Proposed Syllabus For M.Phil Entrance Test In The Discipline Of 
Electronics For The Academic Session 2010

UNIT I
Electronic Transport in semiconductor, PN Junction, Diode equation and diode 
equivalent circuit. Breakdown in diodes, Zener diodes, Tunnel diode, Semiconductor 
diodes, characteristics and equivalent circuits of BJT, JFET, MOSFET, IC 
fabrication—crystal growth, epitaxy, oxidation, lithography, doping, etching, 
isoation methods, metalization, bonding, Thin film active and passive devices.

Superposition, Thevenin, Norton and Maximum Power Transfer Theorems, Network 
elements, Network graphs, Nodal and Mesh analysis, Zero and Poles, Bode Plots, 
Laplace, Fourier and Z-transforms. Time and frequency domain responses. Image 
impedance and passive filters. Two-port Network Parameters. Transfer functions, 
Signal representation. State variable method of circuit analysis, AC circuit analysis, 
Transient analysis.

UNIT II
Rectifiers, Voltage regulated ICs and regulated power supply, Biasing of Bipolar 
junction transistors and JFET. Single stage amplifiers, Multistage amplifiers, 
Feedback in amplifiers, oscillators, function generators, multivibrators, Operational 
Amplifiers (OPAMP)—characteristics and Applications, Computational 
Applications, Integrator, Differentiator, Wave shaping circuits, F to V and V to F 
converters. Active filters, Schmitt trigger, Phase locked loop.

UNIT III
Logic families, flip-flops, Gates, Boolean algebra and minimization techniques, 
Multivibrators and clock circuits, Counters—Ring, Ripple. Synchronous, 
Asynchronous, Up and down shift registers, multiplexers and demultiplexers, 
Arithmetic circuits, Memories, A/D and D/A converters.

Architecture of 8085 and 8086 Microprocessors, Addressing modes, 8085 instruction 
set, 8085 interrupts, Programming, Memory and I/O interfacing, Interfacing 8155, 
8255, 8279, 8253, 8257, 8259, 8251 with 8085 Microprocessors, Serial 
communication protocols, Introduction of Microcontrollers (8 bit)—8031/8051 and 
8048.

Introduction of FORTRAN language, programming discipline, statements to write a program, intrinsic functions, integer-type data, type statement, IF statement, Data validation, Format-directed input and output. Subscripted variables and DO loops. Array, Fortran Subprogram.

UNIT IV

UNIT V
Characteristics of solid state power devices—SCR, Triac, UJT, Triggering circuits, converters, choppers, inverters, converters. AC - regulators, speed control of a.c. and d.c. motors.

Stepper and synchronous motors; Three phase controlled rectifier; Switch mode power supply; Uninterrupted power supply.
Optical sources—LED, Spontaneous emission, Stimulated emission, Semiconductor Diode LASER, Photodetectors—p-n photodiode. PIN photodiode, Phototransistors, Optocouplers, Solar cells, Display devices, Optical Fibres—Light propagation in fibre, Types of fibre, Characteristic parameters, Modes, Fibre splicing, Fibre optic communication system—coupling to and from the fibre, Modulation, Multiplexing and coding, Repeaters, Bandwidth and Rise time budgets.

UNIT VI
Transducers—Resistance, Inductance Capacitance, Peizoelectric, Thermoelectric, Hall effect, Photoelectric, Techogenerators, Measurement of displacement, velocity, acceleration, force, torque, strain, speed and sound temperature, pressure, flow, humidity, thickness, pH, position.
Analytical Instruments—Biomedical instruments—ECG, blood pressure measurements, spectrophotometers, Electron Microscope, X-ray diffractometer.

Open-loop and close-loop control system. Error amplifier, on-off controller, Proportional (P), Proportional-Integral (PI), Proportional-Derivative (PD), PID controllers, Dynamic Behaviour of control systems—servomechanism characteristics parameters of control systems—Accuracy, Sensitivity, Disturbances, Transient response, Stability, Routh-Hurwitz criterion, Bode plots, Nyquist criterion, Controlling speed. Temperature and position using analog/digital control circuits.

NOTE:

1. One subjective type question will be set from each of the above units, and examinee will be required to attempt any four questions. Each question will carry 10 marks.
2. Five multiple choice questions will be set from each of the above unit. Each question shall carry one mark.