



**INDIAN INSTITUTE OF INFORMATION TECHNOLOGY
UNA (H.P.)**

(An Institute of National Importance under MoE)

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Prof. A. N. GILL
REGISTRAR (i/c)

IIITU/Acad/A.Y-2022-23/PhD-Admission/2022-1514

30, Nov.'22

**CALL FOR APPLICATIONS FOR
FULL-TIME/PART-TIME PHD PROGRAM**

IIIT Una is one of the 20 IIITs established as an Institute of National Importance by the Ministry of Education, Govt. of India by an Act of Parliament under the Public Private Partnership (PPP) model in the A.Y. 2014-15. The Institute offers B.Tech. program in CSE, ECE, and IT branches. Five batches of students have graduated out. The Institute also offers PhD program.

Applications are invited from enthusiastic and dynamic students who are motivated to pursue research and contribute for the Field/Institute/Country/Nation with excellent consistent academic record from Secondary School to Post Graduation for the admission in full-time/part-time PhD program starting from the even semester of A.Y. 2022-23, January 2023 under Non-Stipendiary category in the following discipline:

School	Number of Seats
School of Computing	Full time-07 Part time-07
School of Electronics	Full time-05 Part time-05

Eligibility Criteria:

I. Full Time PhD

Candidates with a Master's degree in Engineering/Technology with a good academic record or a Master's degree by Research in Engineering/Technology in relevant discipline with good and consistent academic record.

or

B. Tech. / B.E. degree of any recognized University/Institute in India with a minimum CGPA of 8.0 on a 10.0 point scale or equivalent with valid GATE score in addition to exceptional academic record and within top three ranks of the University/Institute. GATE may be exempted for a

candidate with bachelor's degree from Centrally Funded Technical Institute (CFTI)/ Government Funded Technical Institute (GFTI) with minimum CGPA of 8.0 and exceptional academic record.

II. Full Time-External Registration Program (FT-ERP)

Candidate sponsored by and employed in Organisation/Institution (both public and private), national laboratories, reputed universities/colleges having Research and development (R&D) facilities and recognized by DST, UGC or IIIT, Una is eligible under this category.

In addition to the eligibility criteria given under full-time PhD, the following is also applicable in this category:

1. National level examinations such as GATE etc. is not mandatory for admission. However, the institute may conduct its own entrance test.
2. The candidate should have completed full time employment of 2 years of service as on the last date for application (of the year of admission into the program) for session of admission.
3. Organization/Institution must have at least 5 years of its existence for sponsoring candidates to this category. Only persons engaged in R&D work in Technical / Scientific Institutions/ Industries or R&D Establishments are eligible. The organization should have adequate facilities for carrying out research. All CFTI and GFTI may be considered irrespective of their years of existence.
4. Unconditional sponsorship or "No Objection Certificate (NOC)" by the employer is essential and a must at the time of joining.
5. The Institute will not have any financial liability for such candidates throughout the tenure of PhD (in terms of sponsoring for conferences, etc.).
6. A research scholar admitted under the external registration program will normally carry out part or all of the research work in the industry/organization/national laboratories/universities employing the scholar under the supervision of a co-guide also employed in the same organization and a guide at IIIT, Una.

III. Part Time PhD

In addition to the eligibility criteria given under full-time PhD, the following are applicable in this category:

1. The candidate should have a minimum experience of two years' after M.Tech. or equivalent as

on the last date for application for the session of admission.

2. The candidate is required to submit a NOC from the employer clearly stating the following:

- (a) The candidate is permitted to pursue studies on a part-time basis.
- (b) The candidate's official duties permit to devote sufficient time for research.
- (c) Facilities for research in the candidate's field of research in the area in which admission is sought are available at the candidate's place of work.
- (d) The candidate will be fully relieved from duty and permitted to reside at the institute for the minimum residential requirement of the program.
- (e) The availability of a Co-guide in the same organization to supervise the candidate's research work/progress.

3. If the candidate after joining PhD program changes the organization, the candidate should get NOC from the new employer as well and fulfil all the conditions for admission to Part-time PhD program.

IV. Schedule of Selection Process:

i)	Release of advt. on website	30, Nov'22
ii)	Last date for receipt of Applications through google form	31, Dec'22
iv)	Scrutiny of applications and shortlisting of candidates for interview	01, Jan'23
v)	Date of Written Test and Interview	07, Jan'23
vi)	Result Declaration	08, Jan'23
vii)	Fee payment window	09-16, Jan'23
viii)	Registration for PhD	16, Jan'23
ix)	Commencement of Classes	17, Jan'23

The interested candidates may register their candidature by Submitting the online application with scanned copies of certificates, through the following google link:

<https://forms.gle/NUZzJ4F6j4DqTq518>

General terms and conditions:

- The written examination will be of 50 marks (30 multiple choice questions of 01 marks each and 10 problem solving questions of 02 marks each).
- The syllabus of the written examination is attached in Annexure-I.
- Original documents of age proof/degrees/mark sheets/experience must be presented at the time of Written Test and Interview.
- Applicants in employment (private, government or any other organization) are required to submit a “No Objection Certificate” from the employer at the time of interview.
- No TA/DA will be paid for attending the interview.
- Canvassing in any form will render a candidate ineligible.
- Institute reserves the right to select or reject a candidate without assigning any reason/s thereof.
- The institute reserves the right to defer or cancel the advertisement at any stage of processing without assigning any reasons, if required.
- The institute reserves the right to place a reasonable limit on the total number of candidates to be called for interview. Mere fulfilment of qualification does not entitle a candidate to be called for interview.

