Indian Institute of Technology Dharwad

॥ सा विद्या या विमुक्तये ॥

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I.I.T. DHARWAD

Information Brochure

M.Tech. by Research Admissions

Autumn 2026-27

CONTENTS

<u>Section I</u>

General Information on

Admission Process

A. SCHEDULE OF M.Tech. by Research (M.Tech[R]) ADMISSION

All the updates regarding the admission process/important dates will be available on the [institute website](#) **under section Admissions >>** [M.Tech by Research](#). All potential candidates are requested to keep visiting the institute website regularly for updates.
Any query related to admission may send through email to **pgadmissions@iitdh.ac.in**

B. APPLICATION CATEGORIES AND FINANCIAL SUPPORT

IIT Dharwad admits M.Tech. [R] candidates under different admission categories for which details are given below. Availability of respective admission categories in a particular department can be found in the department-specific section of this document.

B.1 Teaching Assistantship (TA)

Funded by the Ministry of Education (MoE), Government of India, the assistantship i.e. ₹12,400/- is available for a maximum period of 2½ years or up to the thesis defense, whichever is earlier. The continuation of the assistantship will be subject to the satisfactory performance of the academic, research performance as well as duties assigned by the Departments. The employees (with or without pay) of any organization are not eligible for admission under this category. If they want admission under this category, they have to resign and submit a relieving letter from their employer before joining the program. The reservation to various social categories is applicable as per the Govt. of India norms.

Students getting assistantships from the Institute may join projects sponsored by external agencies and obtain corresponding fellowships in lieu of TA ship.

B.2 Project Assistantship (PA)

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.Tech[R]. program 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.Tech[R] 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 fulfill the coursework requirement (and qualifier examination, if applicable). The certificate should also provide details of the facilities in the organization relevant to the research program 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.Tech[R] Program. The coursework requirement is likely to be a period of 1-2 semesters. Depending on the student's background and the program 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.Tech[R] 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 program 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 for this category.**

7. At the time of joining the program, 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.

B.5. Self Finance_Sponsored Candidates (SF)

This is a full-time M.Tech.(R). admission category where the candidates are fully funded by their parent organisation. They are not eligible for any financial support from the institute (IIT Dharwad).
1. The competence of these candidates will be assessed along with the regular candidates.
2. Along with the application, the candidate should submit a no objection certificate (NOC) from the organization in which he/she is employed giving an undertaking that the candidate would be released from the normal duties during the M.Tech.(R). program.
3. The candidate is required to be at the Institute as a full-time student.
4. At the time of joining the program, 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 M.Tech.(R). program.
5. Candidates under this category should have :
(i) GATE Qualified (not necessarily have a valid GATE score) **OR** Clearing a written test conducted by the department
  AND
(ii) Clearing one or more rounds of Departmental Interview

(iii) In case of MoUs with specific organisations, the conditions in the MoU will supersede the above requirements.

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 filling in the application form.

2.   The link for the online application is available on the website.

3.   Click on Register/ Signup, and provide your details. Please note that the phone number and email ID that you provide while registering should be valid till the admission process is completed. All communication will be through this email ID.

4.   After registration, you will get an email with your User ID/username as well as a link to set your password. Set a new password by clicking on the link. Note down your User ID and password for future reference.

5.   Login using your User ID and password. >> Fill out the form step by step >> Keep all the documents ready in soft copy >> Pay the application fee through the IIT Dh. e-pay facility. https://epay.iitdh.ac.in/Payment/AdvanceFee > User ID and Date of Birth to be filled. [User ID will be generated after Register/Signup the application] >> Note down e-pay transaction No.>> Fill the remaining details in the CIMS application>> Note down the submission ID for future reference and you will get a mail confirmation of the application.

6.   The application fee is as follows:

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

7.   If you face any technical difficulties while applying, you can send your queries to pgadmissions@iitdh.ac.in.

8.   This information brochure and future updates regarding the admission process will be made available on the institute website under the section Academics >> Admissions >>M.Tech. by Research (M.Tech(R)).

9.   The Application Form without valid online payment details will not be considered. Application FEE once paid is Non-Refundable.

10.   An applicant needs to pay the application fee only once irrespective of the number of departments the applicant is applying to.

