

Sem.	Subject code	Course title	No. of hours	Credits	Paper type
VI	17U6PMC8	Digital electronics and instruments	5	5	Major Core

Objectives:

(i) To introduce the students to discrete electronics and to make them study the basic building blocks of memory and arithmetic circuits which are the back bone of modern computers (ii) To introduce the students to measuring instruments and their working principle.

Learning outcome:

(i) The student will be able to design digital circuits for various physical applications.

Unit I: Number Systems

Binary number system–Binary to decimal conversion–Decimal to binary conversion–Octal numbers–Hexadecimal numbers–ASCII code–Basic gates-Boolean algebra–NOR gates–NAND gates–Boolean laws and theorems–Sum of products method– Truth table to Karnaugh map– Pairs, Quads, and Octets–Karnaugh simplifications–Product of sums method–Product of sums simplification .

Unit II: Binary arithmetic and Flip-flops

2's complement representation–2's complement arithmetic–Arithmetic building blocks–The Adder-Subtractor–RS Flip-Flops–Gated Flip-Flops–Edge-Triggered JK Flip-Flops–JK Master-slave Flip-Flops.

Unit III: Registers and combination circuits

Types of registers–Serial in serial out–Serial in parallel out–Asynchronous counters– Synchronous counters–Variable-resistor Networks–Binary ladders–A/D converter-simultaneous conversion.

Unit IV: Operational Amplifier

Introduction–Operational amplifier Symbol–Polarity Conventions–Ideal Operational amplifier–Virtual ground and summing point–Operational amplifier applications–Linear amplifier–Unity follower–Adder–Subtractor–Integrator–Differentiator.

Unit V: Oscilloscope

Introduction– Basic Principle –CRT Features–Block diagram of oscilloscope–Simple CRO–Vertical amplifier–Horizontal deflecting system–Trigger sweep CRO–Delayed in trigger CRO–Dual beam CRO–Dual trace oscilloscope block description–Measurement of frequency by Lissajou's method –Checking of diodes–Use of Lissajou's figure for phase measurement.

Text Book(s):

1. Digital Principles and Applications, D.P.Leech, A.P. Malvino, G.Saha, 8th Edition, McGraw Hill, (2016).

Unit I: 5.1-5.8, 2.1-2.2, 3.1-3.5, 3.7-3.8.

Unit II: 6.1– 6.8, 8.1–8.2, 8.5, 8.8,12.1-12.2,12.5

Unit III: 9.1-9.3, 10.1, 10.3, 11.1, 11.2, 11.5

2. Basic Electronics Solid State, B.L.Theraja, S.Chand & Co., (2001).

Unit IV: 31.18-31.30

3. Electronic Instrumentation – H.S. Kalsi – Tata McGraw Hill, 15th Reprint (2003).

Unit V: 7.1-7.8, 7.9, 7.10, 7.14, 7.15 upto 7.15.1 (only), 7.20, 7.23, 7.26, 7.30

Books for Reference:

1. Modern electronic instrumentation and measurement techniques, Albert D.Helfrick, William D.Cooper, PHI Learning Private Limited, (1990)
 2. A Text Book of applied electronics, R.S. Sheda, S.Chand & Co., (2003).
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Websites:

1. <http://ocw.uc3m.es/tecnologia-electronica/digital-electronics>
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