University of Mysore
Syllabus for Ph.D. Entrance Exam
ELECTRONICS

Unit 1: Analog Circuit Design
Transport phenomena in semiconductors, intrinsic and extrinsic semiconductors, direct bandgap semiconductors, pn- junction, zener, tunnel diodes, BJT, JFET, MOSFET and their character. AC and DC load lines, Transistor Biasing, Single stage and multi-stage amplifiers and their frequency response, feedback in amplifiers, oscillators.

Unit 2: Digital Circuit Design
Logic Gates, Logic Families, Simplification of Boolean Algebra and minimization Techniques, Karnaugh maps, Combinational and Sequential Logic Circuits, Encoder, Decoder, MUX and DEMUX, Memories, A/D and D/A Converter.
Op-amp Characteristics, Inverting and non-inverting configuration, Comparator, Schmitt Trigger, Integrator, Differentiator, 1_{st} and 2_{nd} order active filters, VCO, 555 Timer, PLL.

Unit 3: Network Theorems and Control Systems
KVL, KCL, Mesh and Node Analysis, Thevenin, Norton, Supeposition, Maximum Power Transfer Theorems. h- parameters.
Classification of Control Systems, Transfer function and Impulse Response of Control System, Block Diagram Representation, Signal Flow Graph, Stability Analysis, Routh's Stability Criteria, Root Locus Diagram, Bode Plot, Polar Plot.

Unit 4: Microprocessor and Microcontroller
Architecture and features of 8085, 8086 microprocessors and 8051 microcontroller, Programming, Addressing Modes, Interrupts, Memory and I/O Interfacing, Interfacing 8255, 8257, Serial Communication Protocols.

Unit 5: Analog and Digital Communication
Introduction, Need of Modulation, Analog Modulation and Demodulation Schemes- AM, FM, PM. Noise in Analog Communication, Transmission Lines, Wave Guides, Antennas, Channels of Digital Communication System, Source and Channel Coding, Sampling Theorem, Waveform Coding – PCM, DPCM, Delta Modulation. Digital Modulation Techniques- ASK, FSK, PSK, DPSK, QPSK, M-ary modulation and Demodulation, TDM and FDM Schemes.

Unit 6: Power Electronics
Semiconductor power diodes, transistors, SCR, Triacs, Diacs, GTOs, MOSFETs, IGBTs and their characteristics and principles of operation, triggering circuits, phase controlled rectifiers, Converters, Inverters, Choppers.

Unit 7: Computer Organization and Programming in C
Basic Structure of Computer Hardware and Software, Memory and I/O organization and Pipelining.
Overview of C, Constants, Variables and Data types, Operators and Expressions, I/O operations, Decision making, branching, looping, Arrays, Structures, User defined functions, Pointers, File management in C.

Unit 8: Signals and Systems
Classification of Signals, Concept of Frequency in Continuous-time and Discrete-time signals. Discrete-time signals and systems, Analysis of discrete-time linear time-invariant systems, Correlation and autocorrelation, Z-transforms, Inverse Z-Transforms, Fourier Series, Fourier Transform and their properties.

Unit 9: VLSI Technology
Introduction to IC Technology, IC fabrication, n-MOS, C-MOS, Bi-CMOS Fabrication, Latch up in CMOS, Stick Diagrams, Lambda based Designing rules and Layout Diagrams, Scaling Model and Scaling Factors, Sub-system Design.

Unit 10: Optical Fibre Communication
Optical Sources- LED, Spontaneous and Stimulated emission, Semiconductor Diode LASER, Photodetectors, PIN photo diodes, Phototransistors, Optocouplers, Optical Fibre, Light