11.   Keep the following information handy while filling out the application form online(whichever is relevant).

●   Passport size photograph [50 kb to 200 kb ,JPEG/PNG formats only]

- Identity Proof (Adhaar Card, Voter ID Card, Passport etc.)
- Educational qualification details from secondary school onwards.
- NET/GATE/Other relevant qualifying examination details (if applicable).
- List of fellowships/ awards (if applicable).
- Details of the Publications (if applicable).
- Sponsorship Letter and CV of co-supervisor if you are applying under 'EX' category. (merged as a single PDF)(if applicable).

12. Every department may offer only some modes of financial support/application categories. Please ensure that you meet the eligibility criteria for that category/ mode. Refer to the brochure for further details.

13. Choose your Department and eligibility for the Application carefully after going through the brochure. Once you proceed to the next page, these options can not be modified.

14. Please verify all your details before clicking on the 'Submit' button. Applications once submitted can not be modified. **Your application is liable to be rejected for incomplete/ false information.**

15. You can apply for multiple departments. Separate applications should be submitted for each department.

16. **Keep checking the institute website and your emails regularly for any communication from the institute regarding the selection process. It is the candidate's responsibility to be aware of the schedule of various events related to the admission process.**

17. The Shortlisted candidates' list will be uploaded on the institute website as per the schedule given above in Section A.

18. Candidates (if) called for a 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.

19. **Please note that the candidates (if selected) should be able to produce all relevant documents within a short period of notice. If the documents are not produced within the deadline, the admission is liable to be canceled.**

20. The candidates who secure admission under OBC-NCL and EWS categories are required to produce the OBC-NCL/ EWS certificate issued **after 01 April 2025**. The certificate should be produced at the time of admission. The category certificate must be in the **format applicable to Central Government institutions**, and the state Government formats will not be accepted under any circumstances.

21. The SC/ST/PwD candidates who attend interviews **in person** at IIT Dharwad are eligible for **Travel Fare reimbursement i.e. AC-III Tier in train**. Candidates can also travel by public bus (taxi, chartered bus, etc. not admissible) or air, however the claim will be limited to AC-III tier fare if higher in other modes. The tickets should only be booked through the IRCTC website.

D. INFORMATION PERTAINING TO HOSTELS

About IIT Dharwad	Kindly visit the website https://www.iitdh.ac.in/ for available facilities
Hostel Room Allocation (on a 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)
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	Bicycles are permitted on campus. Motorized vehicle permission is as per Institute norms as amended from time to time.
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.

E.   FEES, DEPOSITS & HOSTEL RENT

The tentative fee applicable for admission to M.Tech [R] program is provided below for reference purposes.

Sl. No.	Fee Amount (In ₹)	General/EWS/OBC	SC/ST/ Divyangjan
A. One-time payment at the time of Admission			
1	Admission Fee	300.00	300.00
2	Academics Service Charges	1,200.00	1,200.00
3	Alumni Lifetime Membership	2,000.00	2,000.00
4	Convocation fee	3,000.00	3,000.00
Sub-Total (A)		**6,500.00**	**6,500.00**
B. Semester Fee			
1	Registration Fee	1,500.00	1,500.00
2	Tuition Fee	#5000.00	## Nil
3	Examination Fee	2,000.00	2,000.00
4	Library	500.00	500.00
5	Gymkhana Fee	3,000.00	3,000.00
6	Hostel Room Rent	1,000.00	1,000.00
7	Electricity & Water Charges	2,500.00	2,500.00
8	Medical and Wellness Fee	2,500.00	2,500.00
9	Student Benevolent Fund	1,000.00	1,000.00
10	Hostel Establishment and Service Charge	2,500.00	2,500.00
11	Mess Establishment and Service Charges	1,500.00	1,500.00
12	Student Activity Establishment charges	2,000.00	2,000.00
Sub-Total (B)		**25,000.00**	**20,000.00**
Mess Advance		**24,500.00**	**24,500.00**
Medical Insurance Premium (MIP)		**1,500.00**	**1,500.00**
C. Deposits (Refundable) to be paid at the time of Admission			
1	Library Deposit	1,000.00	1,000.00
2	Institute Deposit	5,000.00	5,000.00
3	Mess Deposit	5,000.00	5,000.00
Sub-Total (C)		**11,000.00**	**11,000.00**
GRAND TOTAL FEE (A + B + Mess Advance + MIP + C)		**₹ 68,500.00**	**₹ 63,500.00**

<u>**Note:**</u>
1. #IIT Dharwad reserves the right to revise the fee in future.
2. ##All the SC/ST/Divyangjan students are exempted from the payment of Tuition fees.
3. All the students are required to pay the entire fee as per the fee circular. The students who wish to reside outside may be permitted to do so with the permission of the institute only after reporting to the campus. The respective fee components related to the hostel and mess advance will be reimbursed later with the approval of the competent authority.
4. The tuition fee for the EX category will be ₹ 25,000/-.

