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Courses (https://swayam.gov.in/explorer) >

Switching Circuits and Logic Design

By Prof. Indranil Sengupta | IIT Kharagpur

Learners enrolled: 4130

Switching Circuits and Logic Design by Prof Indranil Sengupta

This course will discuss the basic background of switching circuits, and discuss techniques for mapping the theory to actual hardware circuits. Synthesis and minimization techniques of combinational and sequential circuits shall be discussed in detail. Designing circuits using high-level functional blocks shall also be discussed. The course will closely follow the undergraduate curriculum existing in most engineering colleges.

INTENDED AUDIENCE: Any Engineering Students/Faculty
PREREQUISITES: Basic knowledge of electronics and electrical circuitsl
INDUSTRY SUPPORT: TCS, Wipro, CTS, Google, Microsoft, HP, Intel, IBM

PRINCIPAL
G.Narayanamma Institute of Technology & Science

Summary

Course Status :	Completed
Course Type :	Elective
Duration :	12 weeks

Category : (https://swayam.gov.in/) (https://swayam.gov.in/nc_details/NPTEL)

Credit Points : 3

Level : Undergraduate

Start Date : 14 Sep 2020

End Date : 04 Dec 2020

Enrollment Ends : 25 Sep 2020

Exam Date : 19 Dec 2020 IST

Note: This exam date is subjected to change based on seat availability. You can check final exam date on your hall ticket.

This is an AICTE approved FDP course

Course layout

Week 1 : Introduction to number systems and codes, error detection and correction, binary arithmetic.
Week 2 : Switching primitives and logic gates, logic families: TTL, CMOS, memristors, all-optical realizations.
Week 3 : Boolean algebra: Boolean operations and functions, algebraic manipulation, minterms and maxterms, sum-of-products and product-of-sum representations, functional completeness.
Week 4 : Minimization of Boolean functions: K-map method, prime implicants, don't care conditions, Quine-McCluskey method, multi-level minimization.
Week 5 : Design of combinational logic circuits: adders and subtractors, comparator, multiplexer, demultiplexer, encoder, etc.
Week 6 : Representation of Boolean functions: binary decision diagram, Shannon's decomposition, Reed-Muller canonical form, etc.
Week 7 : Design of latches and flip-flops: SR, D, JK, T. Master-slave and edge-triggered flip-flops. Clocking and timing issues.
Week 8 : Synthesis of synchronous sequential circuits, Mealy and Moore machines, state minimization.
Week 9 : Design of registers, shift registers, ring counters, binary and BCD counters. General counter design methodology.
Week 10: Algorithmic state machine and data/control path design.
Week 11: Asynchronous sequential circuits: analysis and synthesis, minimization, static and dynamic hazards.
Week 12: Testing and fault diagnosis in digital circuits: fault modeling, test generation and fault simulation, fault diagnosis, design for testability and built-in self-test.

Books and references

1.ZviKohavi and Niraj K. Jha, "Switching and Finite Automata Theory", 3rd Edition, Cambridge University Press, 2010.
2.M. Morris Mano and Michael D. Ciletti, "Digital Design: With an Introduction to the Verilog HDL", 5th Edition, Pearson Education, 2013.
3.Randy H. Katz and Gaetano Borriello, "Contemporary Logic Design", 2nd Edition, Pearson Education, 2005.

Instructor bio

swayam (https://swayam.gov.in/) (https://swayam.gov.in/nc_details/NPTEL)

Prof. Indranil Sengupta

IIT Kharagpur

Indranil Sengupta has obtained his B.Tech., M.Tech. and Ph.D. degrees in Computer Science and Engineering from the University of Calcutta. He joined the Indian Institute of Technology, Kharagpur, as a faculty member in 1988, in the Department of Computer Science and Engineering, where he is presently a full Professor. He had been the former Heads of the Department of Computer Science and Engineering and also the School of Information Technology of the Institute. He has over 28 years of teaching and research experience. He has guided 22 PhD students, and has more than 200 publications to his credit in international journals and conferences. His research interests include cryptography and network security, VLSI design and testing, and mobile computing.

He is a Senior Member of IEEE. He had been the General Chairs of Asian Test Symposium (ATS-2005), International Conference on Cryptology in India (INDOCRYPT-2008), International Symposium on VLSI Design and Test (VDAT-2012), International Symposium on Electronic System Design (ISED-2012), and the upcoming Conference on reversible Computation (RC-2017). He had delivered invited and tutorial talks in several conferences in the areas of VLSI design and testing, and network security.

Course certificate

The course is free to enroll and learn from. But if you want a certificate, you have to register and write the proctored exam conducted by us in person at any of the designated exam centres.
The exam is optional for a fee of Rs 1000/- (Rupees one thousand only).
Date and Time of Exams:**19 December 2020** Morning session 9am to 12 noon; Afternoon Session 2pm to 5pm.
Registration url: Announcements will be made when the registration form is open for registrations.
The online registration form has to be filled and the certification exam fee needs to be paid. More details will be made available when the exam registration form is published. If there are any changes, it will be mentioned then.
Please check the form for more details on the cities where the exams will be held, the conditions you agree to when you fill the form etc.

CRITERIA TO GET A CERTIFICATE

Average assignment score = 25% of average of best 8 assignments out of the total 12 assignments given in the course.
Exam score = 75% of the proctored certification exam score out of 100

Final score = Average assignment score + Exam score

YOU WILL BE ELIGIBLE FOR A CERTIFICATE ONLY IF AVERAGE ASSIGNMENT SCORE >=10/25 AND EXAM SCORE >= 30/75. If one of the 2 criteria is not met, you will not get the certificate even if the Final score >= 40/100.

Certificate will have your name, photograph and the score in the final exam with the breakup.It will have the logos of NPTEL and IIT Kharagpur .It will be e-verifiable at nptel.ac.in/noc (http://nptel.ac.in/noc).

Only the e-certificate will be made available. Hard copies will not be dispatched.

Once again, thanks for your interest in our online courses and certification. Happy learning.