



Basic Electronics

ABOUT THE COURSE:

The course is about basic electronic circuits, both analog and digital. In the analog part, diode circuits, BJT amplifiers, Op Amp circuits will be covered. In the digital part, combinatorial and sequential circuits will be covered. A unique feature of the course is extensive use of circuit simulation results in order to give a realistic picture of the circuit operation and waveforms. Assignments are designed to help the students to test their understanding of the concepts being covered. A circuit simulation package will be made available (as free download) to enable students to simulate circuits covered in the course and gain further insight in their functioning.

Course layout

WEEK 1

Lecture 1 : A brief history of electronics

Lecture 2 : Superposition

Lecture 3 : Useful circuit techniques-1

Lecture 4 : Useful circuit techniques-2

Lecture 5 : Phasors-1

Lecture 6 : Phasors-2

WEEK 2

Lecture 7 :RC/RL circuits in time domain-1

Lecture 8 :RC/RL circuits in time domain-2

Lecture 9 : RC/RL circuits in time domain-3

Lecture 10 : RC/RL circuits in time domain-4

Lecture 11 : RC/RL circuits in time domain-5

Lecture 12 : Simulation of RC circuit

WEEK 3

Lecture 13 : Diode circuits-1

Lecture 14 : Diode circuits-2

Lecture 15 : Diode circuits-3

Lecture 16 : Diode circuits-4

Lecture 17 : Diode circuits-5

Lecture 18 : Diode circuits-6

WEEK 4

Lecture 19 : Diode rectifiers-1

Lecture 20 : Diode rectifiers-2

Lecture 21 : Diode rectifiers-3

Lecture 22 : Bipolar Junction Transistor-1

Lecture 23 : Bipolar Junction Transistor-2

Lecture 24 : Bipolar Junction Transistor-3

WEEK 5

Lecture 25 : BJT amplifier-1

Lecture 26 : BJT amplifier-2

Lecture 27 : BJT amplifier-3

Lecture 28 : BJT amplifier-4

Lecture 29 : BJT amplifier-5

Lecture 30 : BJT amplifier-6

WEEK 6

Lecture 31 : BJT amplifier-7

Lecture 32 : Introduction to op-amps

Lecture 33 : Op-amp circuits-1

Lecture 34 : Op-amp circuits-2

Lecture 35 : Op-amp circuits-3

Lecture 36 : Difference amplifier

WEEK 7

Lecture 37 : Instrumentation amplifier-1

Lecture 38 : Instrumentation amplifier-2

Lecture 39 : Op-amp nonidealities-1

Lecture 40 : Op-amp nonidealities-2

Lecture 41 : Bode plots-1

Lecture 42 : Bode plots-2

WEEK 8

Lecture 43 : Bode plots-3

Lecture 44 : Op-amp filters

Lecture 45 : Simulation of op-amp filter

Lecture 46 : Precision rectifiers-1

Lecture 47 : Precision rectifiers-2

Lecture 48 : Precision rectifiers-3

WEEK 9

Lecture 49 : Simulation of triangle-to-sine converter

Lecture 50 : Schmitt triggers-1

Lecture 51 : Schmitt triggers-2

Lecture 52 : Schmitt triggers-3

Lecture 53 : Sinusoidal oscillators-1

Lecture 54 : Sinusoidal oscillators-2

WEEK 10

Lecture 55 : Introduction to digital circuits

Lecture 56 : Boolean algebra

Lecture 57 : Karnaugh maps

Lecture 58 : Combinatorial circuits-1

Lecture 59 : Combinatorial circuits-2

Lecture 60 : Combinatorial circuits-3

WEEK 11

Lecture 61 : Introduction to sequential circuits

Lecture 62 : Latch and flip-flop

Lecture 63 : JK flip-flop

Lecture 64 : D flip-flop

Lecture 65 : Shift registers

Lecture 66 : Counters-1

WEEK 12

Lecture 67 : Counters-2

Lecture 68 : Simulation of a synchronous counter

Lecture 69 : 555 timer

Lecture 70 : Digital-to-analog conversion-1

Lecture 71 : Digital-to-analog conversion-2

Lecture 72 : Analog-to-digital conversion