Section II

Department-Specific Information

F. DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING (CSE)

F.1. Eligibility for Admission

F.1.a. Qualifying Degree

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

<div align="center">OR</div>

  II. Any B.Tech./ B. E. in related Engineering branches

<div align="center">OR</div>

  III. Master of Computer Applications (MCA)

<div align="center">OR</div>

  IV. M.Sc. in Computer Science

A valid GATE score in Computer Science and Engineering or Data Science and AI*

*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-NCL 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 M.Sc. in Computer Science have eligibility criteria of a minimum of 60% marks in both B.Sc. in Computer Science and M.Sc. 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 cutoff of 500. And for other categories, relaxation is given as per GOI norms, i.e. 0.9*500 =450 for OBC-NCL and ⅔*500=333 for SC/ST/PwD candidates.**

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

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

Students who are in the final phase of receiving the above-mentioned qualifying degree and who are likely to graduate before commencement of Autumn 2026-27 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. Admission categories Available.

The Department of Computer Science and Engineering at IIT Dharwad invites application for the M.Tech.[R] program under the following categories **only** for the Autumn 2026-27 semester

Admission Category	Advertised for Autumn 26-27	Broad Research Area	Remarks
TA	Yes	Research Areas mentioned in **F.4.**	The applicant may be asked to indicate the choice of research topics in the order of preference.
PA	No	Not Applicable	-
EX	Yes	Research Areas mentioned in **F.4.**	The applicant may be asked to indicate the choice of research topics in the order of preference.
SF	Yes	Research Areas mentioned in **F.4.**	The applicant may be asked to indicate the choice of research topics in the order of preference.

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 an interview (online) by the respective panel based on the research area preference mentioned in the admission form.

The candidates are encouraged to check the Institute Website (https://www.iitdh.ac.in/mtech-research) 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. Computer Networks (CN), IoT and Security:

● 5G/IoT Networks, AI Driven Networking, Network Virtualization, Network/Cyber Security, Blockchains, Software Defined Networks, Network Function Virtualization, Data Center Networking.

2. Computer Systems and Programming:

● Approximate Computing, Modeling and characterization of heterogeneous processors, Edge-Cloud systems, Runtime Verification of Hardware, Efficient Computer Architectures, Parallel Computing, Compilers and Translation Systems, Programming models and runtime systems.

3. Machine learning (ML) and Artificial Intelligence (AI):

● Machine Learning (ML), Deep Learning (DL), Reinforcement Learning (RL) , Stochastic Control and Optimization, Bayesian Optimization, Text Mining, Speech and Audio Processing.

● Handwriting and Document Processing, Natural Language Processing, Machine Translation, Multimodal AI, LLMs, AI Chatbot Assistant, Computer Vision, ML for Cyber Physical Systems, Digital Twins, Mixed Reality - AR/VR/MX, Mining large data streams, ML for Cyber Security, Big Data Analytics, Distributed data processing.

4. Systems for Machine Learning (SysML)

● Application of neural networks on Edge devices, Hardware for machine learning systems, GPU/TPU/NPU/ML systems and software stack, quantized and low-precision machine learning.

5. Theoretical Computer Science (TCS):

● Algorithms, Concurrency, Formal Verification, Verification of Quantum Programs, Graph Theory, Logic.

The applicant may be asked to indicate their choice of the research topics in order of preference.

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, colouring. 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(Arithmetic Logic Unit), 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.Local optimisation, Data flow analyses: constant propagation, liveness analysis, common subexpression elimination.

● **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 inquiries

For queries related to M.Tech.[R] admissions, you can send an email to pgadmissions.cse@iitdh.ac.in with the Subject "Query related to M.Tech. by Research Admissions for CSE".

 Please visit the website- https://www.iitdh.ac.in/mtech-research regularly to get the latest information on M.Tech.[R] admissions for the CSE Department.

G. DEPARTMENT OF ELECTRICAL, ELECTRONICS, AND COMMUNICATION ENGINEERING (EECE)

G.1. Eligibility for Admission
G.1.1. General Criteria

1. B. Tech / B. E. or equivalent degree in Electrical Engineering, Electronics and Communication Engineering, Electrical and Electronics Engineering, Instrumentation Engineering, Computer Science Engineering, or any related stream.