Amrinder Nathi Gill
30/11/22

REGISTRAR

Annexure –I

A.Y. 2022-23: PhD Admission

1. School of Computing: Syllabus for written test

A. Mathematical Foundations

Linear Algebra: Matrices, determinants, a system of linear equations, eigenvalues and eigenvectors, and LU decomposition.

Probability and statistic: Random variables, Uniform, normal, exponential, Poisson, and binomial distributions, Mean, median, mode, and standard deviation, Conditional probability and Bayes theorem.

Number theory: Definition, Divisibility, Greatest common divisor, Prime numbers, Fundamental theorem of arithmetic, Mersenne primes, Fermat numbers, Euclidean algorithm, Fermat's theorem, Euler totient function, Euler's theorem. Introduction to Congruence's, Basic properties of congruence's, Residue classes, Chinese remainder theorem.

Group theory: Definition of a group, Groups as symmetries, Examples: cyclic, dihedral, symmetric, matrix groups, Homomorphism's, Subgroups and quotient groups, Cosets, Conjugacy classes, Normal subgroups, Lagrange's theorem, The isomorphism theorems.

B. Data Structures and Algorithms

Programming and Data Structure: Programming in C; Functions, Recursion, Parameter passing, Scope, Binding; Abstract data types, Arrays, Stacks, Queues, Linked Lists, Trees, Binary search trees, Binary heaps.

Algorithm: Analysis, Asymptotic notation, Notions of space and time complexity, Worst and average case analysis; Design: Greedy approach, Dynamic programming, Divide-and-conquer; Tree and graph traversals, connected components, Spanning trees, Shortest paths; Hashing, Sorting, Searching. Asymptotic analysis (best, worst, average cases) of time and space, upper and lower bounds, Basic concepts of complexity classes – P, NP, NP-hard, NP-complete.

C. Database Management Systems

ER-model, Relational Data Model - Concept of relations, schema-instance distinction, keys, referential integrity and foreign keys, relational algebra and tuple calculus operators. SQL - Introduction, data definition in SQL, table, key and foreign key definitions, update behaviors. Querying in SQL, notion of aggregation, aggregation functions group by and having clauses, embedded SQL, Database design (integrity constraints, normal forms), File structures (sequential files, indexing, B and B+ trees).

Transaction processing and Error recovery - concepts of transaction processing, ACID properties, concurrency control, locking based protocols for concurrency control, error recovery and logging, undo and redo recovery methods.

D. Computer Networks

ISO/OSI stack, LAN technologies (Ethernet, Token ring), Flow and error control techniques, Routing algorithms, Congestion control, TCP/UDP and sockets, IP(v4), Application layer protocols (icmp, dns, smtp, pop, ftp, http); Basic concepts of hubs, switches, gateways, and routers. Network security – basic concepts of public key and private key cryptography, digital signature, firewalls.

E. Operating Systems

Processes, Threads, Inter-process communication, Concurrency, Synchronization, Deadlock, CPU scheduling, Memory management and virtual memory, File systems, I/O systems, Secondary Storage Structure, Protection and security.

2. School of Electronics: Syllabus for written test

A. Networks, Signals and Systems:

Circuit analysis: Node and mesh analysis, superposition, Thevenin's theorem, Norton's theorem, reciprocity. Sinusoidal steady state analysis: phasors, complex power, maximum power transfer. Time and frequency domain analysis of linear circuits: RL, RC and RLC circuits, solution of network equations using Laplace transform.

Linear 2-port network parameters, wye-delta transformation.

Continuous-time signals: Fourier series and Fourier transform, sampling theorem and applications.

Discrete-time signals: DTFT, DFT, z-transform, discrete-time processing of continuous-time signals. LTI systems: definition and properties, causality, stability, impulse response, convolution, poles and zeroes, frequency response, group delay, phase delay.

B. Communications:

Random processes: autocorrelation and power spectral density, properties of white noise, filtering of random signals through LTI systems.

Analog communications: amplitude modulation and demodulation, angle modulation and demodulation, spectra of AM and FM, super heterodyne receivers.

Information theory: entropy, mutual information and channel capacity theorem.

Digital communications: PCM, DPCM, digital modulation schemes (ASK, PSK, FSK, QAM), bandwidth, inter-symbol interference, MAP, ML detection, matched filter receiver, SNR and BER. Fundamentals of error correction, Hamming codes, CRC.

C. Electronics 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, LED, photo diode and solar cell.

D. Digital Electronics:

Number representations: binary, integer and floating-point- numbers.

Combinatorial circuits: Boolean algebra, minimization of functions using Boolean identities and Karnaugh map, logic gates and their static CMOS implementations, arithmetic circuits, code converters, multiplexers, decoders.

Sequential circuits: latches and flip-flops, counters, shift-registers, finite state machines, propagation delay, setup and hold time, critical path delay.

Data converters: sample and hold circuits, ADCs and DACs.

Semiconductor memories: ROM, SRAM, DRAM.

Computer organization: Machine instructions and addressing modes, ALU, data-path and control unit, instruction pipelining.

E. Analog Circuits:

Diode circuits: clipping, clamping and rectifiers.

BJT and MOSFET amplifiers: biasing, ac coupling, small signal analysis, frequency response.

Current mirrors and differential amplifiers.

Op-amp circuits: Amplifiers, summers, differentiators, integrators, active filters, Schmitt triggers and oscillators.
