

**DEPARTMENT OF ELECTRONICS AND COMMUNICATION
ENGINEERING**

PUNJABI UNIVERSITY PATIALA
(Established under Punjab Act No 35 of 1961)

Syllabus for Ph. D. Entrance Test for Session 2026-27
SECTION-A
(RESEARCH METHODOLOGY)

Nature and objectives of research. Methods of Research: historical, descriptive and experimental

Alternative approaches to the study of the research problem and problem formulation. Formulation of hypotheses, Feasibility, preparation and presentation of research proposal.

Introduction to statistical analysis: Probability and probability distributions; binomial, Poisson, exponential and normal distributions and their applications.

Sampling: Primary and secondary data, their collection and validation, methods of sampling: Simple random sampling, stratified random sampling and systematic sampling, Attitude Measurement Land Scales: Issues, Scaling of attitude, deterministic attitudes, measurement models, summative models, multidimensional scaling.

Regression and correlation analysis. Tests of significance based on normal. t and chi-square distributions. Analysis of variance. Basic Principles of design of experiments, completely randomized and randomized block designs.

SECTION-B
(SUBJECT)

- I. Wireless Communication: Cellular concept, Frequency reuse, Co-channel and adjacent channel interference, Cell splitting, Handover, Call processing. GSM digital cellular standard: GSM services, GSM architecture, GSM Radio aspects, Security aspects, Handover, Call flow sequence in GSM, Evolutionary directions.
- II. Optical fibers, SI, GI fibers, modes, Dispersion in fibers, Limitations due to dispersions. Dispersion shifted and dispersion flattened fibers. Optical transmitters and fibers: Basic concepts, LED structures spectral distribution, semiconductor lasers, Transmitter design, Receiver PIN and APD diodes design.
- III. Behavioral, Dataflow and Structural style of modeling. Assignment statements, Sequential statements, Conditional statements, Concurrent statements, Case statements, Array and Records, Functions, Packages & Libraries. VHDL modeling of combinational circuits such as Adders, Subtractors, Multiplexers, Encoders and Decoders.
- IV. Architecture of 8051 Microcontroller, Addressing Modes. Instruction Set: Arithmetic, Logic and Single Bit Instructions, I/O instructions, etc. Assembly Language Programming: I/O Programming, Timer/Counter Programming.
- V. Fourier and Z Transforms: Properties of Fourier and Z transform. Frequency analysis of discrete time signals and LTI Systems. Discrete Fourier Transform: Definition and properties of DFT, Linear filtering methods using DFT, Frequency analysis of signals using the DFT. Fast Fourier Transform: FFT algorithms and their applications, linear filtering approach to computation of the DFT.