2. A valid GATE score in the relevant stream*
*Valid GATE score is essential for candidates applying in TA and PA 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 External (EX) and Sponsored Candidates (SF) categories.

G.1.2. 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 program.

G.1.3. Applicants in the final phase of getting qualifying degree

Students who are in the final phase of receiving the above-mentioned qualifying degree and who are likely to graduate before commencement of Autumn 2026-27 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. Admission categories Available.

The Department of Electrical, Electronics, and Communication Engineering admits candidates for full-time M.Tech. by Research M.Tech[R] Program, under Teaching Assistantship (TA), Project Assistantship (PA), External (EX), and Sponsored Candidates (SF) categories only.

Admission Category	Advertised for Autumn 26-27	Broad Research Area	Remarks
TA	Yes	Research Areas mentioned in **G.3.1**	-
PA	Yes	Research Areas mentioned in **G.3.2**	Vacancies: 11
EX	Yes	Research Areas mentioned in **G.3.1**	-
SF	Yes	Research Areas mentioned in **G.3.1**	

G.3. Research Areas

G.3.1 Research Areas for TA, EX, and SF Category

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

1. Microelectronics and VLSI
● *VLSI Circuits:* Including but not limited to, Analog / Mixed signal / RF Integrated Circuits and Systems, Power management and Energy harvesting circuits, Digital signal processing for digital VLSI, and AI/ML hardware accelerators design, etc.

● *Electronic Devices:* Including but not limited to Gas sensors, Nano-electronics, Flexible devices, GaN-based High-electron mobility transistors (HEMTs), Silicon Carbide (SiC) Power Diodes, Semiconductor Radiation Detectors etc.

2. Communication, Signal Processing, and Machine Learning
● *Communication Technologies:* Including but not limited to, physical and medium access control layer technologies in next generation wireless systems, internet of things, multiple access methods, multi-input multi-output systems, millimeter wave communications, low-latency and energy harvesting based communications, machine learning and blockchain oriented resource allocation in 6G, quantum communication.

● *Signal Processing and Machine Learning:* Including but not limited to, speech and natural language processing, image processing and computer vision, and machine learning and deep learning for signal processing.

3. Power Electronics, Energy, and Power Systems

● *Power systems:* Grid-connected renewables and flexible loads, grid-forming technology, autonomous microgrids and smart grids, power system stability, control, and protection.

●*Power Electronics and Drives:* Converters for grid-interfacing, modular and multi-level inverters, power converters for electric vehicles, DC circuit breakers for medium-voltage applications, design of wide-bandgap device-based converters, modeling, and controls for advanced power electronics.

●*Magnetics:* Design of electric machines, magnetics for power-electronics, multiphysics optimization, eddy-current devices, Condition monitoring, characterization of magnetic components, rotational and stress-induced losses.

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

G.3.2 Research Areas for PA category*

1. Microelectronics and VLSI – 3 positions
2. Communication, Signal processing and Machine learning – 3 positions
3. Power Electronics, Energy, and Power Systems – 5 positions
4. Control and Robotics – 0 position
*The number of seats under the PA category may change depending on the approval of projects and the availability of funds.

G.4. Selection process

All the eligible candidates are invited for the first round of interviews via video conferencing (online-mode). 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 interviews in offline-mode at IIT Dharwad campus. The syllabus for the interview is given in Section G.5 of this document.

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

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

G.5 Syllabus

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

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.

Electronic Devices and Circuits: Energy bands in intrinsic and extrinsic semiconductors, equilibrium carrier concentration, direct and indirect band-gap semiconductors. Carrier transport: diffusion current, drift current, mobility and resistivity, generation and recombination of carriers, Poisson, and continuity equations. P-N junction, Zener diode, BJT, MOS capacitor, MOSFET (Metal Oxide Semiconductor Field Effect Transistor), LED (Light Emitting Diode), photodiode, and solar cell.

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, Fourier transform etc.

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 (MMAE)

H.1. Eligibility for admission

H.1.a. General Criteria

B.Tech./B.E. or equivalent degree in Mechanical Engineering or Materials and Metallurgical Engineering or Aerospace Engineering or other related streams.
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 (Teaching Assistantship) (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).
Minimum GATE score requirement is 350 for General/EWS, 315 for OBC (NCL), 233 for SC/ST/PWD.

