

Ph. D Written Test Syllabus

Electronics Engineering, Faculty of Engineering

Ph.D. Admission Test Format

The written test consists of two parts.

1. **Part A:** Research Methodology 25 questions.
2. **Part B:** EC 25 questions

Part A: Research Methodology Syllabus

Research Fundamentals:

Meaning of research; objectives of research; characteristics of good research, Research problem: Identification, selection, and techniques for defining research problem, Research process, Research outcomes, Review of Literature, Hypothesis: Definition and Types

Types of Research:

Types of research, fundamental and applied research, qualitative and quantitative. Research Design: Types of research design – Exploratory, Descriptive, Casual Analytical

Sampling, Data Collection and analysis:

Types and sources of data: Primary and secondary, Methods of collecting data: questionnaire, interview, observation, case study, experiments etc., Sampling and sampling methods, characteristics of good sample, sampling techniques, Statistical Methods for Data Analysis: measures of central tendency and dispersion

Research Report:

Main body of report, abstract and keywords, Referencing styles and bibliography. Journal and author indexing

Ethics in Research:

Biasing: Definition and Types, Plagiarism -Definition and forms, IPR, copyright infringement, AI Generated Content

Part B: Electronics Engineering Syllabus

Analog and Digital Electronics:

Analog Electronics: Diodes and transistor circuits, Bipolar Junction Transistor (BJT), MOSFET, CMOS devices, Biasing techniques and small signal analysis, Operational Amplifiers and applications, Oscillators, waveform generators, filters and regulators

Digital Electronics: Number systems and Boolean algebra, Logic gates and combinational circuits, Sequential circuits, Flip-Flops, Counters and Registers, ADC, DAC and Semiconductor Memories, Programmable Logic Devices (PLD, FPGA basics) Digital system design concepts.

Signals, Systems and Network Analysis:

Circuit laws and network theorems, Steady state and transient analysis, Two-port networks and resonance, Fourier Series and Fourier Transform, Laplace Transform and Z-Transform, Continuous and discrete time systems, Convolution and correlation, Sampling theorem and signal reconstruction.

Communication Engineering:

Analog communication systems: AM, FM, PM, Pulse modulation and its applications, PCM. Digital communication techniques, Information theory and channel coding basics, Noise analysis and SNR, ASK, FSK, PSK, QPSK.

Electromagnetic Theory and Microwave Engineering:

Electrostatics and magnetostatics, Maxwell's equations and electromagnetic wave propagation, Transmission lines and Smith chart, Waveguides and microwave components, Antenna fundamentals and radiation patterns

Control Systems and Embedded Systems:

Mathematical modelling of systems, Transfer functions and block diagrams, Time domain and frequency domain analysis, Stability criteria: Routh-Hurwitz, Nyquist and Bode plot, Root locus techniques, State space analysis.
8085/8086 architecture basics, Microcontrollers and interfacing, Embedded system design concepts.