# MIZORAM UNIVERSITY

DEPARTMENT OF INFORMATION TECHNOLOGY

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No. MZU/IT/A-41/22/ Dated Aizawl, the 16th August, 2023

## Notification

It is hereby notified that the Online PhD Entrance Test for PhD Admission for Academic Session 2023-24 in the Department of Information Technology, Mizoram University is scheduled as under.

| Date and Time | Mode of Entrance Test | Syllabus |
|---|---|---|
| 18/08/2023<br>11:00 am – 12:30 pm | ▪ MCQ type<br>▪ Online Entrance Test Link will be shared on time | 1. Research Methodology<br>2. Computer Science subjects (Enclosed in Annexure - I) |
| 18/08/2023<br>1:30 pm onwards | Online presentation, Viva-voce / Interview<br>(Google Meet Link will be shared) | 10 mins PowerPoint Presentation on Research Proposal followed by Viva voce/Interview |

The list of short-listed and non-eligible candidates for Online PhD (IT) Entrance Test is enclosed at Annexure – II.

(Dr. R. Chawngsangpuii)
Convener, PhD (IT) Admission 2023,
(HoD, Deptt. of IT)
Mizoram University.

Copy to:
1. Director of Admissions, MZU
2. Dean (SET), MZU for kind information
3. System Administrator, ICT for displaying in MZU website
4. Office file

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**ANNEXURE – I**

## Detailed Syllabus for PhD Entrance Test in the Department of Information Technology

1. **RESEARCH METHODOLOGY SYLLABUS:**

Foundations of Research: Meaning, Objectives, Motivation, Utility. Concept of theory, empiricism, deductive and inductive theory. Characteristics of scientific method – Understanding the language of research – Concept, Construct, Definition, Variable. Research Process.

Problem Identification & Formulation – Research Question – Investigation Question – Measurement Issues – Hypothesis – Qualities of a good Hypothesis –Null Hypothesis & Alternative Hypothesis. Hypothesis Testing – Logic & Importance.

Research Design: Concept and Importance in Research – Features of a good research design – Exploratory Research Design – concept, types and uses, Descriptive Research Designs – concept, types and uses. Experimental Design: Concept of Independent & Dependent variables.

Interpretation of Data and Paper Writing – Layout of a Research Paper, Journals in Computer Science, Impact factor of Journals, When and where to publish? Ethical issues related to publishing, Plagiarism and Self-Plagiarism.

Use of tools / techniques for Research: methods to search required information effectively, Reference Management Software like Zotero/Mendeley, Software for paper formatting like LaTeX/MS Office, Software for detection of Plagiarism.

2. **COMPUTER SCIENCE SUBJECTS SYLLABUS:**

a) Data Structure:
Arrays, stacks, queues, linked lists, trees, binary search trees, binary heaps, graphs.

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

c) Database Management Systems:
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.

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d) Design and Analysis of Algorithms:
Searching, sorting, hashing. Asymptotic worst-case time and space complexity. Algorithm design techniques: greedy, dynamic programming and divide-and-conquer. Graph traversals, minimum spanning trees, shortest path problems.

e) Operating System:
System calls, processes, threads, inter-process communication, concurrency and synchronization.Deadlock. CPU and I/O scheduling. Memory management and virtual memory. File systems.

f) Formal Languages and Automata Theory:
Regular expressions and finite automata. Context-free grammars and push-down automata. Regular and context-free languages, pumping lemma. Turing machines and undecidability.

g) Computer Networks:

Concept of layering: OSI and TCP/IP Protocol Stacks; Basics of packet, circuit and virtual circuit-switching; Data link layer: framing, error detection, Medium Access Control, Ethernet bridging; Routing protocols: shortest path, flooding, distance vector and link state routing; Fragmentation and IP addressing, IPv4, CIDR notation, Basics of IP support protocols (ARP, DHCP, ICMP), Network Address Translation (NAT); Transport layer: flow control and congestion control, UDP, TCP, sockets; Application layer protocols: DNS, SMTP, HTTP, FTP, Email.