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

For General/General-EWS/OBC-NCL 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 a qualifying degree.

The students who are in the final phase of receiving the above mentioned qualifying degree and are likely to graduate before the commencement of the Spring 2024-25 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 the Institute website. The candidate needs to meet the criteria specified in section H.1. ELIGIBILITY FOR ADMISSION AT MMAE IIT DHARWAD 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. Admission categories Available.

The Department of Mechanical, Materials, and Aerospace Engineering at IIT Dharwad invites applications for the M.Tech[R] program under the following categories,

Admission Category	Advertised for Autumn 26-27	Broad Research Area	Remarks
TA	Yes	Research Areas mentioned in **H.7.1.**	-
PA	Yes	Research Areas mentioned in **H.7.2.**	Vacancies: 03
EX	Yes	Research Areas mentioned in **H.7.1.**	-
SF	Yes	Research Areas mentioned in **H.7.1.**	-

H.5. Shortlisting of Applications

Modality of selection process:

●   For the TA category: Candidates will go through an online interview round. The details of the interview round will be communicated to the shortlisted candidates.
●   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.
The candidates are encouraged to check the institute website from time to time for the results. Selection committee decisions are final in all matters. Please note that the selection process may not exactly match what is mentioned in section A.

H.6. DOs & DON'Ts for Your Online Interview

DOs:

- **Test your setup beforehand:** Have a mock call to ensure your audio, video, and internet connection (at least 2 Mbps) are working smoothly. Keep at least 2 GB of data handy if not on WiFi.
- **Prepare your space:** Sit in a quiet, well-lit room with a neutral background (a wall or virtual background works). Ensure your camera is at eye level.
- **Keep essentials close:** Have your pen, paper, calculator, and a glass of water within reach. Ensure your device is fully charged or plugged in.
- **Join early and stay focused:** Log into Google Meet 10-15 minutes early. Keep your video ON during the interview and stay muted when not speaking.
- **Remember:** The use of AI tools, additional devices, or any unauthorized assistance during the interview is strictly prohibited and will be treated as a violation of academic integrity.

DON'Ts:

- **Do not cheat:** The use of AI tools (like ChatGPT or other language models), smart

devices, screen-sharing, or seeking help from anyone during the interview is strictly forbidden. Any such act will be considered a serious violation and will lead to disqualification and possible blacklisting.

- **Do not record:** Recording the interview in any form is strictly prohibited and will invite punitive action.
- **Do not disappear:** Stay visible on camera at all times. Do not leave your seat or take any breaks during the interview.
- **Do not have others nearby:** Ensure you are alone in the room. Any interaction with someone else during the interview will be considered suspicious.
- **Do not ask about results:** The schedule will be announced online as soon as possible. Use your time with the panel for meaningful academic inquiries instead.

Note: For any matter related to the selection process, the decision of the selection committee is final.

H.7. Focus area of research

H.7.1. Topics available for TA, EX and SF

Department of MMAE, IIT dhArwAD is looking for M.Tech[R] students in the following broad research areas. Applicants should be interested in at least one of the following research areas.

1. **Thermal and Fluids Stream:** Atomization and sprays, Computational fluid dynamics, Fire dynamics, Multiphase flows, Turbomachinery aerodynamics, Combustion and Thermoacoustic, Dynamics of thin films, Battery Thermal Management, Minimally Invasive Thermal Therapies.
2. **Design Stream:** Fracture mechanics, Finite Element Analysis, Biomechanics, Multibody kinematics and dynamics, Tribology, Computer vision and augmented reality, Reduced order modeling.
3. **Manufacturing Stream:** Metal forming, Additive manufacturing, Computational Materials Design, Physical and Mechanical Metallurgy, Digital Twins, Structural Materials for Aerospace and Automobile. Constitutive modeling of liquid state processing of metals and composites and severe plastic deformation, Foam casting, Computational materials science, Self-clean/Superhydrophobic Coatings & Multifunctional coatings and adhesives, light-weight composites.

H.7.2. Topics available for PA category

Total number of project position available: 3

Each topic falls under a different stream, and applications are invited from candidates who can carry out research work in the following domains.

