## **School of Electronics**

## Syllabus for Ph.D. ENTRANCE TEST PART-A

Part-A shall consist of 50 objective type compulsory questions of 1 mark each based on research methodology. It shall be of generic nature, intended to assess the research aptitude of the candidate. It will primarily be designed to test reasoning ability, data interpretation, and quantitative aptitude of the candidate.

## PART-B

Part-B shall also consist of 50 objective type compulsory questions of 1 mark each based on the syllabus of the subject at Masters Level as per the broad headings below:

Electronic Devices and Digital Circuits: Boolean algebra and minimization of Boolean functions. Logic gates, TTL and CMOS IC families. Combinatorial circuits: arithmetic circuits, code converters, multiplexers and decoders. Sequential circuits: latches and flip-flops, counters and shift-registers. Sample-and-hold circuits, ADCs, DACs. Electronic Transport in semiconductor, PN junction, Diodes - PN, Zener, Tunnel, Characteristics and equivalent circuits of BJT, JFET, MOSFET.

Programming in C: Elements of C –Tokens, identifiers, data types in C. Control structures in C. Sequence, selection and iterations. Structured data types in C-arrays, struct, union, string, pointers. File handling in C.

Microprocessors and Microcontrollers: Architecture of 8085 and 8086 Microprocessors, Addressing modes, 8085 instruction set, 8085 interrupts Programming, Memory and I/O interfacing. Interfacing of 8155, 8255, 8279, 8253,8257, 8259, 8251 with 8085 Microprocessors. Serial Communication Protocols.

Signals and Systems: Linear time invariant systems: impulse response, transfer function and frequency response of first- and second order systems, convolution. Random signals and noise: probability, random variables, probability density function, autocorrelation, power spectral density. Sampling theorem, Discrete-time systems: impulse and frequency response, IIR and FIR filters.

Communications: Amplitude and angle modulation and demodulation, frequency and time division multiplexing. Pulse code modulation, amplitude shift keying, frequency shift keying and pulse shift keying for Digital modulation. Bandwidth and SNR calculations. Information theory and channel capacity.

Opto-Electronics: Optical processes in semiconductors, Schottky and Ohmic contacts, Light emitting diodes (including double heterojunction LED and multi quantum well LED), Introduction to lasers, Photodetectors (photoconductors, junction p-i-n photodiodes, and Schottky photodiodes, Fast optical communication components (fiber optic, optoelectronic modulation, integrated and external optic modulators), Solar cells.