications

Short-listing will be done based on the GATE score. The minimum GATE score for getting shortlisted is 460 for General and for other categories, relaxation is given as per GOI norms.

Modality of selection process

- For the TA category, the selection is based on the GATE score alone.
- GATE is not mandatory for the candidates who have B.Tech. or equivalent degree

from IITs or BS degree from IISc with minimum CPI/CGPA of 8.0 on the scale of 0-10; for those candidates, the selection will be based on CPI/CGPA only. Up to 10% of the total seats can be filled from this category.

- Those who opt for the project category need to go through one online interview round. The details of the interview round will be communicated to the shortlisted candidates. For such candidates, there will be 70% weightage from GATE and 30% weightage from the interview for the final selection as MS scholars under the project category.

The candidates are encouraged to check the institute website from time to time for the results. Selection committee decisions are final in all matters.

H.6 Department level contacts for admission process enquiries

For queries related to MS admissions in MMAE Department, one can write to pgadmissions.me@iitdh.ac.in and cc to pgadmissions@iitdh.ac.in with the subject “Query related to MS Admissions in MMAE”.

I. Appendix A: Sponsorship Certificate for M.S External Registration (EX)

(To be typed on letterhead of the Sponsoring Organization)

Name of the applicant:

Name of the sponsoring organization:

Address:

Present Designation of the applicant:

Present status of the applicant: (Permanent/Semi-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.

Date:

Signature of proposed Co-supervisor (external)

=====*****=====

Statement of sponsoring authority

If Shri. /Kum. / Smt. _____

is admitted to the M.S. programme, we shall allow him/ her to undergo the programme of studies at IIT Dharwad.

Further, 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 Shri. /Kum. / Smt./Dr. _____

of our organization to be the Co-supervisor (external) of the M.S. thesis, along with a faculty member of IIT Dharwad as the Supervisor.

Date:

Signature and Seal of the Sponsoring Authority

=====*****=====