Code	Topic	Stream	No. of vacancy
PA-topic-1	Viscoplastic drop impact on a solid substrate: the effect of yield stress on spreading, bouncing and splashing	Thermal and Fluids	1

	High temperature creep and thermo-mechanical fatigue behavior of Additively manufactured Ni-based superalloys	Manufacturing and Materials	1
PA-topic-2			
PA-topic-3	Experimental combustion and thermoacoustics	Thermal and Fluids	1

The details regarding each of the above fellowship categories is given in section B "APPLICATION CATEGORIES AND FINANCIAL SUPPORT" of this document. The applicants are advised to read this carefully to avoid selecting categories for which they are ineligible.

Note:
- The selection under Project Assistantship (PA) is subject to the approval of the project and sanction of funds.
- Candidates should give correct preferences during filling the application to offer admission under this category.

H.8 Syllabus for interview

Engineering Mathematics:
- **Linear Algebra:** Matrix algebra, systems of linear equations, eigenvalues, and eigenvectors.
- **Calculus:** Functions of single variable, limit, continuity and differentiability, mean value theorems, 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, 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; heat, wave and Laplace's equations.
- **Complex variables:** Analytic functions; Cauchy-Riemann equations; Cauchy's integral theorem and integral formula.
- **Probability and Statistics:** Definitions of probability, Sampling theorem, 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.

Analytical reasoning
- **Verbal reasoning**: reading comprehension, drawing inferences based on multiple facts stated in short paragraphs.
- **Non-verbal reasoning**: inductive, logical, abstract, diagrammatic, and spatial reasoning.

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; 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 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.

● **Vibrations:** Free and forced vibration of single degree of freedom systems, effect of damping; 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, springs.

Fluid and 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; 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.

● **Heat-Transfer:** Modes of heat transfer; one dimensional heat conduction, resistance concept and electrical analogy, heat transfer through fins; lumped parameter system, thermal boundary layer, dimensionless parameters in free and forced convective heat transfer, heat exchanger performance, LMTD and NTU methods; radiative heat transfer, Stefan-Boltzmann law, Wien's displacement law.

● **Thermodynamics:** Thermodynamic systems and processes; properties of pure substances, behavior 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; psychrometric chart, basic psychrometric processes.

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

Manufacturing Stream

● **Engineering Materials:** Structure and properties of engineering materials, phase diagrams, heat treatment, stress-strain diagrams for engineering materials.

● **Forming, Joining and Casting Processes:** Plastic deformation and yield criteria; fundamentals of hot and cold working processes; load estimation for bulk (forging, rolling, extrusion, drawing) and sheet (shearing, deep drawing, bending) metal forming processes; principles of powder metallurgy. Principles of welding, brazing, soldering and adhesive bonding. Different types of castings, design of patterns, moulds, and cores; solidification and cooling; riser and gating design.

● **Machining and Machine Tool Operations:** Mechanics of machining; basic machine tools; single and multi-point cutting tools, tool geometry and materials, tool life and wear; economics of machining; principles of non-traditional machining processes; principles of

work holding, jigs and fixtures; abrasive machining processes; NC/CNC machines and CNC programming.

● **Metrology and Inspection:** Limits, fits, and tolerances; linear and angular measurements; comparators; interferometry; form and finish measurement; alignment and testing methods; tolerance analysis in manufacturing and assembly; concepts of coordinate-measuring machine (CMM).

● **Computer Integrated Manufacturing:** Basic concepts of CAD/CAM and their integration tools; additive manufacturing.

H.9. Department-level contacts for admission process inquiries

For queries related to M.Tech.[R] 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 M.Tech.[R] Admissions in MMAE".

I. Appendix A: Sponsorship Certificate for M.Tech. [R] External Registration (EX)

(To be typed on letterhead of the Sponsoring Organization)

    i. Name of the applicant:
    ii. Name of the sponsoring organization:
    iii. Address:
    iv. Present Designation of the Applicant:
    v. Present status of the applicant: (Permanent/Semi-permanent/Temporary)
    vi. Division where research work is proposed to be done:
    vii. Name of supervisor from the sponsoring organization:
    viii. (Biodata of the supervisor to be enclosed giving details of designation, qualification, research experience, etc.)
    ix. Details of facilities relevant to the research problem will be made available to the candidate by the organization.

a. 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)

b. Statement of sponsoring authority

If Shri. /Kum. / Smt. _____

is admitted to the Ph.D. program, we shall allow him/ her to undergo the program 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 program, 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 Ph.D. thesis, along with a faculty member of IIT Dharwad as the Supervisor.

Date: Signature and Seal of the Sponsoring Authority
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