



DIGITAL CIRCUITS

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INTENDED AUDIENCE : All Engineering Student/Faculty

PRE-REQUISITES : Basic Electronics

INDUSTRIES APPLICABLE TO : Companies involved in development digital products

COURSE OUTLINE :

Digital circuits are part of any electronic design today. This also happens to be one of the core subjects for the undergraduate students in Electronics, Electrical and Computer Engineering. It forms the basis of many of the next level courses. The proposed course on digital circuits will cover all the fundamental concepts in digital design. It will primarily focus on the prescribed GATE syllabus for Electronics and Communication Engineering (ECE) specialization. The course will start with the representations of numbers – different number systems and conversion between them, representation of integer and real numbers etc. This will be followed by combinational and sequential circuit design techniques. Data converters and semiconductor memories will be covered. Microprocessor 8085 will be discussed as a complete digital system example. Designed primarily as a single course covering the digital circuits portion of GATE syllabus, the course will also be helpful for any other aspirant willing to learn digital electronics principles comprehensively in today's perspective.

ABOUT INSTRUCTOR :

Prof. Santanu Chattopadhyay received his BE degree in Computer Science and Technology from Calcutta University (B.E. College) in 1990. He received M.Tech in Computer and Information Technology and PhD in Computer Science and Engineering from Indian Institute of Technology Kharagpur in 1992 and 1996, respectively. He is currently a Professor in the Department of Electronics and Electrical Communication Engineering, IIT Kharagpur. Prior to this, he had been a faculty member in the IEST Sibpur and IIT Guwahati in the departments of Computer Science and Engineering. In both these places he has taught the subject of Compiler Design several times. His research interests include Digital Design, Embedded Systems, System-on-Chip (SoC) and Network-on-Chip (NoC) Design and Test, Power- and Thermal-aware Testing of VLSI Circuits and Systems. He has published more than 150 papers in reputed international journals and conferences. He has published several text and reference books on Compiler Design, Embedded Systems and other related areas. He is a senior member of the IEEE and an Associate Editor of IET Circuits Devices and Systems journal.

COURSE PLAN :

Week 01 : Introduction, Number System

Week 02 : Boolean Algebra

Week 03 : Combinational function minimization – K Map, Boolean identities

Week 04 : Logic Gates

Week 05 : Arithmetic circuits, Code converters

Week 06 : Multiplexers, Decoders, PLA

Week 07 : Sequential Circuits – Latches and Flip-flops

Week 08 : Counters, Shift Registers, Finite State Machines

Week 09 : Data Converters – Sample and hold circuits, ADCs, DACs

Week 10 : Semiconductor Memories – ROM, SRAM, DRAM

Week 11: Microprocessor 8085 – Part I

Week 12 : Microprocessor 8085 – Part II