Exam Topics for ET – SOC "System-on-Chip Design"

- Benefits of SoC solutions over rack based systems or discrete components

- Microprocessor elements
  – logic costs and performance
  – registers
  – MMU
  – ALU
  – shifters
  – memory, internal, external, I-cache, D-cache
  – memory blocks
  – external ports
  – effects of word size (data, instruction word)
  – software development
  – interrupts
  – pipelining
  – RISC architecture

- Microcontroller softcore/hardcore

- Including softcore microcontrollers in FPGAs

- Program download for development and production (flash memory)

- Number formats
  – floating numbers and floating arithmetic
  – use of floating arithmetic in embedded applications
  – reasons for the use of integer arithmetic in embedded applications
  – signed and unsigned integer
  – fractional numbers and fractional arithmetic (add, multiply, division)

- Standart bus technologies for attaching IPs

- Integrating free and licensed IPs

- Design of user logic for standard bus systems, integrating VHDL modules

- Device drivers

- Application software
  – interrupt service
  – processes
  – application development
  – code blocks, data blocks, stack and heap memory / linker script
  – elf file structure and analysis (object dump)
  – Block memory map (bmm) for elf and hex files
  – assembly and C code instructions