

# **Entrance Test Syllabus**

## **for Ph.D**

### **in**

## **Electronics & Communication Engineering**

### **(2025)**

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#### **Unit 1: Engineering Mathematics**

- Linear algebra: matrix operations, eigenvalues, Cayley-Hamilton theorem.
  - Differential equations, Laplace and Fourier transforms, Z-transform.
  - Partial differentiation, maxima/minima of multivariable functions.
  - Fourier series, convolution theorem and applications in signals.
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#### **Unit 2: Network Theory and Signals**

- Circuit elements: RLC circuits, Kirchhoff's laws, mesh/nodal analysis.
  - Network theorems: Thevenin, Norton, Superposition, maximum power transfer.
  - Two-port networks: Z, Y, h, ABCD parameters; interconnections.
  - Network functions, resonance, filters (constant-k, m-derived).
  - Classification of signals and systems, time and frequency domain analysis.
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#### **Unit 3: Analog Electronic Circuits**

- Diodes: characteristics, rectifiers, regulators, clipping/clamping circuits.
  - BJT and FET operation, biasing, small-signal models, multistage amplifiers.
  - Feedback amplifiers: topologies, stability, frequency response.
  - Differential amplifiers, current mirrors, active loads, IC biasing.
  - Power amplifiers (Class A/B/AB/D), oscillators, waveform generators.
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#### **Unit 4: Digital Systems and VLSI**

- Number systems, Boolean algebra, logic minimization (K-map, Quine-McCluskey).
  - Combinational circuits: MUX, DEMUX, encoder, decoder, adder/subtractor.
  - Sequential circuits: flip-flops, counters, shift registers, state machines.
  - Memory: ROM, RAM, FPGA, CPLD, PLA, PAL basics.
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## **Unit 5: Signals and Systems**

- Time-domain analysis: convolution, system properties (LTI, causality, stability).
  - Fourier and Laplace transforms, frequency response, filter design.
  - Sampling theorem, aliasing, CTFT and DTFT.
  - Z-transform: properties, system analysis, region of convergence.
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## **Unit 6: Digital Signal Processing (DSP)**

- Discrete-time signals and systems, convolution, difference equations.
  - DFT, FFT algorithms, spectral analysis.
  - FIR and IIR filter design and implementation.
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## **Unit 7: Communication Systems**

- Modulation techniques: AM, FM, PM, DSB, SSB, VSB.
  - Pulse modulation: PAM, PWM, PPM, PCM, delta modulation.
  - Digital modulation: ASK, FSK, PSK, QPSK, error performance.
  - Noise in communication systems, SNR, noise figure, detection.
  - Spread spectrum, multiplexing (TDM, FDM), bandwidth calculations.
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## **Unit 8: Control Systems and Embedded Systems**

- System modeling using differential equations and transfer functions.
  - Block diagrams, signal flow graphs, time and frequency domain analysis.
  - Stability criteria: Routh-Hurwitz, Nyquist, Bode plots, Root locus.
  - Embedded systems: architecture of 8051, peripherals and interfacing.
  - Microcontrollers, memory and I/O interfacing.
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## **Unit 9: Electromagnetic Fields and Microwave Engineering**

- Vector calculus, Maxwell's equations, boundary conditions.
  - Wave propagation in lossless and lossy media.
  - Transmission lines: impedance matching, Smith chart, VSWR.
  - Waveguides, cavity resonators, Microwave devices: klystron, magnetron, Gunn diode.
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## **Unit 10: Advanced Topics: Wireless and VLSI**

- Wireless communication: fading, path loss, propagation models.
- Cellular concepts: frequency reuse, handoff, capacity analysis.
- VLSI design: CMOS logic, layout, combinational/sequential design.

**PhD Vacancies in**

**Dept. of Electronics & Communication Engineering**

## IOT Zakura

S. No.	Name of Faculty	Ph.D Scholar Vacancy
1.	Dr. Abdul Mueed Hafiz	4
2.	Dr. Bilal Ahmad Malik	4